National Trends in Hemodialysis Vascular Access in Portugal: Insights from a Comprehensive Registry

SPN Interventional Nephrology Working Group, with the collaboration of the SPN Registry Office

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Abstract

Introduction: Vascular access (VA) is a key determinant of outcomes in hemodialysis (HD). Real-world VA practice patterns are central to improving HD care, but few countries maintain national VA registries. The recent integration of a dedicated VA dataset into the Portuguese Society of Nephrology (SPN) Chronic Kidney Disease (CKD) Registry enables a detailed assessment of current national patterns.

Methods: Retrospective observational analysis of the SPN national CKD Registry, focusing on incident and prevalent HD patients in 2024 and 2025, complemented by temporal trends since 2014.

Results: A total of 2209 and 2203 patients initiated HD in 2024 and 2025, respectively. CVC use at HD initiation remained high (60.5% in 2024; 61.8% in 2025), continuing an upward trend over the past decade. Among prevalent patients, CVC prevalence rose from 19.2% to 20.4%, while arteriovenous fistula use declined slightly (73.3% to 71.9%). Substantial inter-center variability persisted, with 59 units reporting CVC rates higher than 20% at the end of 2025. Hospital-based units consistently showed higher prevalent CVC use than peripheral units. The VA thrombosis rate was 0.081 and 0.085 events per patient-year in 2024 and 2025, respectively.

Conclusion: CVC use in Portuguese HD patients remains high and continues to increase, particularly at dialysis initiation, despite recognition of its adverse impact. Substantial inter-center and inter-regional variability highlights important differences in practice patterns and ongoing structural challenges. These findings support the need for registry-driven benchmarking, monitoring of first VA at hospital level, and targeted national strategies tailored to regional realities.

Keywords: Arteriovenous Fistula; Catheterization, Central Venous; Kidney Failure, Chronic; Renal Dialysis; Vascular Access Devices

INTRODUCTION

Vascular access remains one of the most critical determinants of outcomes in hemodialysis (HD), with arteriovenous fistulas (AVFs) being associated with lower infection rates, reduced mortality, and improved long-term patency compared with central venous catheters (CVCs).[1] Although arteriovenous access is the preferred option, it carries a high early failure rate, particularly in elderly patients.[2] Consequently, despite recognizing the AVFs favorable safety and outcome profile, more recent recommendations focus on a more patient-centered approach, favoring a more judicious placement of AVFs. The increasing number of elderly (and frail) end-stage kidney disease patients, with multiple comorbidities and limited vascular access options, are other causes of the widespread use of catheter as a HD vascular access.[3]

The Dialysis Outcomes and Practice Patterns Study (DOPPS), which analyzed data from 20 countries, reported AVF use ranging from 19% to 84% in incident HD patients and from 49% to 92% in prevalent HD patients.[4] Data from the ERA Registry, which aggregates several European national registries, consistently show a progressive increase in CVC use over time — both at HD initiation and among prevalent patients — alongside a decline in AVF use. In earlier analyses, CVC use at HD initiation rose from 58% to 68%, while AVF use fell from 42% to 32%, with prevalent CVC use rising to approximately 28%–32%.[5] Both vascular access choice and patient outcomes appear to be influenced by patient-related factors,[6] as well as by local and organizational factors.

A major limitation in improving vascular access outcomes globally is the lack of high-quality data. Although

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randomized controlled trials (RCTs) remain the gold standard for informing clinical recommendations, real-world evidence is increasingly recognized as a valuable complementary source. Real-world studies more accurately reflect routine clinical practice and encompass more heterogeneous patient populations. In this context, national registries provide population-level data directly relevant to the target population of these recommendations and may play a pivotal role in improving clinical outcomes.[6,7]
The Interventional Nephrology Workgroup of the Portuguese Society of Nephrology (SPN) has developed a comprehensive vascular access dataset within the SPN national CKD Registry. This provides a unique opportunity to thoroughly evaluate national practices and evolving trends over time, contributing to the optimization of clinical outcomes. This study aims to characterize vascular access practices in Portugal, compare findings with international benchmarks, and analyze temporal trends, while also identifying structural levers for improvement.

METHODS

Retrospective observational study using anonymized aggregated data from the SPN National CKD Registry.

Patients

Incident and prevalent HD patients from 2015 to 2025. Newly collected variables (catheter sub-type, reasons for CVC, thrombosis events) were available from 2024 onwards, following the integration of the Interventional Nephrology Workgroup VA dataset into the registry.

Definitions

Operational definitions

- AVF — autologous arteriovenous fistula ("FAV" in the Portuguese registry).
- AVG — arteriovenous graft ("PAV" in the Portuguese registry).
- TCC — tunneled cuffed catheter ("CLD" in the Portuguese registry).
- NTC — non-tunneled ("provisional") catheter ("CVCp" in the Portuguese registry).
- CVC — umbrella term for TCC + NTC.
- Hospital-based unit — dialysis unit located within a public hospital under the National Health Service (SNS).
- Peripheral unit — outpatient dialysis unit, predominantly within the private network providing services to the SNS.

Outcomes

(i) Type of vascular access at HD initiation; (ii) distribution of vascular access types in prevalent patients; (iii) CVC prevalence and reported underlying reasons; (iv) inter-center and inter-regional variability; (v) vascular access thrombosis rate, expressed as events per patient-year.

Statistical Analysis

Categorical variables are presented as absolute numbers and proportions; continuous variables as means. Between-group comparisons of proportions were performed with the χ^2 test (Fisher exact test where cell counts were <5). A two-sided *p*-value <0.05 was considered statistically significant. Given the aggregated nature of the registry, no patient-level multivariable adjustment was possible.

RESULTS

Study Population

Table 1. Incident and prevalent HD population, 2024 and 2025

Year	Incident HD patients	Missing data	Prevalent HD patients	Missing data
2024	2209	34	13 177	230
2025	2203	17	13 076	72

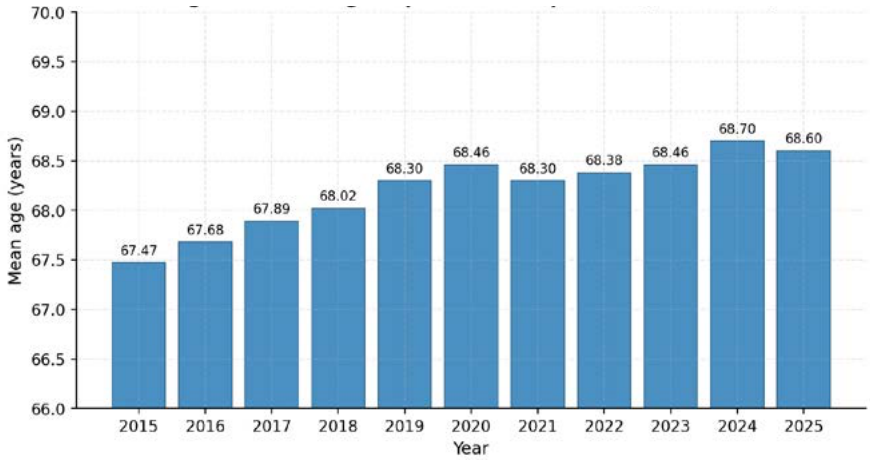

Figure 1. Mean age of prevalent HD patients at the end of each year (2015–2025). The HD population has progressively aged, from a mean of 67.5 years in 2015 to 68.6 years in 2025.

Incident Population: Vascular Access at HD Initiation

CVC use at HD initiation has shown a sustained upward trend over the last decade, rising from 54.8% in 2015 to 61.8% in 2025 (Fig. 2). The distribution of access types in incident patients (Fig. 3) shows a corresponding decline in AVF use, from a peak of 42.8% in 2016 to 37.9% in 2024. The contribution of non-tunneled (provisional) catheters at initiation also increased over the most recent years.

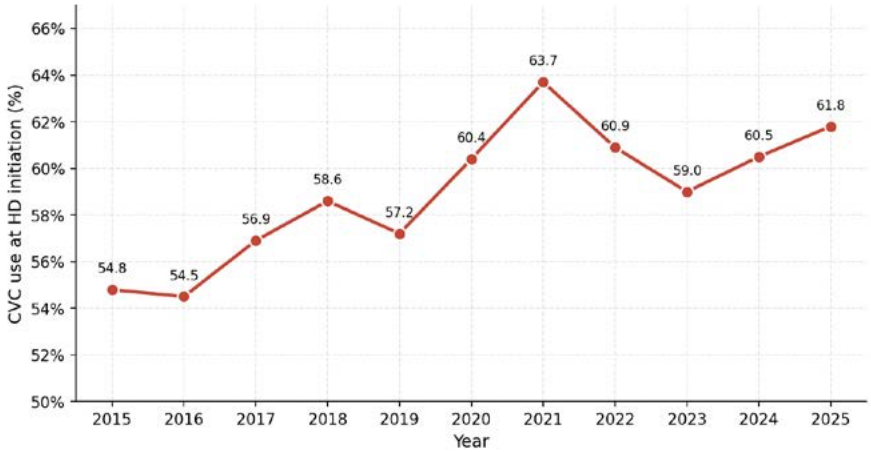

Figure 2. Trend in CVC use at HD initiation (2015–2025).

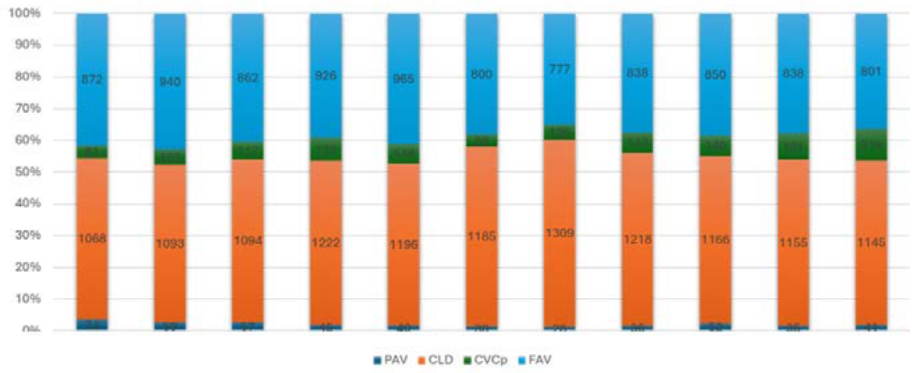

Figure 3. Distribution of vascular access types in incident HD patients (2015–2025).

Substantial inter-regional differences were observed at HD initiation in 2025 (Fig. 4). AVF use ranged from 26.3% (Madeira) to 45.4% (Norte), with the national mean at 34.4%.

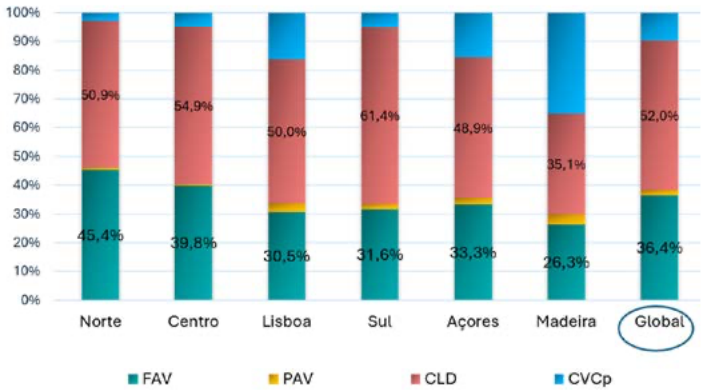

Figure 4. Incident vascular access type by geographical region (2025).

Prevalent Population: Vascular Access Distribution and CVC Use

Among prevalent HD patients, AVF remained the predominant vascular access throughout the study period, with a relatively stable prevalence of approximately 73%. Although the proportion decreased slightly to 71.9% in 2025 (from 73.3% in 2024; Fig. 5), it is unclear whether this represents the beginning of a sustained trend or simply year-to-year variation. In contrast, AVG use declined more substantially over the study period, falling from approximately 11% in the first year to around 7.5%, where it has since stabilized. While CVC prevalence increased over the same period (from 19.2% to 20.4%), this rise was of considerably smaller magnitude than the decline in AVG use, suggesting that the reduction in AVGs was not simply offset by greater CVC utilization.

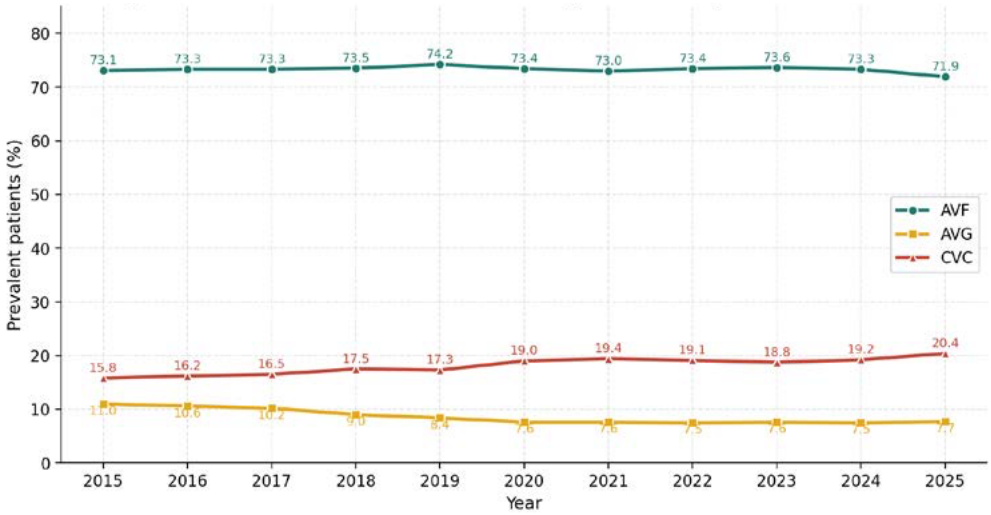

Figure 5. Distribution of vascular access in prevalent HD patients (2015–2025).

Regional differences in prevalent VA distribution (Fig. 6) were also substantial, with AVF use ranging from 59.8% (Madeira) to 80.3% (Norte) in 2025. Hospital-based units showed lower AVF use and higher CVC prevalence than peripheral units (Fig. 7).

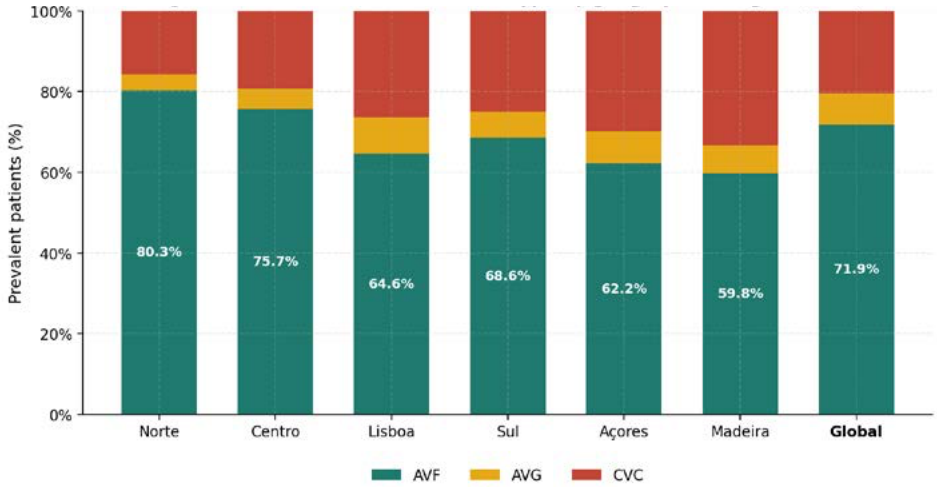

Figure 6. Prevalent vascular access type by geographical region (2025).

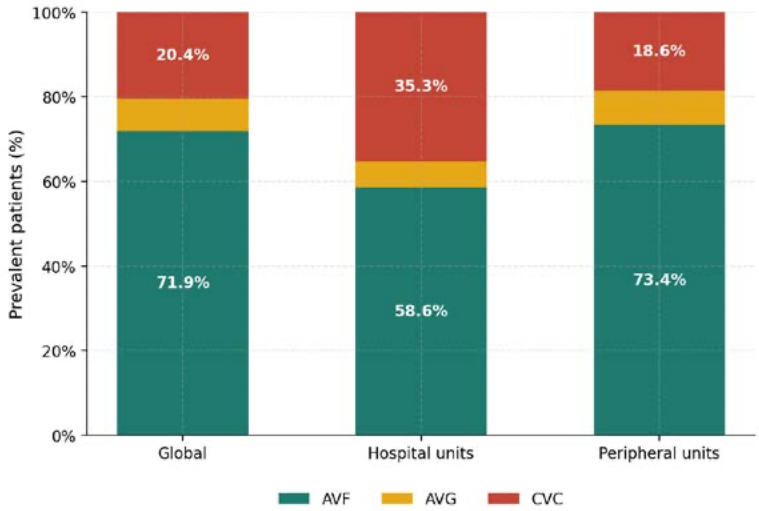

Figure 7. Prevalent vascular access type by unit type (2025).

Inter-Center Variability

Inter-center variability in CVC prevalence was substantial. At the end of 2025, 59 of the participating units reported CVC prevalence >20%, while only 11 units achieved a CVC prevalence <10% (Fig. 8; national mean 20.4%). The variability was particularly marked among hospital-based units (Fig. 9; national mean 35.3%; 20 units >20%, 1 unit <10%) and remained important among peripheral units (Fig. 10; national mean 18.6%; 40 units >20%, 10 units <10%).

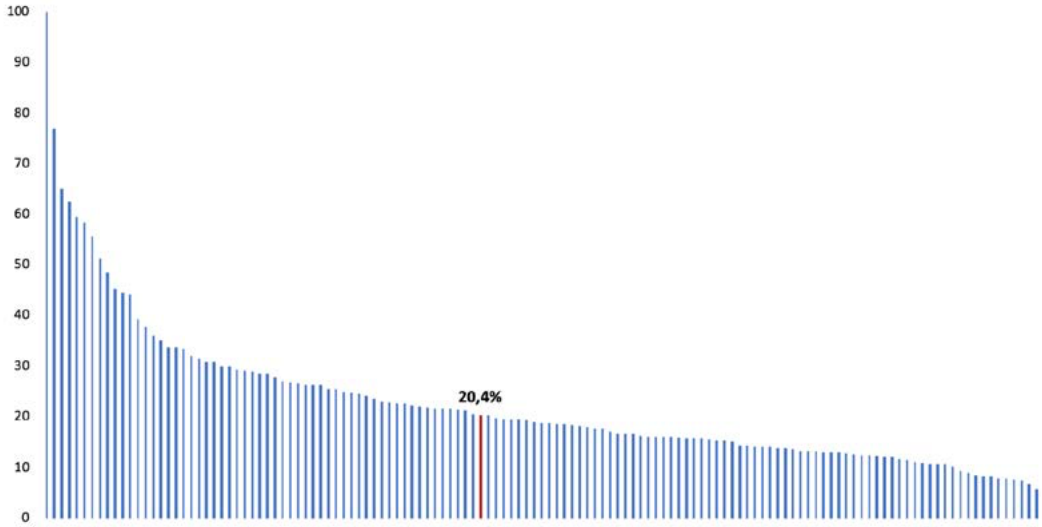

Figure 8. CVC prevalence by dialysis unit, end of 2025.

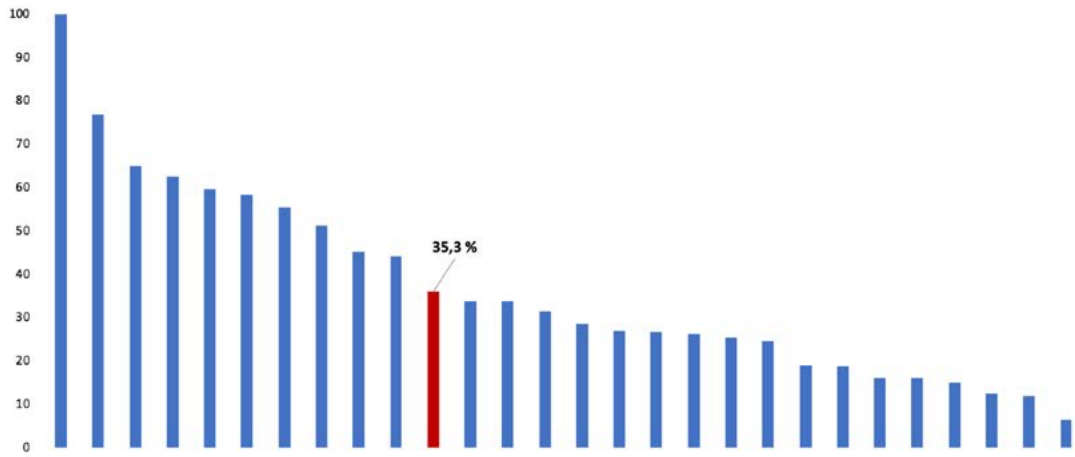

Figure 9. CVC prevalence in hospital-based dialysis units, end of 2025.

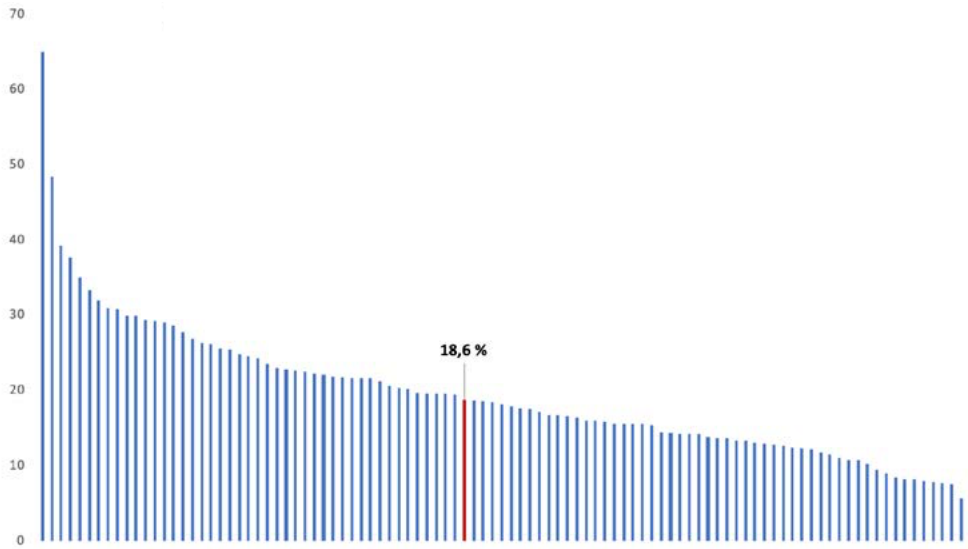

Figure 10. CVC prevalence in peripheral dialysis units, end of 2025.

Reasons for CVC and Patient Characteristics

The reported reasons for CVC use in prevalent patients were broadly consistent across 2024 and 2025 (Fig. 11). The dominant reason was the absence of suitable vascular access (~51%–52%), followed by awaiting first or second access creation (~35% combined), and patient refusal (~13%–14%).

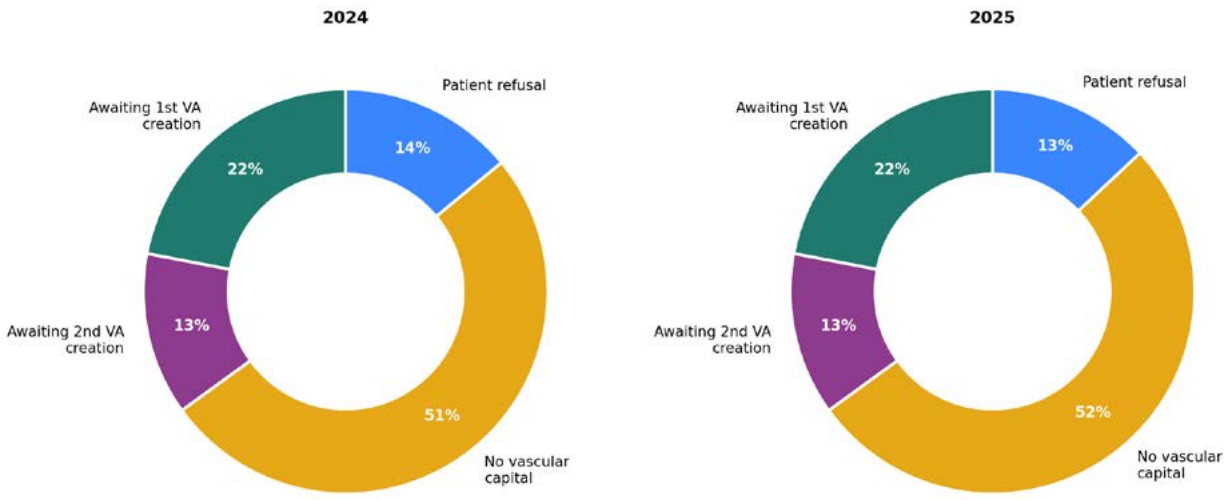

Figure 11. Reasons for CVC use in prevalent patients (2024 *vs* 2025).

CVC prevalence varied significantly according to patient characteristics, particularly age and diabetes. Fig. 12 and Table 2 show, for each subgroup, the percentage of patients dialyzing through a CVC at the end of 2024 and 2025, with the corresponding *p*-values from the comparison between subgroups.

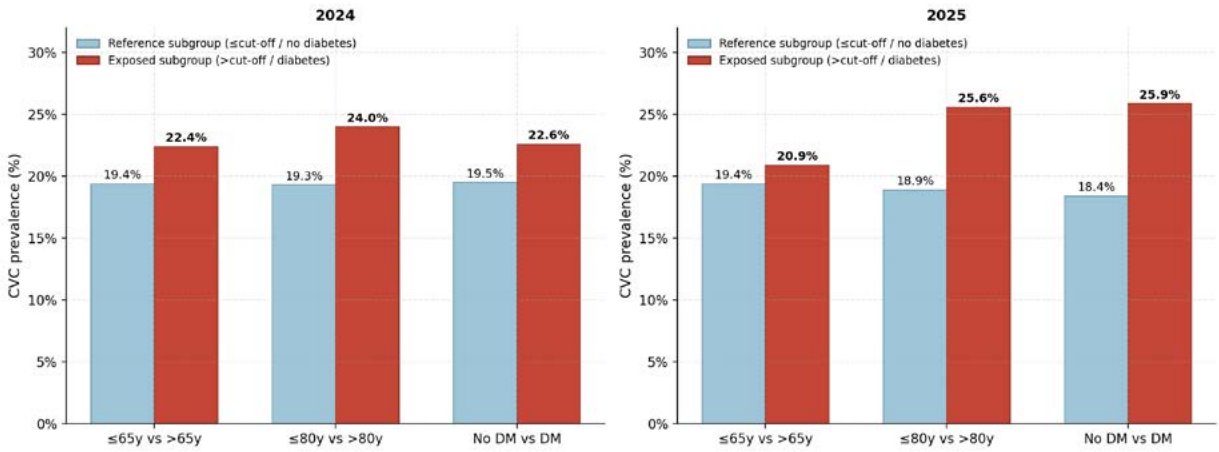

Figure 12. CVC prevalence in prevalent HD patients by age (≤65 *vs* >65 years; ≤80 *vs* >80 years) and diabetes status (no diabetes *vs* diabetes), in 2024 and 2025.

Table 2. CVC prevalence in prevalent HD patients by age and diabetes status, 2024 and 2025.

Subgroup comparison	Year	CVC % in reference subgroup	CVC % in exposed subgroup	*p*-value
≤65 *vs* >65 years	2024	19.4%	22.4%	<0.001
≤80 *vs* >80 years	2024	19.3%	24.0%	<0.001
No diabetes *vs* diabetes	2024	19.5%	22.6%	<0.001
≤65 *vs* >65 years	2025	19.4%	20.9%	0.037
≤80 *vs* >80 years	2025	18.9%	25.6%	<0.001
No diabetes *vs* diabetes	2025	18.4%	25.9%	<0.001

For each row, the percentages refer to the proportion of patients on CVC within each subgroup; the *p*-value corresponds to the comparison between the two subgroups.

Vascular Access Thrombosis

The data referring to vascular access thrombosis is limited to the last two years, which does not infer the evolution of dialysis practices; however, comparative analysis with international databases confirms the alignment of Portugal outcomes with international benchmarks, despite the marginal increase observed between 2024 and 2025.5 Furthermore, future iterations of the VA registry should differentiate between AVF and AVG data, given that their respective thrombosis rates are distinct.

Table 3. Vascular access thrombosis events and rates, 2024 and 2025

Outcome	2024	2025
Vascular access thrombosis events	1062	1114
Thrombosis rate (events/patient-year)	0.081	0.085

Rates calculated as events divided by the prevalent HD population of each year.

DISCUSSION

In this nationwide analysis of the Portuguese National Chronic Kidney Disease (CKD) Registry, we provide a comprehensive and contemporary overview of vascular access (VA) practices in hemodialysis (HD), encompassing both incident and prevalent populations over the past 11 years. In addition, we were able to analyze newly collected data from 2024 and 2025, introduced following a proposal by the Interventional Nephrology Workgroup.

Portugal has traditionally been characterized by a high use of arteriovenous fistulas (AVFs); however, this favorable profile coexists with a concerning and growing reliance on central venous catheters (CVCs) (Fig. 3). We observed a consistent increase in CVC use, accompanied by substantial inter-center variability in both incident and prevalent patients.

CVC Use at HD Initiation as a Quality Indicator of Pre-Dialysis Care

CVC use at HD initiation remained persistently high, continuing the upward trend observed over the past decade (Fig. 2). This pattern is particularly concerning given that early vascular access planning is a cornerstone of optimal CKD management, and preoperative ultrasound mapping has become routine practice in the vast majority of centers. The optimal timing for vascular access creation, however, remains challenging: delaying AVF creation increases the risks associated with initiating dialysis through a CVC, whereas creating an AVF too early may expose some patients to unnecessary procedures if kidney replacement therapy is never required.[8,9]Also, we should not forget that this trend can be interpreted in light of the paradigm shift promoted by recent KDOQI recommendations, which advocate a patient-centered rather than a “fistula-first” approach to vascular access planning, this factor is unlikely to account for the magnitude of the observed increase in CVC use but some patients may be affected. The patient-centered strategy appropriately discourages unnecessary pre-emptive AVF creation in selected individuals with uncertain kidney disease progression, limited life expectancy, or a low likelihood of benefiting from a permanent vascular access. However, these patients represent only a relatively small proportion of the incident HD population. Consequently, while a more individualized approach may have contributed modestly to higher CVC use at dialysis initiation, delays in CKD referral, late dialysis planning, and limited institutional capacity for timely vascular access creation are likely to remain the dominant determinants of the persistently high CVC rates Importantly, the high prevalence of CVCs at dialysis initiation largely reflects hospital-based care pathways, since the responsibility for first vascular access creation in incident patients lies exclusively within the National Health Service (SNS), unlike subsequent accesses in prevalent patients, which are managed within private dialysis networks in patients dialyzed outside hospital units. Consequently, the first vascular access represents a highly relevant quality indicator of pre-dialysis nephrology care, multidisciplinary coordination, and institutional capacity for timely access creation. This reinforces the importance of systematically registering and monitoring first vascular access nationally, allowing identification of structural fragilities and center-specific disparities in outcomes, and provides the natural rationale for the national survey to Nephrology services now being launched by the Workgroup.

The impact of incident CVC placement at HD initiation extends to the prevalent cohorts, demonstrating a tight regional parallelism between the two groups. This linear relationship indicates that incident CVC rates could serve as a primary driver for long-term prevalent CVC dependency within those regions.

Structural and Organizational Drivers

Despite increasing use of vascular mapping and greater awareness regarding timely referral, CVC dependence at dialysis initiation remains excessively high. This suggests that improvements in preoperative evaluation alone are insufficient if not accompanied by adequate procedural capacity. Several factors may contribute to this persistent problem, including delayed nephrology referral, prolonged surgical waiting lists, limited interventional radiology availability, and variability in surgical expertise and AVF maturation outcomes between centers. In many

hospitals, vascular access surgery is not performed by teams exclusively dedicated to dialysis access, but rather integrated into broader vascular surgical activity. As a result, VA procedures may compete with other complex vascular interventions for operating room availability and institutional resources, potentially limiting prioritization and delaying access creation. Differences in local expertise, procedural volume, and multidisciplinary organization may also contribute to higher rates of primary AVF failure and greater catheter dependence in some centers. At the same time, patient demographics are evolving substantially, with an increasing proportion of elderly patients (Fig. 1) presenting a greater burden of comorbidities, including diabetes mellitus, peripheral vascular disease, heart failure, and increased frailty, all of which may compromise vascular capital and reduce AVF feasibility and maturation rates.[10] Therefore, the persistently elevated incidence of CVCs is likely multifactorial, reflecting not only organizational and logistical limitations but also the increasing clinical complexity of the contemporary HD population.

Ultimately, systematic surveillance of first vascular access through national registries may provide a valuable tool to identify bottlenecks, benchmark institutional performance, and guide targeted healthcare policies aimed at reducing avoidable catheter dependence at HD initiation.

The Increase in Non-Tunneled Catheters at Initiation: Three Overlapping Phenomena

An additional noteworthy finding was the apparent increase in the use of temporary non-tunneled catheters (NTC) at dialysis initiation. However, interpretation of this trend requires caution, because at least three distinct phenomena likely contribute simultaneously, and the current registry does not yet allow them to be fully disentangled.

First, a clinical phenomenon. Contemporary nephrology increasingly faces patients initiating dialysis in urgent or semi-urgent settings, particularly those with acute kidney injury superimposed on chronic kidney disease (AKI-on-CKD), without an initially predictable likelihood of renal recovery, or with unexpectedly accelerated CKD progression. In these situations, clinicians are often confronted with the uncertainty of whether kidney replacement therapy will be temporary or permanent. Consequently, in the absence of a usable AVF, two main strategies are generally possible: immediate placement of a tunneled cuffed catheter (TCC) or initial insertion of a non-tunneled catheter followed by tunneled catheter placement in a second stage if dialysis dependence persists. This second strategy is clinically appropriate when there is a realistic expectation of renal recovery and should not be benchmarked as a quality failure.

Second, a technical-protocol phenomenon. The choice between these approaches is influenced by multiple factors, including the clinical scenario, local organizational protocols, and technical resources available in each center. In many hospitals, the routine strategy consists of initial placement of a temporary catheter to allow urgent dialysis initiation, particularly in patients presenting with pulmonary edema, severe hyperkalemia, metabolic acidosis, or rapidly progressive uremia. This approach may also facilitate short inpatient observation after the first dialysis session, optimization of ambulatory planning, and assessment of family or social support before transfer to a peripheral dialysis unit — aspects that may be particularly relevant in socioeconomically vulnerable patients. Furthermore, delayed conversion to a tunneled catheter may also reflect technical considerations: in some centers, tunneled catheter placement is performed in a planned second procedure. In other centers, tunneled catheter placement is only performed by a dedicated access team rather than by all nephrologists of the department, which mechanically increases the proportion of NTC reported as the first access.

Third, a registry-coding phenomenon. Reporting practices across the country are not yet fully uniform. In some centers, the first registered vascular access may correspond to the tunneled catheter ultimately used for transfer to an outpatient dialysis facility, even when dialysis was initially started through a temporary catheter during hospitalization. Conversely, other centers may systematically register the temporary catheter as the first access. Therefore, heterogeneity in reporting practices may partially contribute to the observed rise in provisional CVC use, and should be addressed through standardization of registry coding in future cycles — ideally with a forced-choice justification field distinguishing clinical instability or expected recovery from service technical protocol and from team or scheduling availability.

Another possible explanation for the increasing frequency of urgent dialysis initiation relates to the changing epidemiology of advanced CKD. Although the incidence of AKI-on-CKD requiring dialysis would not necessarily be expected to rise substantially, the current CKD population is increasingly elderly, frail, and multimorbid, frequently exposed to complex multidrug regimens including renin–angiotensin system inhibitors, sodium-glucose cotransporter-2 inhibitors, mineralocorticoid receptor antagonists such as finerenone, sacubitril/valsartan, and intensive diuretic therapy. While these therapies provide substantial long-term cardiovascular and renal benefits, they may also increase susceptibility to acute declines in kidney function during intercurrent illness, dehydration, infection, acute heart failure or hypotensive episodes. Therefore, the growing use of temporary catheters may partly reflect the increasing clinical complexity and fragility of the modern CKD population rather than exclusively deficiencies in vascular access planning. A future joint analysis with the AKI Working Group will be essential to formally test this hypothesis.

Taken together, these findings highlight the importance of improving vascular access registries, particularly regarding the distinction between true first access, bridging temporary catheters, and definitive outpatient access. Better characterization of urgent-start dialysis pathways may help distinguish organizational limitations from evolving clinical realities and ultimately guide more individualized and efficient vascular access strategies.

Prevalent CVC, Cascular Capital and Patient-First Approach

Among prevalent patients, CVC use increased from 19.2% in 2024 to 20.4% in 2025 (Fig. 6), reinforcing the notion that catheter dependence is not solely a consequence of late referral but may also persist longitudinally in the chronic HD population. According to the registry, nearly half of the patients persisted with a CVC due to the absence of suitable vascular capital, findings that are consistent with the current demographic profile of HD patients characterized by advanced age, frailty, and multimorbidity (Fig. 11). Consequently, from a vascular feasibility perspective, no more than 10% of patients are deemed ineligible for VA creation.

On the other hand, approximately 13%–14% of patients with a CVC refused vascular access creation (Fig. 11). These patients are the focus of the ongoing transition from a "fistula-first" to a more individualized "patient-first" approach. Vascular access decision-making increasingly incorporates patient characteristics, life expectancy, vascular anatomy, and the perspectives of caregivers and multidisciplinary teams, aiming to provide the right access, for the right patient, at the right time.[1]CVC use differed significantly according to patient characteristics, with the most pronounced differences observed among patients aged over 80 years and those with diabetes (Fig. 12), both groups showing significantly higher catheter prevalence. In contrast, although patients aged over 65 years also differed statistically from the remaining population in 2024, this difference was substantially attenuated in 2025 (p=0.037). These findings suggest that this cut-off alone may not be clinically meaningful for defining age as an independent adverse prognostic factor for vascular access outcomes. Indeed, chronological age in itself is likely less relevant than factors such as vascular capital, frailty, functional status, and overall comorbidity burden when assessing suitability for autologous access creation.

However, the findings in patients aged over 80 years (Fig. 12) suggest that very advanced age may represent a more relevant threshold, likely reflecting the cumulative impact of vascular disease, frailty, and limited life expectancy on access planning and maintenance. Similarly, diabetes is well recognized to compromise vascular integrity through diffuse vascular disease and endothelial dysfunction, thereby reducing the likelihood of creating and maintaining a functional autologous AVF.[10] These observations reinforce the need for individualized vascular access strategies that move beyond simplistic age-based criteria and instead incorporate a comprehensive vascular and clinical assessment.

Inter-Center and Inter-Regional Variability

Differences in case-mix are clearly relevant, as illustrated by the higher CVC rates observed in hospital-based units compared with peripheral centers (33.3% *vs* 17.6% in 2024; 35.3% *vs* 18.6% in 2025), likely reflecting more clinically complex patients.

Another finding is the marked inter-center variability. Approximately 60 units reported CVC rates exceeding 20% in both years, while others achieved substantially lower rates. This degree of variation suggests that differences in clinical practice, organization of care, and local expertise play a major role, beyond patient-related factors alone.

Inter-regional variability also deserves explicit attention. The differences across regions (Figs. 4 and 7) almost certainly reflect a combination of factors: (i) absolute population size — for example, Lisbon's position may partly reflect a denominator effect, (ii) genuinely different demographic and comorbidity profiles, which should be investigated and could justify regionally tailored strategies; and (iii) regional differences in care circuits. A single nationwide strategy may not be optimal if regional asymmetries are real, and understanding these differences should be a priority for the next phase of registry analysis.

In this context, recent national policy developments may represent an important opportunity for change. The implementation of the Program of Advanced Renal Disease, recently published in the *Diário da República,* provides a strategic framework to reorganize care pathways for patients with advanced CKD (KDIGO G5). Within this framework, vascular access should be conceptualized as a time-sensitive priority, analogous to a "fast-track", ensuring timely referral, evaluation, and creation of definitive access. This approach is consistent with the ESKD Life-Plan model, which considers the patient's medical and vascular access circumstances and patient preferences, including contingency plans (i.e., plans for potential future vascular access complications) and succession plans (i.e., plans for future dialysis access).[1] Operationalizing this approach will require optimization of care circuits, particularly at the hospital level, where the first vascular access is mandatory to be created. Strengthening multidisciplinary collaboration between nephrology, vascular surgery, and radiology, alongside streamlined referral pathways, will be essential to improving early access outcomes.

In addition, dedicated training in vascular access represents the cornerstone for developing competent and motivated multidisciplinary teams. Furthermore, structured center accreditation and professional certification programs may constitute complementary strategies to reduce heterogeneity across centers, particularly among

different geographic regions. Certification can promote adherence to standardized quality indicators in VA care, supported by regular external audits, benchmarking, and feedback mechanisms. When integrated with national registry data, this approach enables continuous performance monitoring, facilitates the identification of best practices, and supports targeted quality improvement interventions. Ultimately, certification may help reduce regional disparities and ensure more equitable access to high-quality care.

Vascular Access Thrombosis

Finally, the low thrombosis rate observed in this registry (Table 3) should be interpreted in the context of VA surveillance quality, as structured monitoring programs are associated with earlier detection of access dysfunction and fewer thrombotic events, serving as an indirect marker of care organization and quality. Recent evidence suggests that systematic surveillance strategies — including clinical monitoring and flow-based assessment with timely pre-emptive intervention — are associated with lower rates of arteriovenous access thrombosis in hemodialysis patients.[1,5]

International Context

According to DOPPS data, AVF use at HD initiation varies considerably across countries, ranging from 84% in Japan to as low as 28% in the United States and Canada. Reports from the ERA Registry indicate that CVC prevalence among prevalent HD patients in Europe generally lies between 10% and 20%, with AVFs remaining the predominant access modality. European countries such as Germany, Italy, and Spain report intermediate rates of AVF use, around 53%–58%,[4] whereas the Romanian registry has reported substantially lower rates of approximately 20%.[6] Swedish data have demonstrated lower catheter dependence and the successful implementation of AVF-first strategies, supported by systematic benchmarking and audit feedback.[11] Within this international context, Portugal maintains a relatively favorable vascular access profile, with AVFs remaining the predominant access modality among prevalent HD patients and overall rates comparing favorably with those of many European registries.

Portugal is uniquely positioned to implement these strategies. As highlighted in the present study, it is among the few countries with detailed, nationwide VA data embedded within a comprehensive CKD registry. This infrastructure enables continuous monitoring of practice patterns, identification of high-performing centers, and implementation of targeted interventions at a national level.

Strengths and Limitations

This study has several limitations. The use of aggregated registry data precludes adjustment for patient-level confounders, such as comorbidities and dialysis vintage. In addition, the lack of linkage to clinical outcomes — including infection, hospitalization, and mortality — limits causal inference. Heterogeneity in center-level reporting practices — particularly for non-tunneled catheters and for what is registered as “first access” — cannot be fully excluded, although the standardized national framework mitigates this risk. The reasons-for-CVC field relies on the reporting center’s clinical judgment and is not adjudicated.

CONCLUSION

In conclusion, international experience, such as the Swedish model, has shown that registry-driven benchmarking can reduce unwarranted variation and standardize care delivery. CVC use in Portuguese HD patients remains high and continues to increase, particularly at dialysis initiation, despite long-standing recognition of its adverse impact. AVF remains the dominant prevalent access modality, but a slow decline is now visible. Substantial inter-center and inter-regional variability points to structural and organizational opportunities for improvement. Harnessing the full potential of the Portuguese national registry — through benchmarking, certification, formal monitoring of first vascular access at hospital level, and targeted system-level interventions tailored to regional realities — will be essential to improving vascular access outcomes and aligning national practice with international standards.

Responsabilidades Éticas

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