


Home Hemodialysis: Unraveling Truths and Myths

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INTRODUCTION

Renal replacement therapies (RRT) require a high cost for health systems. Therefore, its choice and use depend largely on the available resources, however, this is not the only factor involved.¹

According to data provided by the Portuguese Society of Nephrology's Chronic Kidney Disease Registry, hemodialysis (HD) was the most performed dialysis treatment in 2023, with around 13 000 prevalent patients distributed across 139 HD Centers in the country; secondly, peritoneal dialysis (PD) was performed by 889 patients integrated in 26 PD Units; and, finally, home hemodialysis (HHD) with a total of only 9 patients performing the modality, in October 2024.²⁻⁴ HHD is a technique that has proven benefits for certain patients with end-stage renal disease (ESRD) and a favorable long-term cost-benefit ratio. Nevertheless, this modality is clearly underused in Portugal and worldwide.^{5,6} This leads to a loss of knowledge and experience, which contributes to a vicious cycle of perpetuating HHD underuse. It is, therefore, important to identify obstacles and address solutions to modify this reality.⁷

HISTORICAL REVIEW

HHD was first performed in Japan in 1961, and in 1964 the first HHD machine was introduced to the United States of America (USA).⁸ Later, HHD programs were created in Boston and London, respectively, and quickly spread to France and Italy.⁸ In 1967, in Seattle, all incident HD patients were initiated in HHD and patients in HD center were transferred to HHD, leading to the creation of an HHD training center. It became the preferred modality in the early 1970s in the USA as it became safer and more economical compared to in-center HD.⁸ However, in 1972, when about 50% of all dialysis patients were on HHD, an addendum to an American law led Medicare® to assume

responsibility for the payment of chronic dialysis, which ended up favoring the development of for-profit dialysis centers. The lack of financial investment, the complexity of technique training and of remote medical support contributed to the decline of HHD.⁹

After decades of fall, while studies demonstrated clear advantages of HHD, as well as a favorable cost-effectiveness ratio, interest in this modality began to increase again, with HHD machines becoming safer, more efficient and simpler to operate.¹⁰ In 2020, Medicare and Medicaid announced the ESRD Choice of Care Financing Model, which provides bonus payments for HHD for three years. In the last decade, HHD prevalence increased from 0.4% to 2.0% in the USA, corroborating the great impact of financial investment in this modality.⁸ Worldwide, it is highly variable, corresponding to about 18% of all performed dialysis in New Zealand, 9% in Australia, 3%-6% in Canada and Western Europe, with other countries having less than 3%.¹⁰ Currently, Portugal has 2 active HHD programs. In 2005, NephroCare® created the Home Autonomous Dialysis Unit at the Lumiar Clinic in Portugal. By 2024, twenty-six patients had undergone HHD; the maximum number was reached in 2012, with 15 patients simultaneously performing this modality, and kidney transplantation was the main reason for drop-out.³ More recently, ULS São João developed a pilot HHD project in May 2024, through funding obtained by the Integrated Responsibility Center that manages the Valongo HD Unit.

IMPROVING ACCESS TO HOME HEMODIALYSIS: OBSTACLES AND SOLUTIONS

Motivation

Patient motivation is the most important factor in reaching a successful HHD program. This is influenced not only

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by how the patient faces their illness but also by the way it impacts on their physical, psychological and social well-being, which, in the end, are necessarily affected by the support given by family members and/or caregivers during the process.⁵⁻⁷ However, it is essential that psychosocial issues related to the patient and care partner burden be prevented through proactive professional, peer and financial support.¹¹

The option for HHD is frequently based on the desire to avoid medical environments, by patients who have spent a huge part of their lives in hospitals, by the wish to be closer and longer with their families, in a comfortable environment; by the possibility of managing their schedules with greater flexibility; by the will to maintain an active professional life; by the need to feel self-empowerment, control, management capability and autonomy preservation; which in the end, culminates in better quality of life and well-being.¹⁰

Capability

The candidate's most preponderant skills for successfully performing HHD are responsibility, discipline, organization, motivation and interest. Despite that, not all patients are eligible for HHD as there are factors that might compromise the safety and efficacy of the treatment, such as: the inability of the patient or caregiver to make decisions or follow instructions, a serious psychiatric illness, the chronic use of sedative medication, a significant neurological disorder, the presence of dementia or encephalopathy, and the inability to self-cannulate in the absence of third parties who can do so.⁵

Education

Once there is the desire of the patient to be an active part of their treatment, in the absence of contraindications, any misconceptions and myths about HHD, frequently spread among patients and healthcare professionals, must be promptly addressed and corrected.⁵ Here are some examples:

- i. The patient's inability to self-cannulate cannot be promptly admitted as an obstacle, as, with adequate training, it can be achieved and optimized. To this end, HHD programs should widely be included across all HD Centers, bridging for the potential lack of infrastructure for HHD training and follow-up.
- ii. The patient's fear of failing, lack of confidence in self-management, and fear of being alone can be overcome by adequate education and training. Additionally, the implementation of a "buddy system" allows the sharing of experiences between patients, which gives them validation and increases their confidence. Also, telemedicine and remote monitoring allow for rapid problem resolution in case of need while avoiding unplanned home visits by healthcare professionals.
- iii. HHD should be addressed at an early phase of the education and training of the healthcare professionals, to

increase motivation and interest in this modality, because without motivated teams HHD is not impossible, as well.

Preparation

The possibility of HHD should be addressed in a timely manner during the consultation where the patient is evaluated and informed about the RRT suitable for them, in order to allow for timely managing, teaching and training, particularly in the case of home therapies.⁵

The lack of space at home or absence of a permanent residence might present itself as a potential obstacle in this phase, which can be possibly managed by the Social Services in a timely manner.⁵

Benefits, Costs and Funding

Summing up to all of the abovementioned advantages obtained from HHD, more benefits have been demonstrated, and these are closely related to a reduction in healthcare costs^{12,13}:

- i. Reduction in medication load, as these patients have better control of blood pressure, less left ventricular hypertrophy, less anemia, less hyperphosphatemia, less malnutrition, thereby decreasing the need for epoetin stimulating agents, other anemia therapies, and bone mineral disease-related treatments;
- ii. Reduction in hospitalizations due to congestive cardiac failure, related to volume overload, hyperkalemia and infections originated in the healthcare setting;
- iii. Reduction in transportation costs;
- iv. Fewer symptoms of fatigue after HD sessions and better functional status to maintain an active professional life, contributing to society's economic growth;
- v. Proven benefits of HHD on patients' longevity and quality of life.

In the end, patients' and healthcare professionals' motivation is not sufficient if there is no funding for the modality. It is, therefore, crucial to encourage investment by the public and private healthcare providers who currently pay for HD treatments in Portugal, presenting the aforementioned advantages and the cost-benefit that is achieved in the long term, avoiding patients' financial burden.¹¹ It is expected and desired that the bundled payment will, eventually, be changed to a more dynamic and individualized value, capable of meeting the particularities of each patient.¹⁴

Specific indications

Patients with clear benefits from more frequent or more physiological HD sessions^{5,13}:

- i. refractory hypertension or hyperphosphatemia;
- ii. frequent intradialytic hemodynamic instability;
- iii. excessive interdialytic weight gains;
- iv. prolonged recovery times after in-center HD sessions;
- v. inadequate control of uremic symptoms;

- vi. PD failure and the patient's desire to maintain a home technique;
- vii. pregnancy, as daily and longer treatments have been shown to improve maternal and fetal outcomes¹⁵;
- viii. postpartum, as it allows for the mothers to not separate from their children when they need to perform the HD treatments.

HOME HEMODIALYSIS IN PORTUGAL

Until the end of October 2024, only nine patients were performing HHD across Portugal: seven patients at the NephroCare Lumiar Unit (using the Fresenius 5008® dialysis monitor) and two patients at the Valongo HD Unit in ULS São João (using the Physidia S3® monitor) - which corresponds to less than 1% of the RRT performed in Portugal.^{3,16} At both units, patients and/or assistants or caregivers undergo a variable training period, after which

the technique is fully transferred to their homes. Patients maintain 24-hour access via telephone to the Nursing team. Monthly on-site clinic visits are performed for laboratory evaluation, monitoring HD performance by the patient, and assessment of vascular access.^{3,4,16}

CONCLUSION

The effectiveness, safety and cost-benefit of HHD have been demonstrated. In Portugal, lack of funding is an identified obstacle to improving access to this modality. This leads to a lack of knowledge, interest, training and experience from healthcare professionals. Patients should not be deprived of this option, as it has been proven to increase their longevity and quality of life, particularly while waiting for a kidney transplant. Therefore, it is crucial to improve education and investment in HHD, and healthcare providers have a preponderant role.

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CC: Drafted the manuscript

MN: Provided a critical review of the manuscript

All authors approved the final version to be published.

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REFERENCES

- Karopadi AN. Analysis of Costs in Renal Replacement Therapy. *Perit Dial Int.* 2017;37:497-9. doi: 10.3747/pdi.2017.00066.
- Sociedade Portuguesa de Nefrologia, Gabinete de Registo da Doença Renal Crónica. Registo Português da DRC sob Tratamento de Substituição Renal 2023 [accessed 01/11/2024]. Available from: <https://www.anadiadial.pt/wp-content/uploads/2024/03/registo-nacional-de-doenca-renal-chronica.pdf>.
- NephroCare Portugal. Diálise Autónoma Domiciliária [accessed 12/10/2024]. Available from: <https://www.nephrocare.pt/doentes/opcoes-de-tratamento/dialiseautonomadomiciliaria02>.
- Portal da ULS João. Centro de Responsabilidade Integrado possibilita criar solução de hemodiálise domiciliária 2024 [accessed 12/10/2024]. Available from: <https://portal-chsj.min-saude.pt/noticia/centro-de-responsabilidade-integrado-possibilita-criar-solucao-de-hemodialise-domiciliaria-como-resposta-as-necessidades-de-um-utente-71>.
- Bieber SD, Young BA. Home Hemodialysis: Core Curriculum 2021. *Am J Kidney Dis.* 2021;78:876-85. doi: 10.1053/j.ajkd.2021.01.025.
- Kerr PG, Jaw J. Home Hemodialysis: What Is Old Is New Again. *Contrib Nephrol.* 2017;190:146-55. doi: 10.1159/000468961.
- Agar J, Schatell D, Walker R. Home hemodialysis needs you! *Hemodial Int.* 2015;19:S4-S7. doi: 10.1111/hdi.12283
- Talluri S, Lohani S. The Rise, Fall, and New Rise of Home Hemodialysis. *ASN Kidney News.* 2021;13:20.
- Blagg CR. A brief history of home hemodialysis. *Adv Ren Replace Ther.* 1996;3:99-105. doi: 10.1016/s1073-4449(96)80048-3.
- Walker RC, Howard K, Morton RL. Home hemodialysis: a comprehensive review of patient-centered and economic considerations. *Clinicoecon Outcomes Res.* 2017;9:149-61. doi: 10.2147/ceor.s69340.
- Bennett PN, Schatell D, Shah KD. Psychosocial aspects in home hemodialysis: A review. *Hemodialysis International.* 2015;19:S128-S34. doi: 10.1111/hdi.12258.
- Young BA, Chan C, Blagg C, Lockridge R, Golper T, Finkelstein F, et al. How to overcome barriers and establish a successful home HD program. *Clin J Am Soc Nephrol.* 2012;7:2023-32. doi: 10.2215/cjn.07080712.
- UpToDate. Choosing home hemodialysis for end-stage kidney disease 2023 [accessed 06/10/2024]. Available from: <https://www.uptodate.com/contents/choosing-home-hemodialysis-for-end-stage-kidney-disease>.
- Costa E, Pestana J. Preço Compreensivo da Hemodiálise em Portugal 2024 [accessed 20/11/2024]. Available from: <https://www.anadiadial.pt/wp-content/uploads/2024/02/Relatorio.pdf>.
- Copur S, Berkkan M, Basile C, Cozzolino M, Kanbay M. Dialysis in Pregnancy: An Update Review. *Blood Purif.* 2023;52:686-93. doi: 10.1159/000531157.
- Notícias RTP. Equipamento móvel leva hemodiálise a casa de doentes renais. 2024. [accessed 24/10/2024]. Available from: https://www.rtp.pt/noticias/pais/equipamento-movel-leva-hemodialise-a-casa-de-doentes-renais_v1605306