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Assisted home hemodialysis in Spain: findings from a national survey on implementation, barriers, and challenges

Hemodiálisis domiciliaria asistida en España: resultados de una encuesta nacional sobre implementación, barreras y desafíos

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ABSTRACT

Introduction: Assisted home hemodialysis (assisted HHD) has emerged as a strategy to expand access to home-based dialysis therapies in patients with chronic kidney disease who have functional limitations or difficulties performing the technique independently. However, data on its real-world implementation in Spain and on the profile of caregivers involved remain limited.
Methods: A national, structured, and anonymous survey was conducted under the auspices of the Home Hemodialysis Working Group of the Spanish Society of Nephrology. The survey was addressed to all home hemodialysis units in Spain. The questionnaire comprised 30 items distributed across six thematic sections and was completed by a single healthcare professional per center. It collected information on organizational aspects, characteristics of patients receiving assisted HHD, caregiver profile and burden, available resources, perceived benefits, and barriers to the implementation of structured assisted HHD programs.
Results: A total of 39 centers from 14 autonomous communities participated, most of them public hospitals. Overall, 311 prevalent patients on home hemodialysis were reported, of whom 26% were receiving assisted HHD. More than 30% of these patients were older than 70 years, and central venous catheters were the predominant vascular access. The main indications for assisted HHD were reduced mobility, fear of performing the technique independently, and cognitive impairment. Caregivers were predominantly family members and mostly female, with limited involvement of paid caregivers and scarce systematic assessment of caregiver burden.
Conclusions: Assisted HHD enables access to home hemodialysis in an older, frail population with functional limitations. However, its development in Spain remains heterogeneous and largely dependent on informal caregiving. Advancing toward structured assisted HHD models that incorporate appropriate funding, dedicated human resources, and formal caregiver support is essential to ensure equitable, safe, and sustainable implementation.

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RESUMEN

Introducción: La hemodiálisis domiciliaria (HDD) asistida constituye una estrategia emergente para ampliar el acceso a las terapias domiciliarias en pacientes con enfermedad renal crónica que presentan limitaciones funcionales o dificultades para realizar la técnica de forma autónoma. Sin embargo, existe escasa información sobre su implantación real en España y sobre el perfil de los cuidadores implicados.
Métodos: Se realizó una encuesta nacional, estructurada y anónima, promovida por el Grupo de Trabajo de HDD de la Sociedad Española de Nefrología, dirigida a todas las unidades de hemodiálisis domiciliaria en España. El cuestionario, compuesto por 30 preguntas en seis secciones temáticas, fue respondido por un único profesional por centro y abordó aspectos organizativos, características de los pacientes en HDD asistida, perfil y carga del cuidador, recursos disponibles, ventajas percibidas y barreras para la implementación de programas estructurados de HDD asistida.
Resultados: Participaron 39 centros de 14 comunidades autónomas, mayoritariamente hospitales públicos. Se reportaron 311 pacientes prevalentes en hemodiálisis domiciliaria, de los cuales el 26% recibían HDD asistida. Más del 30% de estos pacientes eran mayores de 70 años y el acceso vascular predominante fue el catéter. Las principales indicaciones para HDD asistida fueron movilidad reducida, miedo a realizar la técnica de forma autónoma y deterioro cognitivo. El perfil del cuidador fue mayoritariamente femenino y familiar, con escasa presencia de cuidadores contratados y limitada evaluación sistemática de su sobrecarga.
Conclusiones: La HDD asistida permite ampliar el acceso a la HDD en una población envejecida, frágil y con limitaciones funcionales, pero su desarrollo en España es heterogéneo y depende en gran medida del soporte informal del cuidador. Resulta necesario avanzar hacia modelos estructurados de HDD asistida que incluyan financiación, recursos humanos y apoyo formal al cuidador para garantizar una implantación equitativa, segura y sostenible.

Introduction

In recent years, there has been a progressive increase in the incidence and prevalence of home hemodialysis (HHD), both in Spain and across Europe.[1] This growth has been partly driven by technological advances associated with the introduction of low-flow monitors, which have significantly reduced installation costs compared to conventional systems. In addition, their greater ease of use, portability, and safety profile have contributed to greater acceptability of this modality among patients.[2,3] This has been further supported by the development of telemonitoring and remote follow-up systems, which have improved the safety and accessibility of HHD in routine clinical practice.[4]

The available evidence indicates that frequent low-flow hemodialysis schedules have survival outcomes not inferior to those of peritoneal dialysis (PD) and are associated with a significant improvement in health-related quality of life (HRQoL). Moreover, these modalities help preserve patient autonomy and are associated with additional clinical benefits, including better control of phosphorus, anemia, and blood pressure.[5–7] In this context, HHD is considered a particularly suitable option when chosen by the patient and when there are no contraindications to its use.

Nevertheless, despite these benefits and the increase observed in European registries, the overall uptake of home dialysis therapies remains limited. Currently, the combined share of HHD and PD represents approximately 5.8% of all patients on renal replacement therapy (RRT).[1] Spain follows the European trend, remaining among the countries with the lowest HHD uptake. Furthermore, significant territorial disparities exist: not all autonomous communities provide the same level of support for implementing these therapies, and in many cases access depends on the patient's reference hospital. This variability highlights the need to explicitly incorporate home dialysis therapies into strategic documents on chronic kidney disease (CKD) and to develop region-specific policies—in terms of training, funding, and infrastructure—to facilitate access for all potentially eligible patients.

From an operational standpoint, HHD requires a complex training process in which patients must acquire technical skills for circuit assembly, connection and disconnection, treatment delivery, and management of potential complications. This training is generally more demanding than that required for PD and consumes greater amounts of time and professional resources. As a result, it is not uncommon for physicians to restrict the offer of HHD to patients considered capable of completing this process independently, excluding individuals with frailty, physical limitations, or cognitive impairment.

In this context, assisted HHD emerges as a key driver for expanding the uptake of HHD. This modality is designed for patients who are unable to manage their treatment entirely independently, enabling them to benefit from HHD through partial or full support from a caregiver—whether a family member or a professional. Assisted HHD thus extends access to home dialysis therapies to patient profiles traditionally excluded on the basis of functional autonomy criteria. However, in the Spanish healthcare system, the role of the caregiver for renal patients is neither formally recognized nor structured, and there are no specific forms of support from the Spanish public healthcare system for the hiring of professional home caregivers or for family members who regularly assume this role.

Despite growing interest in assisted HHD, there is a notable lack of information on its real-world implementation in Spain, the profile of patients who receive it, and—particularly—on the characteristics, burden, and conditions of the caregivers involved. To address this knowledge gap, a national survey was designed, directed at healthcare professionals involved in HHD programs, aimed at describing the current status of assisted HHD in our country.

The aims of this study are: (a) to characterize the implementation of assisted HHD in Spain; (b) to describe the profile of patients and caregivers involved; and (c) to analyze the perceived advantages, barriers, and challenges to the development and expansion of assisted HHD programs.

Methods

In May 2025, the HHD Working Group of the Spanish Society of Nephrology (S.E.N.) designed and distributed a national survey to all hospitals with HHD programs in Spain, using standard communication channels.

The survey was structured, anonymous, and designed to be completed by a single person per center—either a nephrologist or a nurse with direct responsibility in the HHD program. All participating centers provided consent for the publication of aggregated results.

The questionnaire (Supplementary Material 1) consisted of 30 questions organized into six thematic sections:

1 General data on the healthcare professional surveyed: profession, type of center, and autonomous community.
2 HHD practice: number of patients in the program, indications for assisted HHD, type of vascular access, patient age and sex, and tasks requiring support.
3 Caregiver profile: number of caregivers per patient, type of assistance provided, relationship to the patient, age, sex, and employment status.
4 Caregiver support and assessment: use of caregiver burden or burnout scales, available resources, and perception of the adequacy of the support offered.
5 Perception of assisted HHD: perceived advantages, optimal timing for offering the technique, and barriers to implementation.
6 General opinion: ideal role of the caregiver within the healthcare model, additional comments, and consent for the use of data for research purposes.

Assisted HHD was defined as the modality in which the caregiver assumes the majority of technical tasks related to the treatment—preparation, programming, connection, and monitoring—distinguishing it from situations of non-technical or occasional support, such as accompaniment or logistical assistance with equipment.

Results were expressed as frequencies and percentages for categorical variables, and as median and interquartile range (IQR) for continuous variables.

Results

Center characteristics and HHD activity

A total of 39 centers participated in the survey, representing 14 of Spain's 17 autonomous communities. The regions with the highest participation were the Community of Madrid (8 centers), the Valencian Community (6), Catalonia (5), and Galicia (4). Almost all centers were public hospitals (97%).

Of the surveyed centers, 33 reported offering HHD whenever clinically feasible. The median number of patients treated per center over the past year was 6 (IQR: 3.5–12.5). Overall, the centers reported 311 prevalent patients in HHD programs at the time of the survey, with a median of 5 patients per center (IQR: 3–12).

Uptake of assisted home hemodialysis

Of the total prevalent patients receiving HHD, 26% (n = 81) were receiving assisted HHD, with a median of one patient per center (IQR: 1–3). More than 30% of these patients were older than 70 years, and the vascular access most frequently used was a central venous catheter, present in 90% of cases.

The main reasons identified for requiring assisted HHD were reduced mobility (27 cases), fear of performing the technique independently (21 cases), and mild cognitive impairment (3 cases); in 30 patients, other unspecified causes were recorded. The majority of patients had a single caregiver, although in 8 cases the involvement of two or more caregivers was required.

Degree of autonomy and tasks requiring support

Regarding the degree of autonomy, 39% of patients receiving assisted HHD needed full assistance to perform the technique. The tasks most frequently requiring support were vascular access connection or puncture (82.1%) and machine setup (58.9%). Other activities, such as vital sign monitoring or medication administration, required support less frequently.

Caregiver profile

The caregiver profile was predominantly female (74.4%), compared to 25.6% male. In the majority of cases, caregivers were family members—primarily partners (75%) and children (16%). Only 6.2% were paid caregivers.

Regarding age, 65.9% of caregivers were between 50 and 70 years old, and 15.3% were older than 70 years. In terms of employment status, 41.5% were retired and 37.8% were currently employed (Fig. 1).

Training, support, and caregiver burden

Regarding treatment management according to caregiver type, 33 centers reported differences in clinical practice. In 18 centers, the training process was described as different when conducted with a caregiver compared to the patient alone—being faster in the case of caregivers, though associated with specific fears and barriers.

Only 3 centers conducted systematic monitoring of caregiver burden using the Zarit scale[8] or private interviews, and 15 centers offered some form of psychological support. In 26 centers, institutional support for caregivers was considered insufficient or nonexistent. The main challenges identified were the risk of burnout, the lack of institutional support, and, in some cases, insufficient technical training (Fig. 2).

Barriers, advantages, and professional perception of assisted HHD

The main barriers identified by professionals to the implementation of structured assisted HHD programs were the lack of trained staff in centers, difficulties for families in assuming the technical role, costs associated with hiring home care personnel, and budgetary constraints in certain autonomous communities.

Among the most frequently cited advantages of HHD were greater patient comfort, improved quality of life, reduced risk of nosocomial infections, and greater patient empowerment and individualization of treatment. The majority of centers considered that assisted HHD should be understood as a shared responsibility between caregivers/family members and healthcare professionals, always with healthcare system support.

Discussion

This study represents the first national analysis to systematically describe the implementation of assisted HHD and the profile of the caregivers involved in Spain. Our findings provide a comprehensive overview of current practice, including the organization of programs, the characteristics of patients eligible for assisted HHD, the tasks requiring support, and the main structural barriers perceived by healthcare professionals. The participation of centers from 14 autonomous communities highlights a marked geographical and organizational variability in the provision of this therapeutic modality, with a clear predominance of the public healthcare model.

Despite the well-documented benefits of home hemodialysis, its uptake in Spain remains limited compared to other European countries with a longer tradition in home dialysis therapies. In countries such as Denmark, Finland, the Netherlands, Sweden, and the United Kingdom, HHD prevalence reaches between 2.7% and 5.7% of all patients on dialysis—figures notably higher than those historically observed in our country.[9] Nevertheless, European registries confirm that, although the incidence and prevalence of home dialysis modalities have increased in recent years in some countries, their overall penetration remains low.[1] In our cohort, the majority of surveyed centers offered HHD whenever clinically viable, reflecting a growing interest among nephrologists in prioritizing home dialysis

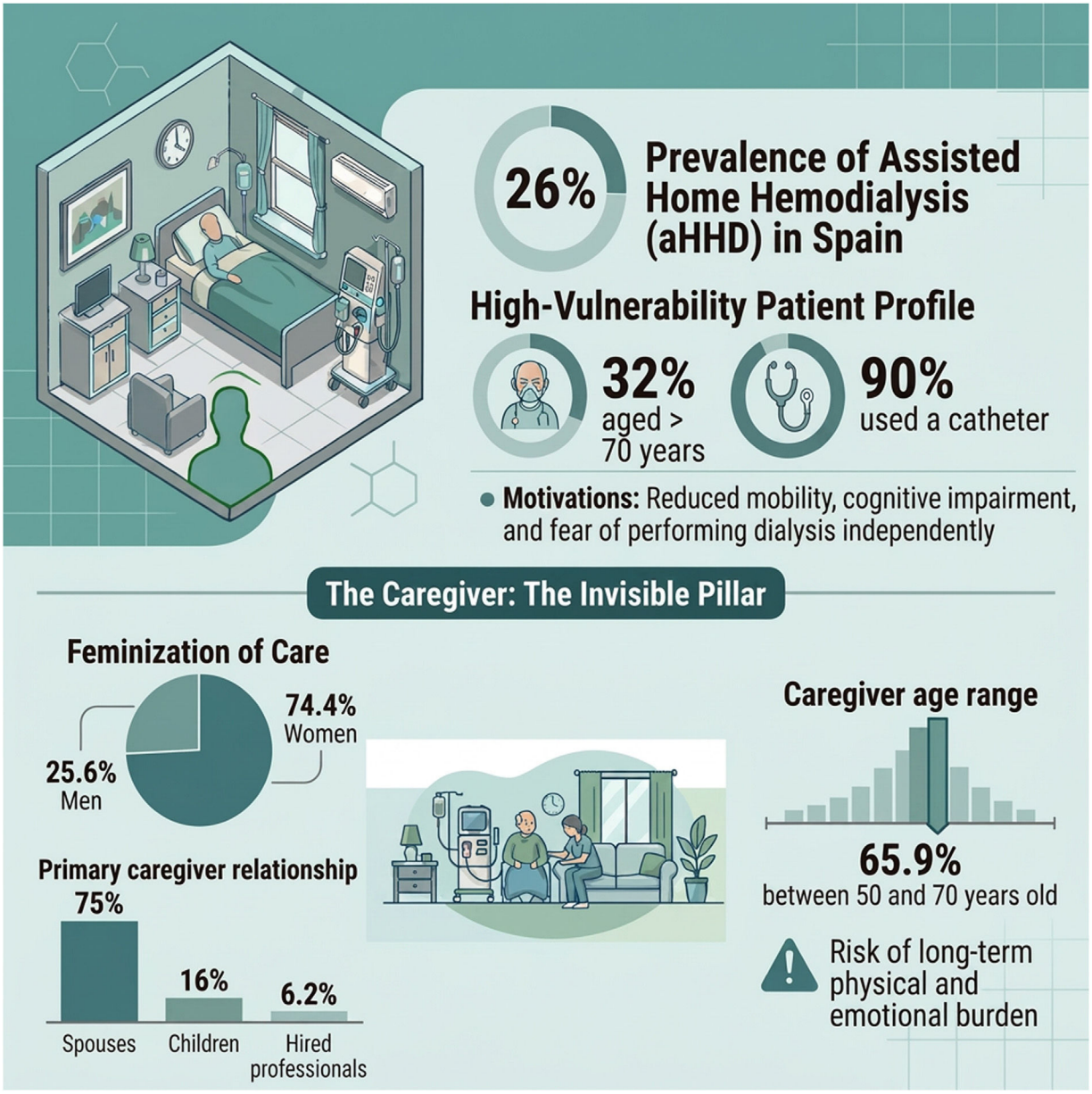

Figure 1. Clinical and social profile of patients on assisted home hemodialysis (assisted HHD) and their caregivers in Spain.

therapies. However, these results should be interpreted with caution, as selection bias is possible given that the participating centers were primarily those with active HHD programs.

From a clinical and operational perspective, HHD is a technically demanding modality that requires specific skills, learning capacity, and manual dexterity, which limits access for patients with physical disability, cognitive impairment, or functional frailty. In this context, assisted HHD emerges as a key tool to expand access to home dialysis, enabling patient profiles traditionally excluded on the basis of autonomy criteria to benefit from this modality. Our results show that the need for assistance is concentrated in older patients, with more than 30% of those receiving assisted HHD being older than 70 years, and with a predominant use of vascular catheters. This pattern is consistent with other studies describing greater functional dependence and more frequent catheter use in older patients or those with greater comorbidity, with the aim of facilitating clinical management and reducing initial technical complications.[10,11]

The main reasons for requiring assisted HHD in our study were reduced mobility, fear of performing the technique independently, and cognitive impairment—findings consistent with the literature describing greater physical and emotional support needs in elderly or frail patients.[12] The finding that almost 40% of patients in assisted HHD required full assistance to perform the technique underscores the importance of structuring specific caregiver support programs, given that the patient's degree of dependence is closely associated with the burden assumed by the primary caregiver.[13]

One of the most relevant findings of the study is the caregiver profile. Consistently with data from the National Statistics Institute, our results show a predominance of female caregivers, mostly family members—primarily partners and children—and a very low proportion of paid caregivers.[14] The advanced age of caregivers, with 15.3% older than 70 years, raises important considerations regarding their own physical and emotional frailty, as well as the risk of caregiver burden. It is particularly notable that only three centers conducted systematic monitoring of caregiver burden, which represents a clear call to action regarding a dimension that remains poorly integrated into clinical practice.[15]

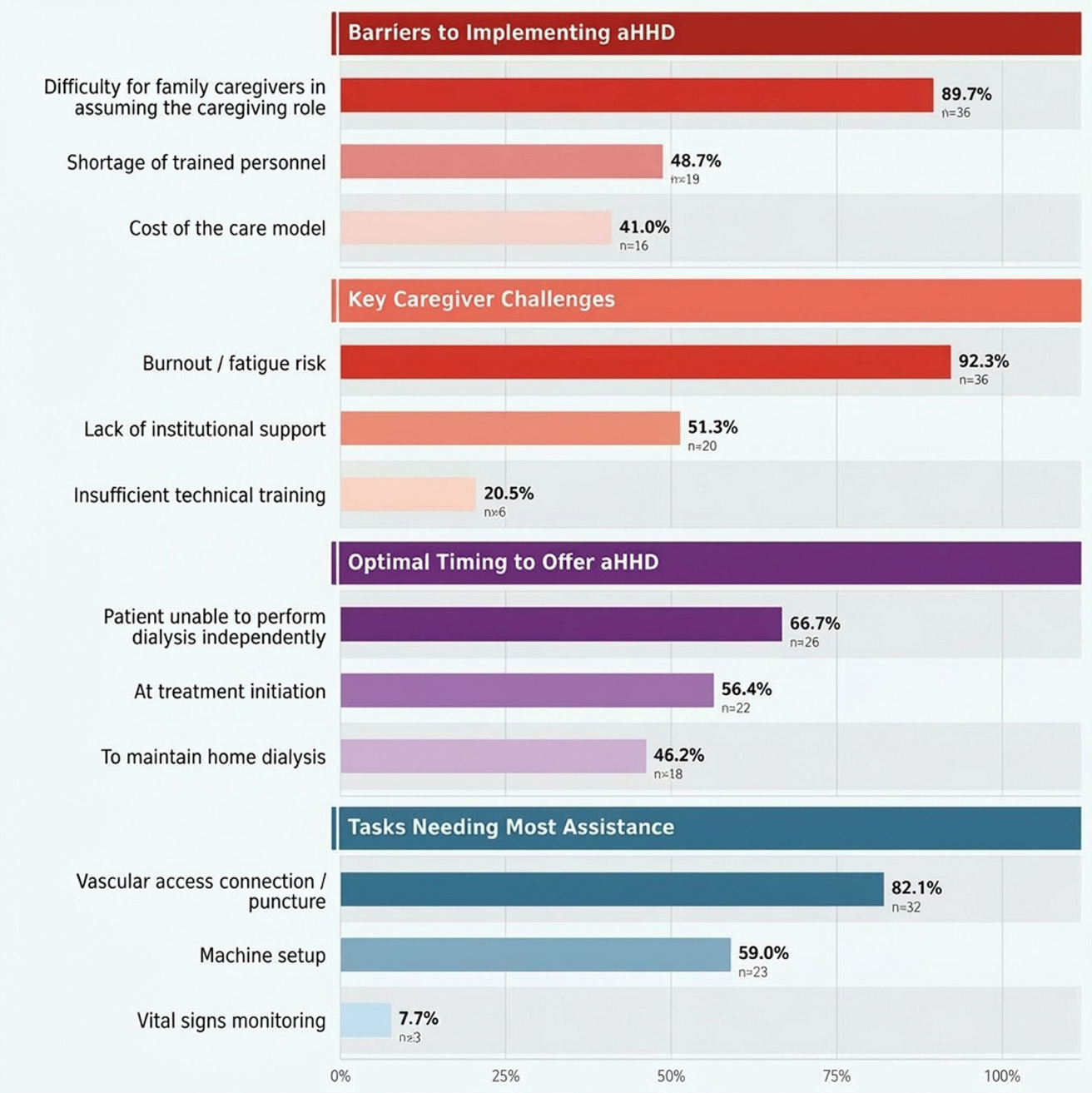

Figure 2. Barriers, challenges, indications, and tasks associated with assisted HHD according to participating centers.

Currently, 'non-professional caregivers' of patients on assisted HHD do not have specific institutional support within the Spanish healthcare system, except in cases where formal recognition of dependency status exists.[16] For caregivers of renal patients without recognized dependency, no assistance currently exists to alleviate the burden this may entail, both at a personal and professional level. The widespread perception of insufficient or nonexistent institutional support, reflected in our survey, translates into an elevated risk of burnout and a burden that affects both the personal and professional sphere of the caregiver. These data reinforce the need for assisted HHD models that incorporate formal caregiver support from both a training and emotional perspective, with the aim of reducing burden and improving clinical and psychosocial outcomes for all those involved.

From a practical standpoint, the tasks most frequently requiring support were those of greatest technical complexity, such as vascular access connection or puncture and machine assembly. This finding aligns with routine clinical experience and highlights the need for training strategies specifically tailored to the caregiver profile. Although training programs with caregivers were perceived as faster than those aimed at the patients themselves, they were also associated with specific fears and barriers, suggesting the value of structured and differentiated educational programs.

The benefits of HHD are well documented and include greater patient comfort, improved quality of life, reduced risk of nosocomial infections, and greater empowerment.[17] Assisted HHD could enable a greater number of patients to access these benefits. However, barriers

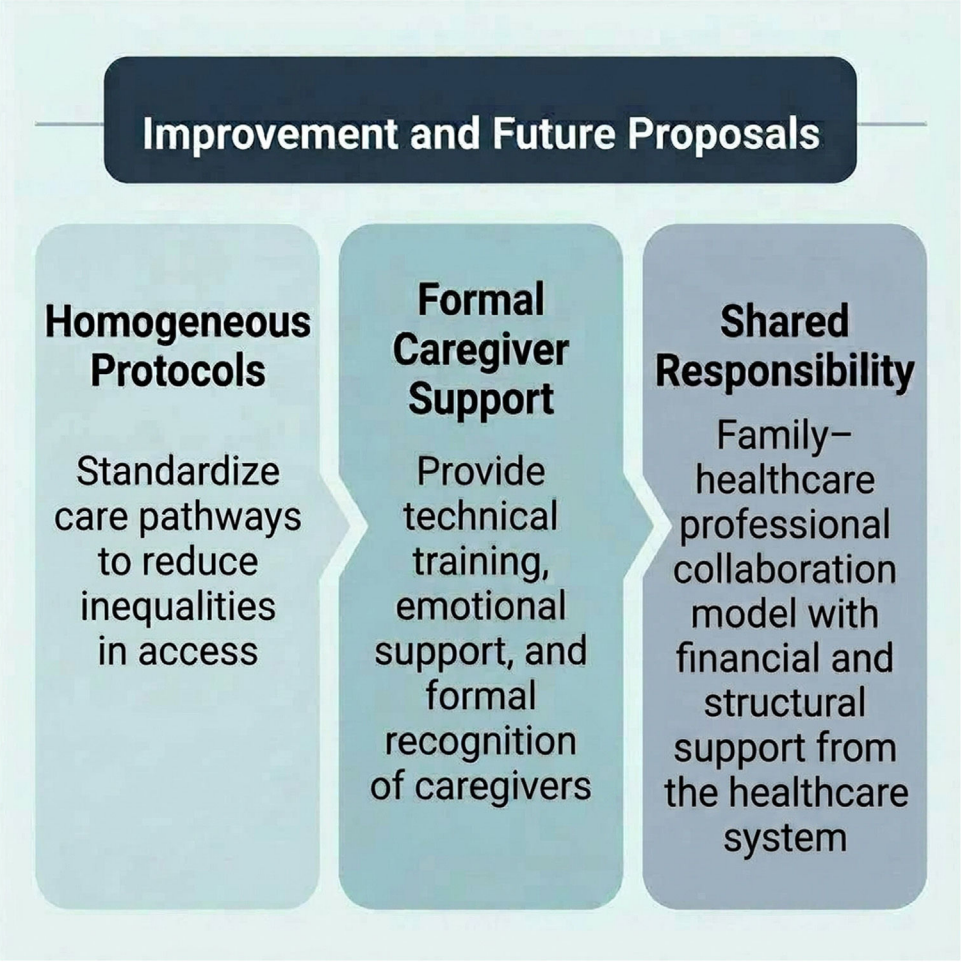

Figure 3. Proposed improvements for the development of assisted home hemodialysis.

to its implementation are multiple and are not limited to the clinical domain. Family difficulties in assuming the technical role, lack of trained personnel, associated costs, and regional budgetary constraints highlight that this is an organizational and socioeconomic challenge. Previous European studies have indicated that the adoption of home dialysis is conditioned by the heterogeneity of healthcare policies, the absence of clear incentives, and the lack of care structures adapted to the home setting.[18]

In this context, the majority of surveyed centers considered that assisted HHD should be understood as a shared responsibility among caregivers, family members, and healthcare professionals, with the backing of a robust public healthcare system. The development of structured assisted HHD programs requires continuous training, remote clinical support, systematic supervision, and specific funding (Fig. 3). Advancing toward a national assisted HHD program integrated into healthcare planning would not only facilitate access to HHD for patients without a caregiver through professional home support, but would also provide training, support, and follow-up for existing caregivers, contributing to a more equitable, efficient, and patient-centered model.

This study has several limitations. First, it should be noted that this is a descriptive study whose primary objective is to characterize and make visible the clinical reality of HHD in Spain from the perspective of healthcare professionals, rather than to establish causal relationships or inferential associations. The questionnaire used has not been previously validated and is based on the perceptions of professionals, with the inherent risk of response bias. Furthermore, voluntary participation and the potentially greater commitment of surveyed centers to HHD programs may limit representativeness and overestimate the real availability of HHD in Spain. The absence of individual clinical data precludes the establishment of causal associations and requires results to be interpreted as a description of current practice.

Despite these limitations, the study addresses one of the most relevant gaps in the current healthcare system by placing the focus on the caregiver—traditionally underrepresented but increasingly essential in a context of aging and growing dependency. Our findings reinforce a key message: the caregiver is a fundamental pillar of the home care model, and adequate training, support, and institutional recognition are essential to ensure the sustainability and quality of assisted home hemodialysis in Spain.

Future studies should incorporate the direct perspective of patients and caregivers to complement the findings obtained from the professional domain.

Conclusions

Assisted HHD represents an emerging modality in Spain that extends access to home dialysis therapies to frail patients with functional limitations who would otherwise be excluded from these options. Its development constitutes a relevant opportunity to advance toward a more equitable, patient-centered, and home-oriented care model.

The consolidation of assisted HHD requires the implementation of organizational strategies at the national level, including specific funding, adequate human resources, and structured professional support. These measures are essential both to facilitate access for

patients without a caregiver and to provide training, support, and follow-up for existing caregivers, thereby ensuring a safe, equitable, and sustainable expansion of this treatment modality within the Spanish healthcare system.

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Declaration of competing interest

EGM and JP have received funding for congresses from Palex; MAB has received honoraria for lectures, consultancy, or travel support from Fresenius Medical Care, Laboratorio Rubió, SPA Farma Ibérica, and CSL-Vifor. The remaining authors have no conflicts of interest related to the content of this article.

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Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at doi:https://doi.org/10.1016/j.nefroe.2026.501578.

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