Trends in Home Dialysis Over the Last Decade in Europe: an ERA Registry Study

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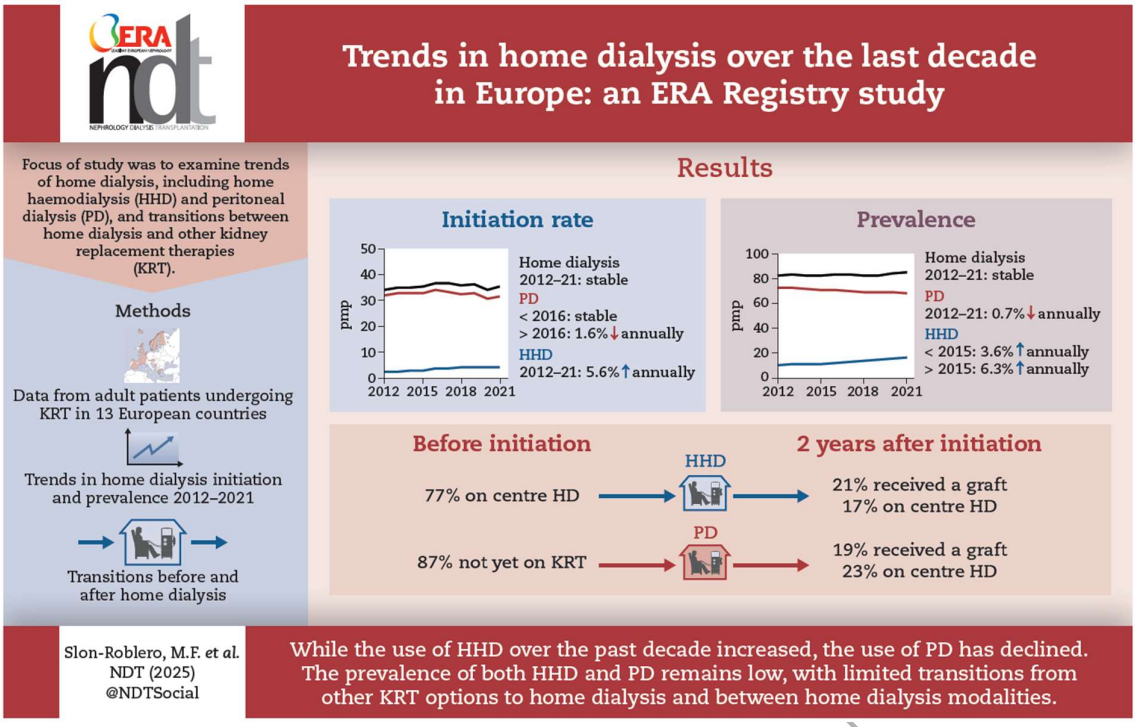
GRAPHICAL ABSTRACT



ABSTRACT

Background. Home dialysis therapies could offer benefits to individuals undergoing dialysis. This study examines trends of home dialysis, including home haemodialysis (HHD) and peritoneal dialysis (PD) across European countries from 2012 to 2021, and evaluates transitions between home dialysis and other kidney replacement therapies (KRT).

Methods. Data from adult patients undergoing KRT in 13 European countries were obtained from the European Renal Association (ERA) Registry. Trends in home dialysis initiation, the number of patients receiving home dialysis by December 31st of each year, and transitions before and after home dialysis were analysed.

Results. Between 2012 and 2021, 65 246 adults initiated PD and 7 878 HHD. Over the last decade, HHD initiation rates and prevalence increased, while those for PD declined, resulting in a stable overall home dialysis initiation rate and prevalence. Home dialysis accounted for 5.8% of the total KRT prevalence. Most HHD patients transitioned from in-centre HD (ICHD, 76.6%), whereas 86.9% of PD patients had no prior KRT. Two years after initiation, 53.2% of HHD patients remained on HHD, 20.9% received a kidney transplant (KT), 16.6% transitioned to ICHD, 8.1% died while on HHD, and 0.6%

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switched to PD. Among PD patients, 39.6% remained on PD, 22.6% transitioned to ICHD, 18.3% received a KT, 17.4% died while on PD and 0.3% switched to HHD.

Conclusions. While the use of HHD over the past decade increased in some European countries, the use of PD has declined. The prevalence of both HHD and PD remains low, with limited transitions from other KRT options to home dialysis and between home dialysis modalities. These findings highlight the need for more effective, region-specific strategies to improve access to these modalities for patients who may benefit from it.

Keywords: home dialysis, home haemodialysis, kidney replacement therapy, peritoneal dialysis, transition

KEY LEARNING POINTS

What was known:

- There is a growing interest in home dialysis therapies due to the variety of benefits they may offer to many individuals undergoing dialysis, including improved quality of life, reduced burden associated with kidney disease, and potentially better outcomes.
- Furthermore, home dialysis represents a cost-effective and person-centred alternative to in-centre haemodialysis.
- Despite the benefits that home dialysis may offer to many patients, its prevalence remains low.

This study adds:

- While renal registries provide annual data on home dialysis utilisation, there is a lack of comprehensive analysis of the trends over time. This is the first study to provide a comprehensive overview of the utilisation of home dialysis across European countries over the past decade.
- Specifically, the findings demonstrate overall trends in home dialysis during this period, as well as trends within different patient subgroups.
- In addition, the study details transitions between different kidney replacement therapy modalities before and after home dialysis.

Potential impact:

- We continue to overlook opportunities to recruit patients who may benefit from home dialysis and to facilitate their continuation at home.

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- By gaining a clearer understanding of the current landscape across European countries, we can develop a comprehensive approach to home dialysis, focused on implementing more effective, region-specific strategies tailored to local needs.
- This will not only enhance the efficiency of healthcare systems but, most importantly, could improve outcomes for our European patients who require dialysis treatment.

Introduction

Home dialysis, including home haemodialysis (HHD) and peritoneal dialysis (PD), provides a person-centred treatment option that allows dialysis prescriptions to be tailored to individual needs and lifestyles, thereby facilitating better life participation compared to in-centre haemodialysis (ICHD) [1-5]. Additionally, it offers potential survival benefits due to more physiological solute and water clearances, greater removal of uremic toxins, improved hemodynamic tolerance, and better preservation of residual kidney function compared to ICHD [4-8]. Moreover, home dialysis is a cost-effective alternative to ICHD and supports environmental sustainability by reducing carbon emissions, resource consumption, and medical waste [9, 10]. However, despite the benefits home dialysis could offer to many patients and the nephrologists' generally positive attitudes toward increasing home dialysis uptake [11], home modalities remain underutilized in Europe and globally [7, 11-14].

While annual reports from renal registries, such as the European Renal Association (ERA) Registry, provide the latest data kidney replacement therapies (KRT) epidemiology [12], comprehensive data on home dialysis trends over time remains limited. Furthermore, the number of individuals initiating home dialysis is not included in these reports, as the incidence of KRT only accounts for the initial KRT treatment and at 91 days after the start of KRT and patients may transition to home dialysis after starting another KRT. Additionally, many patients, particularly younger ones, require multiple KRT changes to adapt to evolving clinical and psychosocial needs [15-17], whether transitioning from a temporary to a preferred modality or due to treatment failure. Nevertheless, information on transitions between different KRT modalities, including home dialysis, is scarce [16, 18]. Consequently, our understanding of home dialysis utilisation across Europe remains incomplete.

The aim of this study was to analyse the trends in the number of individuals initiating HHD and PD for the first time, as well as the trends in the prevalence of HHD and PD across European countries over the past decade using ERA Registry data. Another aim was to evaluate the transitions between KRT modalities, both before and after the initiation of home dialysis.

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Materials and Methods

Study population

The ERA Registry collects data on patients receiving KRT through national and regional renal registries in Europe. Data collected includes year of birth, sex, primary renal disease (PRD), date of start of KRT, treatment modality changes, and date and cause of death. We included adult patients aged ≥20 years from 27 registries covering the following countries and regions: Austria, Dutch-speaking Belgium, French-speaking Belgium, Bosnia and Herzegovina, Denmark, Finland, France (26 out of 27 regions, 99.4% coverage), Greece, Iceland, the Netherlands, Norway, Sweden, the United Kingdom (England, Wales and Northern Ireland), the United Kingdom (Scotland), and Andalucía, Aragon, Asturias, Basque country, Catalonia, Cantabria, Castile-La Mancha, Castile and Leon, Extremadura, Galicia, Madrid, Murcia, Valencian region, together covering 90.8% of Spain. Registries that did not cover the entire 10-year study period (2012-2021) were excluded from this study's analysis.

Definitions

Home dialysis was defined as either HHD or PD, lasting for at least one day. A change between modalities was only considered as a transition if the patient was on the new modality for 90 days or longer. PRD was classified according to the ERA coding system [12] into eight categories: glomerulonephritis, pyelonephritis, polycystic kidney disease, diabetes, hypertension, renal vascular disease, miscellaneous, and unknown.

Statistical analyses

The number of individuals initiating home dialysis for the first time, or receiving home dialysis on December 31st of a given year, was calculated per million population (pmp) or per million age-related population (pmarp) for age stratified analyses. Numerical variables were reported as median with interquartile range (IQR), and categorical variables as number and percentage.

Time trends in crude rates and rates standardised to the age and sex distribution of the 27 European Union countries (EU27) reference population [19], were examined using Joinpoint regression [20]. This method assumes that rates change at a constant percentage relative to the rate of the previous year, unless a Joinpoint was detected where a statistically significant change in the trend took place, and estimates the annual percentage change (APC) with 95% confidence intervals (CI) for each segment. Analyses were performed for the total group and by country, age and sex.

The last modality before and the first modality after home dialysis were compared between patients starting in 2012-2016 and 2017-2021 using chi-square analyses. To ensure comparable follow-up, only the first two years post-initiation were considered, limiting the end year of the second cohort

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to 2019. Additionally, follow-up was examined for the first five years after home dialysis initiation in patients younger and older than 65 years, with censoring at the end of the study period.

P-values ≤0.05 (two-tailed) were considered statistically significant. SAS 9.4 (2016; SAS Institute Inc., Cary, NC, USA) was used for the calculation of rates and for the transition analyses, and the Joinpoint Regression Program (2020; National Cancer Institute, USA) was used for time trend analyses.

Results

Between 2012 and 2021, 65 246 adults started PD and 7 878 started HHD. In total 2 182 adults initiated HHD and later PD or vice versa within the study period.

Trends in the home dialysis initiation rate

Overall

The overall age and sex standardised home dialysis initiation rate remained stable (**Figure 1A**, **Table 1**), but the trend varied across countries (**Figure 2A**).

For HHD, the age and sex standardised initiation rate increased from 3.5 pmp in 2012 to 5.2 pmp in 2021, with an APC of 5.6 (95% CI: 3.7;7.6) (**Figure 1A**, **Table 1**). There were significant variations between countries (**Figure 2B**, **Table 1**), with some reporting no new HHD patients, while others, such as Finland, reached 18.2 pmp. Standardised HHD initiation rates increased in Belgium, France, Norway, and Spain, but remained stable elsewhere. Crude rates showed similar patterns (**Table S1**).

For PD, while the crude initiation rate remained stable during the study period (**Table S1**), the age and sex standardised PD initiation rate decreased (APC: -1.6 [-3.0;-0.2], **Figure 1A**, **Table 1**). Variability between countries was substantial (**Figure 2C**, **Tables 1**, **S1**), with standardised rates ranging from 2.9 pmp to 71.1 pmp, and decreasing rates in Austria and France, and increasing rates in Norway.

Stratified by age and sex

The age and sex standardised HHD initiation rates increased across all age groups (**Figures 3A-C**, **Table S2**), with the largest increase among individuals aged 75+, where rates tripled. The highest rates were observed in the 45-64 age group (ranging from 4.9 to 7.4 pmarp), except in 2021, when the 65-74 age group showed the highest rate (8.2 pmarp). HHD initiation rates in males were double those in females (**Figure 4A-C**, **Table S3**), but the relative increases over time were similar.

For PD, age and sex standardised initiation rates remained stable for the 20-44 and 65-74 age groups, but declined in the 45-64 age group since 2017 (APC: -2.3 [-3.9; -0.6]). Among individuals aged 75+, rates increased between 2012 and 2016 (APC: +2.4 [0.2; 4.7]), but declined thereafter (APC: -2.1

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[-3.6; -0.6]) (**Figure 3C**, **Table S2**). PD initiation rates were nearly twice as high in males compared to females. Among females, rates decreased from 2016 (APC: -1.8 [-2.8; -0.7]) (**Figure 4C**, **Table S3**).

Patient and treatment characteristics

The median age of adults who initiated HHD increased slightly from 53.4 years (2012-2016) to 54.8 years (2017-2021) (**Table 2**). The proportion of adults for whom HHD was the first KRT modality increased from 6.8% to 8.4%, while for the remaining patients the median prior KRT duration decreased from 2.1 years in 2012-2016 to 1.7 years in 2017-2021.

For PD, the median age at initiation slightly increased from 64.2 years (2012-2016) to 65.2 years (2017-2021) (**Table 2**). There were differences in PRD distribution, though no specific category stood out. For the vast majority PD was also the first KRT modality, with this proportion increasing from 77.5% to 79.9%. Among those with previous KRT, median prior KRT duration increased from 0.36 years to 0.41 years between 2012-2016 and 2017-2021.

Trends in the prevalence of home dialysis

Overall

The age and sex standardised prevalence of adults receiving home dialysis on December 31st remained stable (**Figure 1B**, **Table 3**), though trends varied across countries (**Figure 2A**, **Table 3**). Home dialysis accounted for only 5.6%-6.2% of the total KRT prevalence (**Table 4**), and 11.4%-11.9% of the dialysis prevalence (**Table S4**).

The standardised HHD prevalence increased from 10.0 pmp in 2012 to 16.2 pmp in 2021, with an annual increase of 3.6% until 2015, accelerating to 6.3% thereafter (**Figure 1B**, **Table 3**). Patterns varied across countries (**Figure 2E**, **Table 3**). Crude data showed similar patterns (**Table S5**).

While the crude PD prevalence remained around 71 pmp throughout the study period (**Table S5**), the age and sex standardised PD prevalence declined by 0.7% annually (**Figure 1B**, **Table 3**). This decline was observed in most countries (**Figure 2F**, **Tables 3, S54**).

Stratified by age and sex

The standardised HHD prevalence increased across all age categories (**Figures 3E**, **Table S2**) and for both sexes (**Figures 4E**, **Table S3**).

For PD, the standardised prevalence decreased across all age categories (**Figure 3F**, **Table S2**) and for both sexes (**Figure 4F**, **Table S3**), except for the age category 75+, where it increased till 2016.

Transitions between modalities

KRT modalities prior to home dialysis

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Ninety days before HHD initiation, 76.6% were receiving ICHD and 4.7% PD. Additionally, 14.9% was not yet receiving KRT and 3.6% had experienced graft failure less than 90 days ago (**Figure S1**, **Table 5**). The proportion of patients initiating HHD without prior KRT increased from 12.8% to 16.3%, while ICHD as preceding modality declined from 79.1% to 74.7%.

Before PD initiation, 86.9% had no prior KRT (**Figure S1**, **Table 5**), 9.7% transitioned from ICHD, 2.9% started after graft failure, and 0.04% switched from HHD to PD. There were no substantial changes over time (**Table 5).**

KRT modalities after home dialysis

Within two years after HHD initiation, the first transition was to KT for 20.9%, to ICHD for 16.6% and to PD for 0.6% of the patients. In addition, 8.1% died while receiving HHD or within 90 days thereafter, and 53.2% of the patients were still receiving HHD after two years. This pattern remained consistent throughout the study period. Within two years after PD initiation, 22.6% of the patients transitioned to ICHD, 18.3% received a KT, 0.3% switched to HHD, 17.4% died while on PD or within 90 days thereafter, and 39.6% continued on PD (**Table 5**).

When looking at the distribution of patients after start of home dialysis, including all changes that took place during the first five years, we found substantial differences by age. Among adults aged <65 years, five years after HHD initiation 44.8% had a functioning KT (**Figure 5A**), 23.7% continued HHD and 20.5% had died, mostly after switching to another modality. In those over 65 years, 12.6% had a functioning KT, 21.5% remained on HHD and 53.6% had died, nearly half while on HHD (**Figure 5B**).

Five years after PD initiation, 54.9% of the patients aged <65 years had a functioning KT, **7.7%** were still receiving **PD and 21.3%** had died, with **50% while receiving other forms of KRT** (**Figure 5C**). Among adults aged older than 65 years, after five years 10.8% had a functioning KT, 9.6% remained on PD and **64.9%** had died, mostly (**67.3%) while still on PD** (**Figure 5D**).

Discussion

This study provides a comprehensive overview of home dialysis initiation and prevalence trends across European countries over the past decade. Most patients initiated home dialysis with PD. While the HHD initiation rate and prevalence increased between 2012 and 2021, those for PD declined, leading to a stable overall home dialysis initiation rate and prevalence throughout the study period, though with country-specific variations. The mean age of patients initiating HHD and PD increased, yet HHD patients consistently remained younger than those starting PD. Most HHD patients transitioned from ICHD, whereas most PD patients had no prior KRT. Interestingly, the study findings revealed an

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increasing trend of patients selecting home dialysis as their first KRT option. Following home dialysis, most patients either transitioned to ICHD or received a KT.

Despite the recognized benefits that home dialysis may provide to many patients [1, 4, 6, 8, 21, 22] and the willingness of the majority of European nephrologists to promote its uptake [11], the number of patients receiving home dialysis remained low compared to other KRT options. In 2021, only 2.2% of European prevalent dialysis patients were receiving HHD, while 4.7% were on PD. These figures align with 2021 data from the United States, where HHD and PD accounted for 2.3% and 11.9% of dialysis prevalence, respectively. However, these rates remain considerably lower than those observed in high-utilization countries such as Australia (HHD: 15%; PD: 32%) and New Zealand (HHD: 24%; PD: 50%) [7, 14].

Trends in home dialysis

Over the past decade, HHD utilisation has increased across all age groups in the participating European countries. In contrast, PD trends have varied by age, with an overall decline in both initiation rate and prevalence. This decrease in PD usage may be partly attributed to positive reasons likely being the increased KT rate over the past decade, as supported by this study and other ERA Registry studies [13, 23], including pre-emptive KT [24]. However, this decline could also be driven by other factors, such as region-specific barriers at multiple levels, which will be discussed later.

Interestingly, our study found an increase in PD use among patients aged 75+. This trend may partly be attributed to demographic changes, with a growing elderly population requiring and/or being accepted for KRT [25, 26], as well as to a lower proportion of these patients being eligible for KT due to age and comorbidities. Additionally, the rise in elderly patients on PD could reflect the expanded implementation of assisted PD in some European countries in recent years [27, 28]. However, as this study was not designed to assess the use of assisted PD in elderly patients, further research is warranted.

Our findings have shown that home dialysis trends have not been uniform across European countries. This variability may be attributed to several factors, including differences in KRT practices, financial constraints, availability of home dialysis options, health service policies and reimbursement frameworks [1, 4, 11, 13, 25, 29-38], as well as patient-related factors such as limited knowledge, negative attitudes, and comorbidities [11, 31]. Furthermore, insufficient education and training on home dialysis among healthcare professionals can adversely impact patient education and may result in less personalised shared decision-making when selecting KRT options, which is particularly critical when considering home dialysis options [11, 35, 39]. Addressing these gaps through enhanced professional education could foster a supportive culture and address potential misconceptions about these treatment options [11, 31]. In the US, governmental policies have driven increased adoption of both HHD and PD [14, 40], and similar trends may also be observed in some European countries [27,

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28, 36, 40]. While promoting home dialysis is essential, therapy selection should be guided by each patient's unique circumstances, needs, and preferences, as long as the required resources are available [1-5, 30-32]. Although our study did not aim to identify specific barriers to home dialysis, our results suggest that a uniform approach is unlikely to address the diverse complexities across European regions. Recognizing and addressing these barriers at regional and national levels are critical steps to improving access to home-based dialysis throughout Europe [4, 11, 34, 37].

Transition between modalities

Since HHD and PD are both home-based treatment modalities, one might assume they compete with each other. However, each has distinct clinical indications and plays a specific role at different stages of a patient's journey. We found that most patients started home dialysis with PD, mainly as incident KRT patients, whereas 77% of HHD patients transition from ICHD. This could partly reflect logistical and training challenges that initially require in-centre HD for HHD patients, even though we took into account a 90-day training period. Additionally, PD's perceived advantages, such as simplicity, lower cost in general, and better preservation of kidney function and vascular access, may contribute to its preference [18, 21, 41, 42]. Nevertheless, HHD remains a viable first-choice KRT, especially when PD is not feasible [37, 43, 44]. As this study demonstrates, there has been an increasing trend in the percentage of European patients choosing HHD as their initial KRT option. Further research is needed to understand whether this trend results from contraindications to PD or a deliberate preference for HHD [35].

It is striking that across European countries, few patients have initiated home dialysis after kidney graft failure. While several factors may contribute to this trend, this raises concerns that patients may not receive adequate information about home dialysis as an option post-graft loss [15, 35]. It is important to discuss home dialysis at both pre-dialysis and graft failure [29, 35, 39].

High discontinuation rates remain a challenge for HHD and PD [45-47]. In Europe, HHD patients transition to ICHD at lower rates than PD patients, though the younger average age of HHD patients likely influences this trend.

Integrated home dialysis model

The 'integrated home dialysis model' was defined as the sequential initiation of PD, followed by a timely transition to HHD when PD is no longer feasible [21, 41, 43, 44, 48]. This approach acknowledges the peritoneal membrane's limited functional lifespan and prioritizes maintaining patients on a home-based dialysis modality, ensuring continuity of care within the home environment, even when the initial technique reaches its limits. Previous studies suggest that patients who initiate PD and then transition to HHD often experience favourable outcomes compared to ICHD, benefiting from the early advantages of PD and the potential long-term survival benefits offered by HHD [15, 18, 41-44, 49, 50].

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However, our findings show that only 0.3% of patients continued with HHD after discontinuing PD, highlighting the need for more effective strategies to support this transition [1, 18, 37, 41-44, 49, 51].

Strengths and limitations

The main strength of this study is the inclusion of data from 13 European countries reporting to the ERA Registry, covering a 10-year period. It is the first study in Europe to analyse trends in both HHD and PD, as well as transitions prior to, after and between these home dialysis modalities.

However, these findings should be interpreted with caution due to the limitations inherent to an international registry, including the absence of standardised definition of initiation of home-based dialysis. Additionally, there is limited information on regional barriers, patient comorbidities, socioeconomic factors, training processes, centre-specific experience, and eligibility criteria for home dialysis. The impact of the COVID-19 pandemic may have also influenced our findings, particularly in terms of the number of individuals initiating HHD and PD, as well as changes in prevalence, mortality rates, and transitions between modalities during 2020 and 2021 [52].

Conclusions

Despite a significant increase in HHD over the past decade in some European countries, PD has shown a declining trend. The overall prevalence of both HHD and PD among KRT modalities remains low in Europe, with limited transitions from other KRT options to home dialysis and between different home dialysis modalities. These findings highlight the promising opportunities for developing and implementing more effective, region-specific strategies to ensure that patients who could benefit from home dialysis have adequate access to these modalities.

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Conflict of interest statement

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Authors' contributions

Conceptualisation: MFSR, VSS, ESA and AK; Methodology: MFSR, VSS and AK; Formal analysis: AK; Writing–original draft: MFSR, VSS, KJJ and AK; Writing–review & editing: ESA, JME, BFD, ASA, PMF, JMDM, AB, HR, KH, AÅ, IRA, SM, MJEH, ACA, RP, EV, EG, NAF, AJB, VK, JH, JK, SAB, MK, KJJ and AO. All authors read and approved the final manuscript.

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Data availability statement

The data underlying this article cannot be shared with any third party because the national and regional registries that provided data to the ERA Registry remain the owners of the data.

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Table 1. Standardised number pmp of ESKD patients starting home haemodialysis or peritoneal dialysis for the first time in European countries from 2012 to 2021, and the annual percent change over time, by country / region

Country / region		Number of patients pmp starting home dialysis										Annual percentage change (95% confidence interval)	
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Time period [a]	Time period [a]
All countries	PD or HHD	34.9	35.8	35.7	36.1	37.5	37.3	36.5	36.8	34.8	35.9	2012-17: 1.3 (-0.2 ; 2.8)	2017-21: -1.4 (-3.4 ; 0.7)
	HHD	3.5	3.2	3.6	3.6	4.4	4.7	4.8	5.1	4.8	5.2	2012-21: 5.6 (3.7 ; 7.6) [b]	
	PD	32.7	33.7	33.3	33.7	34.6	34.1	33.2	33.3	31.4	32.2	2012-16: 1.2 (-0.8 ; 3.3)	2016-21: -1.6 (-3.0 ; -0.2) [b]
Austria	HHD	0.0	0.2	0.3	0.3	0.1	0.1	0.0	0.0	0.1	0.3	not applicable	
	PD	25.8	26.3	24.1	21.1	23.7	20.4	18.8	17.3	15.7	15.9	2012-21: -5.9 (-7.3 ; -4.6) [b]	
Belgium - Dutch-speaking	HHD	1.4	2.2	1.8	2.9	1.4	2.8	4.3	3.5	4.8	5.7	2012-21: 15.0 (7.1 ; 23.5) [b]	
	PD	31.9	30.5	23.8	29.1	30.8	31.5	27.4	26.4	24.0	25.2	2012-21: -2.1 (-4.5 ; 0.4)	
Belgium - French-speaking	HHD	2.2	5.4	2.5	4.4	7.7	10.0	9.9	11.3	12.0	14.0	2012-21: 21.7 (12.7 ; 31.4) [b]	
	PD	34.9	39.3	35.2	36.8	35.4	38.0	37.8	36.8	28.1	25.4	2012-19: 0.2 (-2.1 ; 2.5)	2019-21: -18.3 (-31.3 ; -3.0) [b]
Bosnia and Herzegovina	HHD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	not applicable	
	PD	6.8	7.3	8.9	13.3	6.1	6.7	10.7	9.1	5.2	2.9	2012-19: 2.9 (-11.1 ; 19.1)	2019-21: -43.8 (-81.2 ; 68.3)
Denmark	HHD	9.4	9.1	5.3	8.7	8.3	9.5	11.1	10.5	7.5	5.1	2012-21: -1.5 (-8.2 ; 5.7)	
	PD	55.1	56.8	63.9	55.6	58.7	59.7	56.4	52.9	53.6	55.7	2012-21: -0.7 (-2.1 ; 0.6)	
Finland	HHD	11.2	10.8	15.0	14.3	15.9	14.0	18.2	14.6	9.1	8.7	2012-18: 7.6 (-0.8 ; 16.7)	2018-21: -22.4 (-39.0 ; -1.3) [b]
	PD	34.6	38.3	34.8	38.0	43.3	40.0	34.0	32.6	33.7	27.7	2012-16: 4.7 (-2.8 ; 12.7)	2016-21: -7.0 (-11.7 ; -2.0) [b]
France	HHD	1.2	1.1	1.8	2.0	2.5	3.1	3.1	3.9	4.4	4.5	2012-21: 17.9 (14.3 ; 21.7) [b]	
	PD	26.5	28.9	27.7	27.0	27.3	27.6	25.9	26.7	24.6	25.4	2012-21: -1.1 (-1.9 ; -0.2) [b]	
Greece	HHD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	not applicable	
	PD	19.2	20.8	22.6	22.5	23.0	20.6	22.3	19.5	17.0	16.5	2012-16: 4.6 (-2.0 ; 11.5)	2016-21: -6.9 (-11.0 ; -2.5) [b]
Iceland	HHD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	not applicable	
	PD	48.2	60.8	12.1	19.8	28.1	71.1	43.0	47.0	40.9	26.3	2012-21: 1.1 (-12.6 ; 17.0)	
Norway	HHD	1.6	1.6	1.3	1.2	1.3	3.9	2.8	4.1	6.5	4.6	2012-21: 19.1 (8.6 ; 30.6) [b]	
	PD	36.3	39.6	31.9	41.7	46.8	51.5	49.0	49.0	46.1	45.5	2012-21: 3.6 (0.6 ; 6.6) [b]	
Spain	HHD	0.6	0.6	0.8	0.8	1.6	2.3	2.2	2.4	2.5	3.6	2012-21: 24.1 (17.8 ; 30.8) [b]	
	PD	34.8	37.1	36.9	36.9	37.7	36.8	37.4	34.7	31.6	36.4	2012-21: -0.6 (-2.0 ; 0.8)	
Sweden	HHD	3.9	4.9	4.0	3.9	5.1	5.1	3.4	3.6	4.0	2.0	2012-21: -5.0 (-10.7 ; 1.1)	
	PD	52.5	58.1	53.4	54.7	59.1	53.7	50.4	53.7	56.2	55.0	2012-21: -0.1 (-1.3 ; 1.2)	
The Netherlands	HHD	4.4	4.2	6.4	6.4	8.1	5.1	6.2	6.3	4.7	5.2	2012-16: 13.9 (-3.0 ; 33.6)	2016-21: -7.3 (-17.2 ; 3.8)
	PD	34.5	31.4	31.4	34.3	31.8	33.3	32.6	34.2	33.6	32.5	2012-21: 0.1 (-0.8 ; 1.1)	
United Kingdom - England, Northern Ireland and Wales	HHD	7.7	6.3	6.3	5.8	6.9	7.5	7.4	7.8	6.8	7.6	2012-21: 1.4 (-1.1 ; 4.1)	
	PD	37.0	35.5	37.3	38.1	38.8	38.3	37.6	39.6	37.8	37.7	2012-21: 0.5 (-0.1 ; 1.2)	
United Kingdom - Scotland	HHD	5.1	3.1	4.8	4.1	4.9	3.3	3.7	2.3	1.1	3.4	2012-21: -8.9 (-17.4 ; 0.4)	
	PD	23.6	25.0	23.9	29.3	32.2	26.2	31.8	26.2	25.8	27.3	2012-21: 1.3 (-1.5 ; 4.1)	

[a] Time periods are defined by a statistically significant joinpoint and could therefore differ between countries and regions. [b] A statistically significant increase or decrease over time.
Rates were standardised to the age and sex distribution of the EU27 reference population.
ESKD: end-stage kidney disease, pmp: per million population, HHD: Home haemodialysis, PD peritoneal dialysis.

Table 2. Patient and treatment characteristics of ESKD patients starting home haemodialysis or peritoneal dialysis for the first time in European countries from 2012 to 2021, by time period

	Home haemodialysis	Peritoneal dialysis

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	Overall	Time periods			Overall	Time periods		
	2012-2021	2012-2016	2017-2021	p-value [a]	2012-2021	2012-2016	2017-2021	p-value [a]
	N=7878	N=3294	N=4584		N=65246	N=32103	N=33143	
Age, median (IQR)	54.3 (44.1-64.7)	53.4 (43.7-63.7)	54.8 (44.6-65.5)	<.001	64.7 (51.5-74.7)	64.2 (51.1-74.5)	65.2 (52.1-74.8)	<.001
Sex, male, N (%)	5095 (64.7)	2127 (64.6)	2968 (64.7)	0.873	41821 (64.1)	20476 (63.8)	21345 (64.4)	0.099
Primary renal disease, N (%)				0.119				<.001
- Glomerulonephritis/sclerosis	1774 (22.5)	774 (23.5)	1000 (21.8)		10765 (16.5)	5327 (16.6)	5438 (16.4)	
- Pyelonephritis	633 (8.0)	287 (8.7)	346 (7.5)		3040 (4.7)	1614 (5.0)	1426 (4.3)	
- Polycystic kidneys, adult type	880 (11.2)	361 (11.0)	519 (11.3)		4584 (7.0)	2284 (7.1)	2300 (6.9)	
- Diabetes mellitus	1245 (15.8)	483 (14.7)	762 (16.6)		14335 (22.0)	6992 (21.8)	7343 (22.2)	
- Hypertension	649 (8.2)	262 (8.0)	387 (8.4)		9763 (15.0)	4874 (15.2)	4889 (14.8)	
- Renal vascular disease	133 (1.7)	59 (1.8)	74 (1.6)		1355 (2.1)	747 (2.3)	608 (1.8)	
- Miscellaneous	1647 (20.9)	687 (20.9)	960 (20.9)		10810 (16.6)	5204 (16.2)	5606 (16.9)	
- Unknown	917 (11.6)	381 (11.6)	536 (11.7)		10594 (16.2)	5061 (15.8)	5533 (16.7)	
Peritoneal dialysis, type, N (%)								0.026
- Automated peritoneal dialysis (APD)	-	-	-		17583 (26.9)	8572 (26.7)	9011 (27.2)	
- Continuous ambulatory peritoneal dialysis (CAPD)	-	-	-		39253 (60.2)	19475 (60.7)	19778 (59.7)	
- Unknown	-	-	-		8410 (12.9)	4056 (12.6)	4354 (13.1)	
Number of years on KRT before initiation of home dialysis [b], median (IQR)	1.54 (0.49-5.80)	1.81 (0.57-6.65)	1.42 (0.42-5.25)	<.001	-	-	-	
Number of years on KRT before initiation of home dialysis in those without home dialysis as initial KRT modality [b], median (IQR)	1.84 (0.66-6.62)	2.13 (0.74-7.43)	1.66 (0.60-5.95)	<.001	0.38 (0.15-1.80)	0.36 (0.15-1.72)	0.41 (0.16-1.86)	<.001
Treatment modality at start kidney replacement therapy, N (%)				0.001				<.001
- ICHD	5202 (66.0)	2133 (64.8)	3069 (67.0)		12369 (19.0)	6446 (20.1)	5923 (17.9)	
- HHD	607 (7.7)	224 (6.8)	383 (8.4)		26 (0.0)	13 (0.0)	13 (0.0)	
- PD	1440 (18.3)	647 (19.6)	793 (17.3)		51380 (78.7)	24892 (77.5)	26488 (79.9)	
- Kidney transplantation	353 (4.5)	166 (5.0)	187 (4.1)		823 (1.3)	372 (1.2)	451 (1.4)	
- Unknown	276 (3.5)	124 (3.8)	152 (3.3)		648 (1.0)	380 (1.2)	268 (0.8)	

[a] Comparing the time periods 2012-2016 and 2017-2021.

[b] The number of years on KRT was defined as the number of years on KRT prior to the start of home dialysis therapy. For individuals receiving PD for the first time more than 75% did not receive KRT before PD, and therefore it was not possible to present the median, Q1 and Q3.

KRT: kidney replacement therapy, HHD: Home haemodialysis, PD: peritoneal dialysis, ICHD: in-centre haemodialysis.

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Table 3. Standardised prevalence pmp of ESKD patients receiving home haemodialysis or peritoneal dialysis in European countries from 2010 to 2019, and the annual percent change over time, by country / region

Country / region		Prevalence pmp of patients receiving home dialysis on December 31st										Annual percentage change (95% confidence interval)	
		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	Time period [a]	Time period [a]
All countries	PD or HHD	82.2	83.0	82.7	82.0	82.9	82.9	82.7	82.8	84.3	84.7	2012-19: 0.1 (-0.2 ; 0.3)	2019-21: 1.2 (-0.6 ; 3.0)
	HHD	10.0	10.4	10.9	11.1	11.9	12.7	13.6	14.2	15.1	16.2	2012-15: 3.6 (2.2 ; 5.0) [b]	2015-21: 6.3 (5.8 ; 6.8) [b]
	PD	72.2	72.6	71.8	70.9	71.1	70.2	69.1	68.6	69.2	68.5	2012-21: -0.7 (-0.8 ; -0.5) [b]	
Austria	HHD	0.2	0.3	0.3	0.1	0.3	0.4	0.3	0.1	0.0	0.1	2012-21: -30.3 (-61.5 ; 26.2)	
	PD	58.8	63.7	59.5	57.7	57.3	51.3	49.2	47.7	45.4	44.3	2012-21: -3.9 (-4.9 ; -3.0) [b]	
Belgium - Dutch-speaking	HHD	3.5	3.7	4.8	5.7	5.6	5.9	7.8	9.6	11.7	14.4	2012-21: 16.7 (14.0 ; 19.5) [b]	
	PD	73.0	70.8	65.8	65.2	65.0	65.8	64.4	65.8	65.3	60.9	2012-21: -1.3 (-2.1 ; -0.6) [b]	
Belgium - French-speaking	HHD	14.2	15.8	15.2	16.0	18.5	21.6	23.2	26.6	29.9	35.6	2012-15: 3.6 (-3.2 ; 10.8)	2015-21: 13.6 (11.1 ; 16.3) [b]
	PD	80.0	79.8	85.5	82.6	79.2	79.4	79.8	81.9	77.5	70.9	2012-19: 0.0 (-1.5 ; 1.4)	2019-21: -6.0 (-15.6 ; 4.7)
Bosnia and Herzegovina	HHD	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	not applicable	
	PD	31.9	31.7	30.2	33.6	34.0	32.7	37.5	38.6	36.7	30.1	2012-19: 3.2 (0.8 ; 5.7) [b]	2019-21: -9.2 (-24.2 ; 8.8)
Denmark	HHD	34.8	35.8	33.6	34.9	36.9	39.4	41.7	41.2	38.5	35.8	2012-19: 3.0 (0.8 ; 5.3) [b]	2019-21: -6.8 (-21.0 ; 10.1)
	PD	122.7	126.5	128.5	119.7	122.8	120.2	117.6	106.8	106.2	105.6	2012-21: -2.1 (-3.0 ; -1.3) [b]	
Finland	HHD	22.1	24.3	26.3	30.7	31.6	32.7	37.5	34.0	29.5	25.9	2012-18: 9.0 (6.7 ; 11.4) [b]	2018-21: -11.3 (-16.8 ; -5.5) [b]
	PD	75.1	80.9	76.3	74.7	82.4	86.2	79.3	64.7	65.6	61.7	2012-17: 1.9 (-2.7 ; 6.7)	2017-21: -7.7 (-13.6 ; -1.5) [b]
France	HHD	4.8	4.9	5.8	6.2	7.2	8.4	9.4	10.6	12.7	13.8	2012-21: 13.3 (12.2 ; 14.4) [b]	
	PD	54.3	56.9	56.8	56.8	55.6	56.0	54.4	54.9	54.0	53.8	2012-14: 2.1 (-0.8 ; 5.2)	2014-21: -0.9 (-1.3 ; -0.5) [b]
Greece	HHD	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	not applicable	
	PD	71.5	72.0	74.4	75.6	76.9	75.5	75.8	71.6	70.6	66.7	2012-17: 1.6 (0.7 ; 2.4) [b]	2017-21: -3.4 (-4.5 ; -2.3) [b]
Iceland	HHD	10.8	5.8	5.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	not applicable	
	PD	116.5	125.2	78.3	42.2	54.8	86.4	81.5	67.8	76.6	69.9	2012-21: -3.8 (-11.2 ; 4.3)	
Norway	HHD	2.9	3.9	3.6	4.3	4.2	7.1	6.7	8.1	11.4	12.4	2012-21: 17.6 (13.8 ; 21.5) [b]	
	PD	58.4	58.6	53.9	58.7	70.4	79.7	88.1	86.5	100.4	95.7	2012-21: 7.5 (5.3 ; 9.8) [b]	
Spain	HHD	1.8	1.9	2.3	2.3	3.2	4.4	5.3	5.7	6.5	8.2	2012-21: 19.7 (17.0 ; 22.5) [b]	
	PD	78.5	81.3	84.1	83.9	83.4	82.8	80.7	79.2	78.9	79.8	2012-14: 3.8 (-0.3 ; 8.0)	2014-21: -1.0 (-1.5 ; -0.5) [b]
Sweden	HHD	18.4	20.4	20.0	18.4	18.2	18.2	17.4	15.2	15.6	14.6	2012-21: -3.3 (-4.6 ; -1.9) [b]	
	PD	104.6	110.3	105.3	106.6	111.2	109.2	100.8	102.7	106.7	106.4	2012-21: -0.2 (-1.0 ; 0.6)	
The Netherlands	HHD	15.6	16.8	18.8	20.7	22.9	20.1	21.4	21.6	20.1	20.1	2012-16: 9.2 (5.2 ; 13.3) [b]	2016-21: -2.1 (-4.6 ; 0.5)
	PD	77.7	72.5	68.4	67.2	68.9	67.4	68.0	69.0	72.4	70.7	2012-14: -7.0 (-13.0 ; -0.6) [b]	2014-21: 0.7 (-0.2 ; 1.6)
United Kingdom - England, Northern Ireland and Wales	HHD	20.0	20.6	20.6	20.0	20.7	22.2	22.8	23.9	25.4	27.4	2012-16: 0.5 (-1.8 ; 2.8)	2016-21: 5.6 (3.9 ; 7.3) [b]
	PD	80.2	76.2	74.7	72.5	71.4	69.1	69.0	70.2	72.2	72.4	2012-17: -2.8 (-3.6 ; -2.1) [b]	2017-21: 1.4 (0.3 ; 2.5) [b]
United Kingdom - Scotland	HHD	15.9	13.4	13.8	13.4	13.8	12.1	12.5	12.4	9.5	10.7	2012-21: -4.1 (-5.9 ; -2.3) [b]	
	PD	58.5	55.5	51.0	53.1	53.6	44.4	47.2	46.3	43.6	42.9	2012-21: -3.3 (-4.4 ; -2.2) [b]	

[a] Time periods are defined by a statistically significant joinpoint and could therefore differ between countries and regions. [b] A statistically significant increase or decrease over time.
Rates were standardised to the age and sex distribution of the EU27 reference population.
ESKD: end-stage kidney disease, pmp: per million population, HHD: Home haemodialysis, PD: peritoneal dialysis.

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Table 4. Crude KRT modality distribution of prevalent ESKD patients receiving kidney replacement therapy in European countries from 2012 to 2021, by country / region

Country / region	Number and percentage of patients receiving home dialysis, in-centre HD, or living with a kidney transplant on December 31st																			
	2012		2013		2014		2015		2016		2017		2018		2019		2020		2021	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
All countries																				
- PD or HHD	15323	6.2	15649	6.1	15782	6.0	15855	5.9	16192	5.8	16408	5.8	16556	5.7	16782	5.6	17279	5.8	17521	5.8
- HHD	1897	0.8	1987	0.8	2086	0.8	2138	0.8	2309	0.8	2498	0.9	2686	0.9	2821	0.9	3022	1.0	3267	1.1
- PD	13426	5.4	13662	5.4	13696	5.2	13717	5.1	13883	5.0	13910	4.9	13870	4.8	13961	4.7	14257	4.8	14254	4.7
- ICHD	114108	46.0	116330	45.7	119415	45.5	122042	45.2	124418	44.9	126330	44.4	128288	44.1	130656	43.9	130426	43.7	131884	43.7
- Kidney transplantation	116890	47.2	121401	47.7	126032	48.0	130587	48.4	135430	48.8	140584	49.4	145101	49.9	149388	50.2	150129	50.3	151620	50.3
- Unknown	1488	0.6	1346	0.5	1378	0.5	1339	0.5	1335	0.5	1194	0.4	1095	0.4	943	0.3	849	0.3	677	0.2
Austria																				
- HHD	1	0	2	0	2	0	1	0	2	0	3	0	2	0	1	0	0	0	1	0
- PD	384	4.6	420	4.9	398	4.6	389	4.4	394	4.5	359	4.0	350	3.9	345	3.9	333	3.7	325	3.7
- ICHD	3904	46.8	3980	46.6	4027	46.6	4093	46.8	4112	46.5	4209	47.0	4133	46.6	4228	47.4	4210	47.3	4229	47.6
- Kidney transplantation	4057	48.6	4142	48.5	4207	48.7	4260	48.7	4333	49.0	4381	48.9	4376	49.4	4334	48.6	4358	48.9	4333	48.7
- Unknown	1	0	1	0	2	0	2	0	1	0	0	0	4	0	7	0.1	9	0.1	3	0
Belgium - Dutch-speaking																				
- HHD	17	0.2	18	0.2	24	0.3	29	0.4	29	0.4	31	0.4	41	0.5	51	0.6	62	0.7	78	0.9
- PD	368	4.8	360	4.6	340	4.3	339	4.2	344	4.2	352	4.2	347	4.1	360	4.2	362	4.2	341	3.9
- ICHD	4057	53.0	4116	52.9	4190	52.9	4211	52.3	4216	51.6	4273	51.3	4306	51.1	4400	51.2	4375	51.2	4464	51.7
- Kidney transplantation	3214	42.0	3280	42.2	3370	42.5	3477	43.2	3580	43.8	3668	44.1	3735	44.3	3780	44.0	3753	43.9	3757	43.5
- Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Belgium - French-speaking																				
- HHD	50	0.9	56	1	54	0.9	57	1.0	66	1.1	78	1.2	84	1.3	97	1.5	111	1.7	132	1.9
- PD	266	4.8	266	4.7	287	4.9	280	4.7	272	4.4	275	4.3	281	4.3	291	4.4	281	4.2	260	3.8
- ICHD	2886	52.4	2962	52.5	3054	52.5	3148	52.5	3252	52.6	3277	51.7	3369	51.5	3476	52.4	3434	51.8	3570	52.3
- Kidney transplantation	2299	41.8	2361	41.8	2419	41.6	2497	41.7	2581	41.8	2695	42.5	2802	42.8	2762	41.6	2797	42.2	2857	41.8
- Unknown	2	0	2	0	3	0.1	9	0.2	10	0.2	10	0.2	9	0.1	9	0.1	9	0.1	10	0.1
Bosnia and Herzegovina																				
- HHD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- PD	83	3.3	84	3.2	79	3.0	90	3.4	89	3.3	85	3.2	95	3.5	98	3.6	92	3.6	75	3.1
- ICHD	2244	89.3	2326	89.1	2361	88.6	2293	86.2	2300	85.2	2242	84.1	2260	83.3	2222	82.5	2065	81.4	1928	80.8
- Kidney transplantation	186	7.4	202	7.7	225	8.4	277	10.4	311	11.5	339	12.7	359	13.2	372	13.8	380	15.0	384	16.1
- Unknown	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark																				
- HHD	154	3.2	158	3.2	151	3.0	157	3.0	167	3.1	179	3.3	189	3.4	189	3.4	179	3.2	165	2.9
- PD	519	10.8	546	11.2	564	11.1	533	10.3	559	10.5	554	10.1	551	10.0	507	9.2	510	9.1	513	9.0
- ICHD	1916	39.8	1871	38.2	1940	38.1	1922	37.1	1905	35.9	1952	35.8	1914	34.8	1861	33.6	1853	32.9	1873	32.7
- Kidney transplantation	2219	46.0	2306	47.1	2421	47.5	2552	49.3	2667	50.2	2765	50.6	2835	51.5	2976	53.7	3079	54.7	3168	55.4
- Unknown	11	0.2	14	0.3	16	0.3	14	0.3	12	0.2	10	0.2	11	0.2	4	0.1	5	0.1	4	0.1
Finland																				

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- HHD	95	2.2	104	2.4	112	2.5	132	2.9	136	2.8	139	2.8	163	3.3	148	2.9	129	2.5	114	2.2
- PD	319	7.4	349	7.9	332	7.4	327	7.1	362	7.6	386	7.9	360	7.2	302	5.9	306	5.9	295	5.7
- ICHD	1361	31.7	1366	31.0	1363	30.5	1393	30.4	1443	30.2	1485	30.3	1506	30.2	1559	30.6	1542	29.8	1500	28.9
- Kidney transplantation	2522	58.7	2581	58.7	2662	59.6	2727	59.6	2832	59.3	2898	59.0	2960	59.3	3081	60.5	3201	61.8	3281	63.2
- Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
France																				
- HHD	233	0.3	240	0.3	286	0.4	306	0.4	357	0.4	421	0.5	473	0.5	533	0.6	642	0.7	703	0.8
- PD	2665	3.6	2837	3.8	2880	3.7	2917	3.6	2898	3.5	2958	3.5	2921	3.3	2982	3.3	2971	3.3	3008	3.3
- ICHD	36517	49.9	37834	50.1	39428	50.3	40787	50.4	41722	50.1	42816	50.0	43937	50.0	45012	50.1	45545	50.4	46085	50.5
- Kidney transplantation	32403	44.3	33392	44.3	34538	44.1	35806	44.2	37138	44.6	38510	44.9	39600	45.1	40613	45.2	40508	44.9	40905	44.9
- Unknown	1306	1.8	1152	1.5	1179	1.5	1122	1.4	1102	1.3	972	1.1	873	1.0	729	0.8	643	0.7	486	0.5
Greece																				
- HHD	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- PD	643	5.1	646	5.1	668	5.1	684	5.2	699	5.1	695	4.9	699	4.8	660	4.4	655	4.3	615	4.0
- ICHD	9350	74.6	9539	74.7	9764	74.9	10035	75.6	10549	76.6	10853	76.8	11316	77.4	11787	78.1	11749	77.8	11810	77.7
- Kidney transplantation	2545	20.3	2592	20.3	2602	20.0	2554	19.2	2528	18.4	2576	18.2	2596	17.8	2642	17.5	2692	17.8	2769	18.2
- Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Iceland																				
- HHD	2	0.9	1	0.5	1	0.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- PD	21	9.9	24	11.2	16	7.5	9	4.3	13	6.0	19	7.5	19	7.4	15	5.3	18	6.1	17	5.5
- In-centre HD	53	25.0	47	22.0	53	25.0	51	24.4	54	24.9	66	26.2	54	20.9	71	24.9	71	24.0	72	23.4
- Kidney transplantation	136	64.2	142	66.4	142	67.0	149	71.3	150	69.1	167	66.3	185	71.7	199	69.8	207	69.9	219	71.1
- Unknown	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Norway																				
- HHD	11	0.2	15	0.3	14	0.3	17	0.4	17	0.3	29	0.6	27	0.5	33	0.6	47	0.9	52	1.0
- PD	196	4.4	197	4.3	188	4.0	210	4.4	261	5.3	303	5.9	344	6.6	343	6.5	409	7.6	399	7.4
- ICHD	1066	24.0	1086	23.9	1155	24.6	1172	24.4	1208	24.5	1242	24.4	1265	24.3	1324	25.0	1317	24.5	1356	25.1
- Kidney transplantation	3163	71.3	3254	71.5	3334	71.1	3401	70.9	3447	69.9	3526	69.1	3561	68.5	3603	67.9	3605	67.0	3589	66.4
- Unknown	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	3	0.1	8	0.1
Spain																				
- HHD	59	0.1	62	0.1	76	0.2	79	0.2	110	0.2	148	0.3	182	0.3	200	0.3	231	0.4	290	0.5
- PD	2553	5.4	2657	5.5	2766	5.5	2786	5.4	2787	5.3	2800	5.2	2760	5.0	2754	4.8	2788	4.9	2843	4.9
- ICHD	20669	43.7	20924	43.1	21281	42.7	21482	42.0	22059	41.7	22095	40.8	22325	40.1	22738	39.8	22729	39.6	23169	39.6
- Kidney transplantation	23894	50.6	24773	51.1	25666	51.5	26685	52.2	27782	52.6	29048	53.6	30252	54.4	31410	54.9	31630	55.0	32182	55.0
- Unknown	73	0.2	76	0.2	81	0.2	96	0.2	116	0.2	105	0.2	99	0.2	96	0.2	85	0.1	77	0.1
Sweden																				
- HHD	135	1.6	150	1.7	148	1.6	137	1.5	137	1.4	138	1.4	135	1.4	118	1.2	122	1.2	115	1.1
- PD	771	8.9	824	9.3	806	8.9	826	8.9	876	9.2	880	9.0	827	8.4	860	8.5	907	8.9	919	8.9
- ICHD	2882	33.1	2847	32.1	2904	31.9	2952	31.8	3011	31.6	3056	31.4	3091	31.4	3122	31.0	3049	30.0	3135	30.4
- Kidney transplantation	4905	56.4	5042	56.9	5237	57.6	5354	57.7	5513	57.8	5659	58.1	5795	58.8	5956	59.2	6073	59.8	6148	59.6
- Unknown	2	0	2	0	3	0	3	0	5	0.1	3	0	3	0	5	0	3	0	1	0
The Netherlands																				

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- HHD	204	1.4	220	1.4	247	1.5	275	1.7	293	1.8	264	1.6	283	1.6	287	1.6	272	1.5	275	1.5
- PD	968	6.4	914	5.9	875	5.5	872	5.3	877	5.3	885	5.2	901	5.2	932	5.3	993	5.6	977	5.5
- ICHD	5215	34.7	5317	34.2	5327	33.4	5329	32.5	5164	31.0	5093	30.2	5064	29.4	5092	28.9	5001	28.3	5010	28.2
- Kidney transplantation	8659	57.6	9086	58.5	9518	59.6	9920	60.5	10304	61.9	10649	63.0	10955	63.7	11291	64.1	11400	64.5	11499	64.7
- Unknown	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	2	0
United Kingdom - England, Northern																				
- HHD	869	1.8	904	1.8	912	1.7	891	1.7	936	1.7	1016	1.8	1053	1.8	1110	1.9	1185	2.0	1294	2.2
- PD	3433	7.0	3312	6.6	3286	6.3	3233	6.0	3227	5.8	3170	5.6	3210	5.5	3308	5.5	3440	5.8	3476	5.8
- ICHD	20169	41.2	20339	40.3	20793	39.8	21347	39.7	21608	39.0	21806	38.3	21894	37.5	21941	36.8	21688	36.4	21877	36.5
- Kidney transplantation	24462	50.0	25899	51.3	27205	52.1	28342	52.6	29582	53.4	30888	54.3	32143	55.1	33279	55.8	33311	55.9	33355	55.6
- Unknown	23	0	29	0.1	21	0	19	0	16	0	21	0	19	0	15	0	13	0	8	0
United Kingdom - Scotland																				
- HHD	66	1.5	56	1.3	58	1.3	57	1.2	59	1.2	52	1.0	54	1.1	54	1.0	42	0.8	48	0.9
- PD	237	5.4	226	5.0	211	4.6	222	4.7	225	4.6	189	3.8	205	4.0	204	3.9	192	3.7	191	3.6
- ICHD	1819	41.2	1776	39.7	1775	38.6	1827	38.3	1815	37.4	1865	37.3	1854	36.1	1823	34.7	1798	34.3	1806	34.1
- Kidney transplantation	2226	50.4	2349	52.5	2486	54.0	2586	54.3	2682	55.3	2815	56.4	2947	57.4	3090	58.9	3135	59.8	3174	59.9
- Unknown	69	1.6	70	1.6	73	1.6	74	1.6	73	1.5	73	1.5	75	1.5	76	1.4	78	1.5	78	1.5

This table shows the crude prevalence of home dialysis, in-centre HD, and kidney transplantations and their percentages in relation to overall KRT (100%).
KRT: kidney replacement therapy, HHD: Home haemodialysis, PD: peritoneal dialysis, ICHD: in-centre haemodialysis.

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Table 5. Prior and next kidney replacement therapy (KRT) modality for ESKD patients starting home haemodialysis or peritoneal dialysis for the first time in European countries from 2012 to 2021, by time period

	Overall		Time periods				
	2012-2021 [a]		2012-2016		2017-2021 [a]		
HHD	N	%	N	%	N	%	p-value [b]
90 days prior to HHD:							<0.001
- Not yet receiving KRT	1171	14.9	422	12.8	749	16.3	
- ICHD	6032	76.6	2607	79.1	3425	74.7	
- PD	374	4.7	151	4.6	223	4.9	
- Kidney transplantation	282	3.6	107	3.2	175	3.8	
- Recovery renal function	14	0.2	6	0.2	8	0.2	
- Unknown	5	0.1	1	0.0	4	0.1	
After HHD (within 2 years) [c]:							0.660
- Still on HHD after 2 years	3193	53.2	1773	53.8	1420	52.5	
- ICHD	996	16.6	528	16.0	468	17.3	
- PD	38	0.6	21	0.6	17	0.6	
- Kidney transplantation	1255	20.9	697	21.2	558	20.6	
- Unknown	2	0.0	1	0.0	1	0.0	
- Recovery of kidney function	21	0.4	11	0.3	10	0.4	
- Loss to follow-up	9	0.2	7	0.2	2	0.1	
- Death	485	8.1	256	7.8	229	8.5	
PD	N	%	N	%	N	%	p-value [b]
90 days prior to PD:							0.003
- Not yet receiving KRT	56697	86.9	27811	86.6	28886	87.2	
- ICHD	6351	9.7	3205	10.0	3146	9.5	
- HHD	27	0.0	13	0.0	14	0.0	
- Kidney transplantation	1883	2.9	912	2.8	971	2.9	
- Recovery renal function	173	0.3	86	0.3	87	0.3	
- Unknown	115	0.2	76	0.2	39	0.1	
After PD (within 2 years) [c]:							0.010
- Still on PD after 2 years	20669	39.6	12601	39.3	8068	40.2	
- ICHD	11781	22.6	7216	22.5	4565	22.7	
- HHD	145	0.3	73	0.2	72	0.4	
- Kidney transplantation	9556	18.3	5949	18.5	3607	18.0	
- Unknown	61	0.1	32	0.1	29	0.1	
- Recovery of kidney function	736	1.4	474	1.5	262	1.3	
- Loss to follow-up	169	0.3	106	0.3	63	0.3	
- Death	9067	17.4	5652	17.6	3415	17.0	

[a] The situation after home dialysis is defined as the first permanent transition that took place within 2 years after the start of home dialysis, and therefore the cohort end year was set at 2019 for these analyses.

[b] Comparing the time periods 2012-2016 and 2017-2021.

[c] A change between modalities was only considered as a transition if the patient was on the new modality for 90 days or longer.

KRT: kidney replacement therapy, HHD: Home haemodialysis, PD: peritoneal dialysis, ICHD: in-centre haemodialysis.

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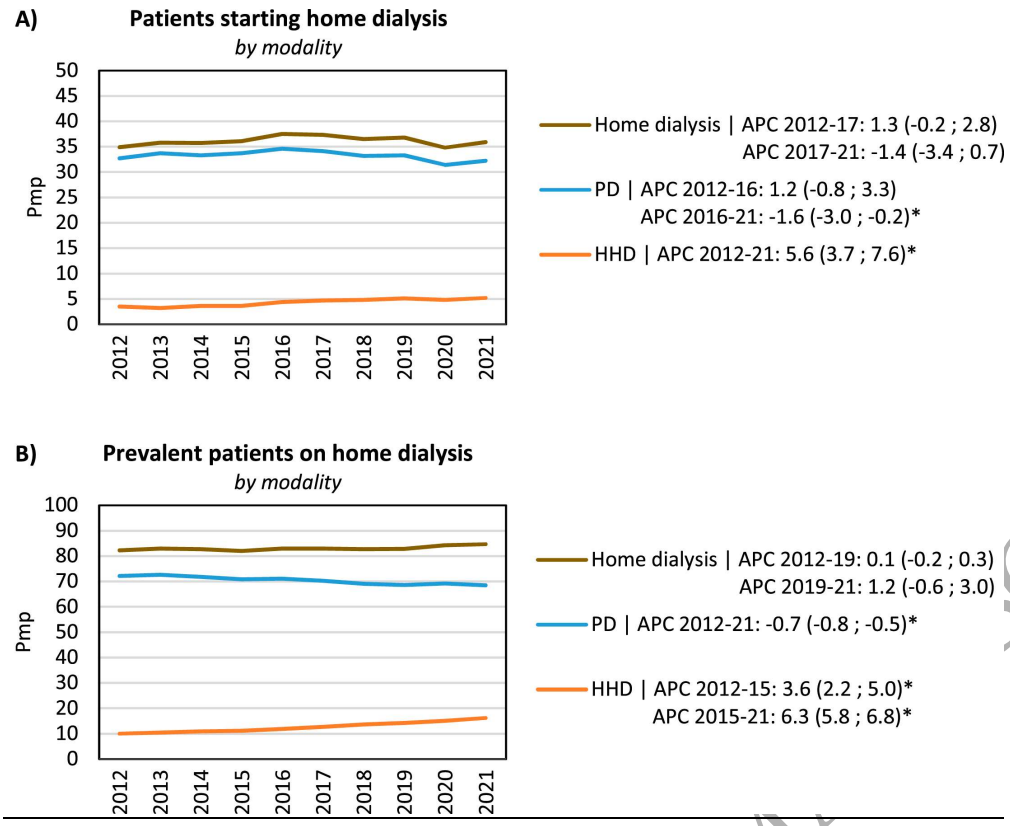

Figure 1. Standardised number pmp of ESKD patients starting any form of home dialysis, home haemodialysis or peritoneal dialysis for the first time (panel A), and the standardised prevalence pmp of ESKD patients receiving any form of home dialysis, home haemodialysis or peritoneal dialysis (panel B) in European countries from 2012 to 2021. The asterisk (*) indicates a statistically significant increase or decrease. Time periods are defined by a statistically significant joinpoint and could therefore differ between subgroups .Rates were standardised to the age and sex distribution of the EU27 reference population. Pmp: per million population, PD peritoneal dialysis, HHD: Home haemodialysis, APC: annual percent change.

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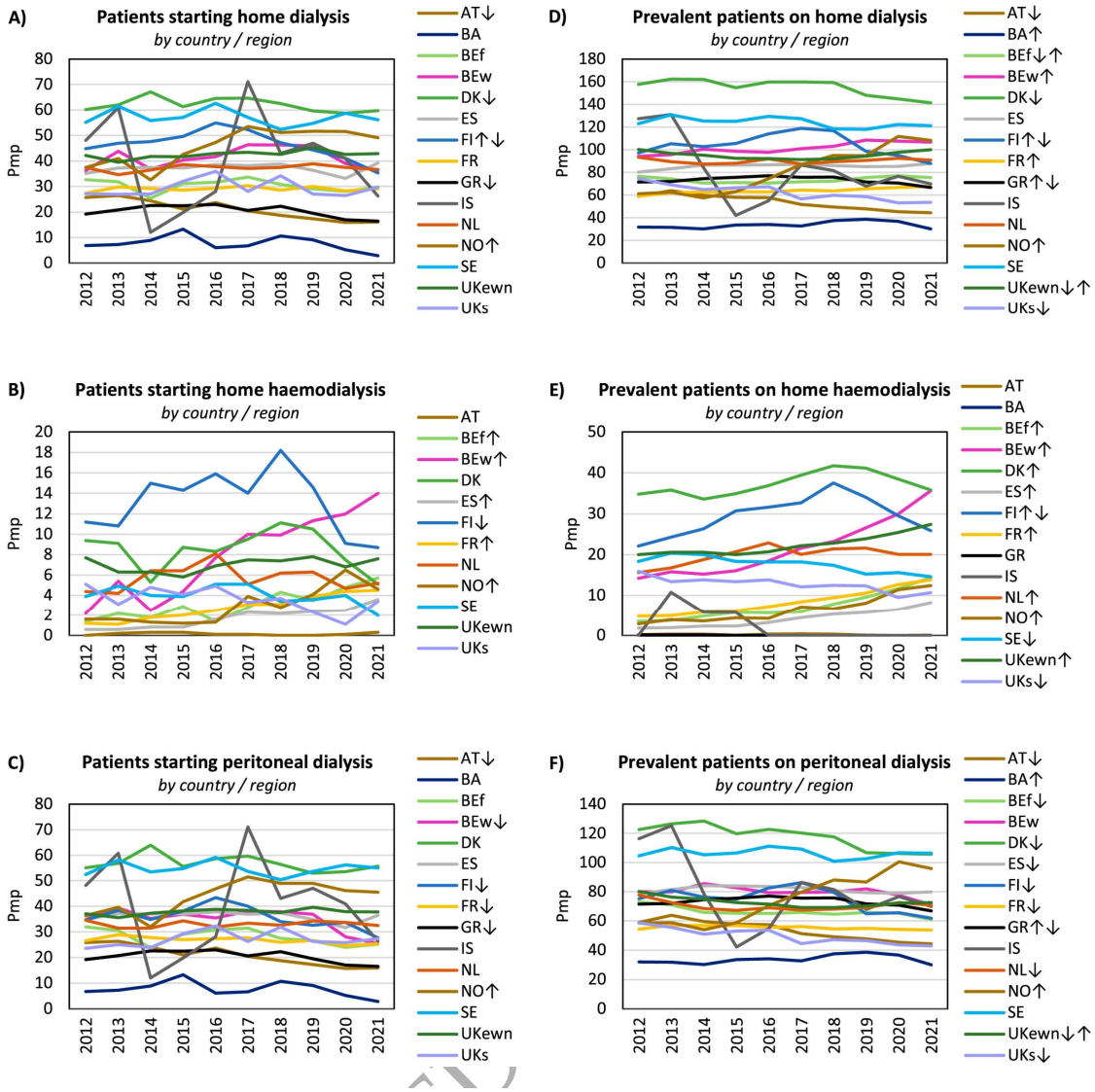

Figure 2. Standardised number pmp of ESKD patients starting any form of home dialysis (panel A), home haemodialysis (panel B) or peritoneal dialysis (panel C) for the first time, and the standardised prevalence pmp of patients with ESKD receiving any form of home dialysis (panel D), home haemodialysis (panel E) or peritoneal dialysis (panel F) in European countries from 2012 to 2021, by country / region. The scale on the y-axis is different for each panel. An upward or downward arrow indicates a statistically significant increase or decrease for at least part of the time period (see Tables 1 and 3). Rates were standardised to the age and sex distribution of the EU27 reference population. Pmp: per million population, AT: Austria, BA: Bosnia and Herzegovina, BEf: Belgium - Dutch-speaking, BEw: Belgium - French-speaking, DK: Denmark, ES: Spain, FI: Finland, FR: France, GR: Greece, IS: Iceland, NL: The Netherlands, NO: Norway, SE: Sweden, UKewn: United Kingdom - England, Northern Ireland and Wales, UKs: United Kingdom - Scotland.

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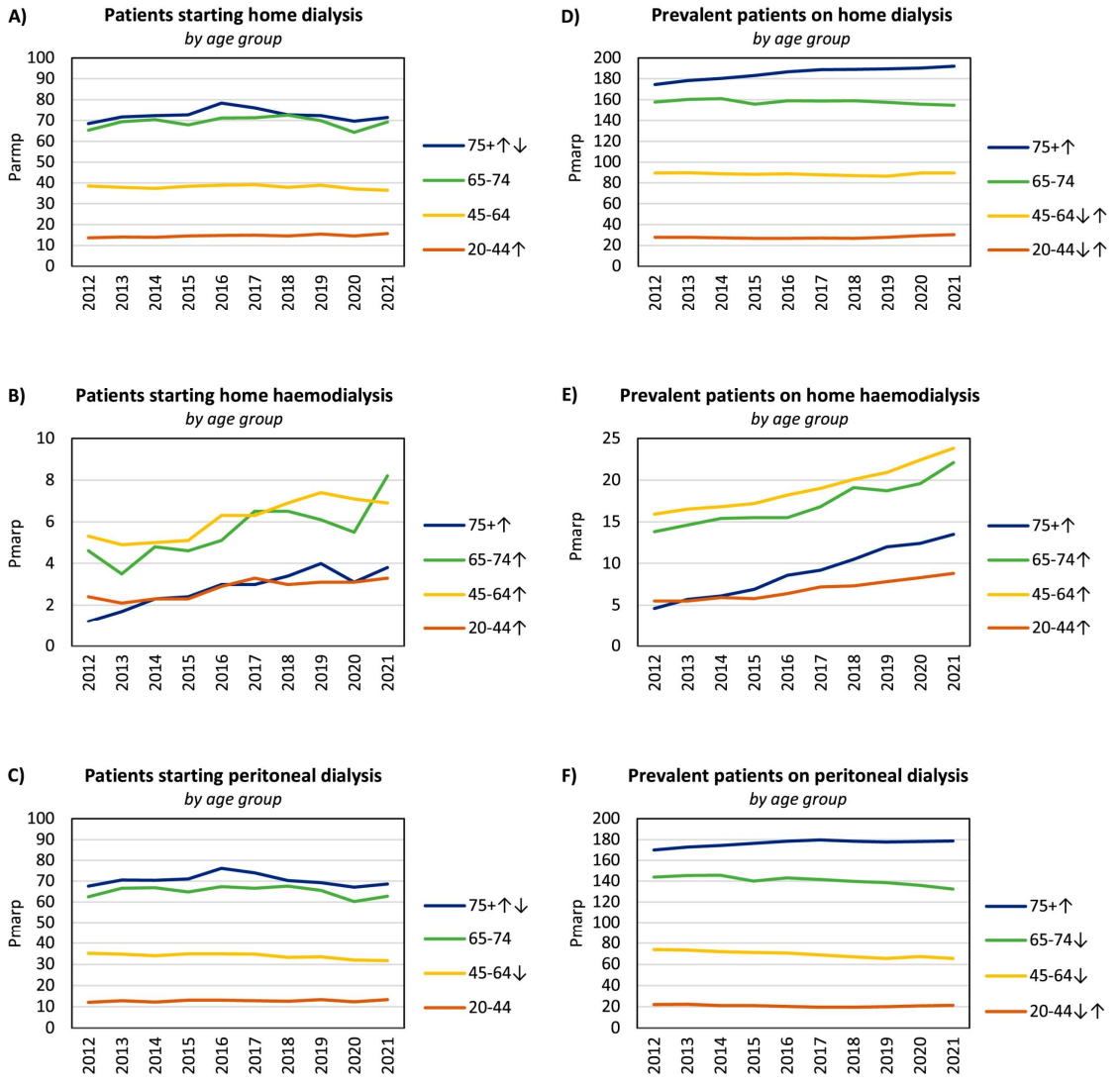

Figure 3. Standardised number pmarp of ESKD patients starting any form of home dialysis (panel A), home haemodialysis (panel B) or peritoneal dialysis (panel C) for the first time, and the standardised prevalence pmarp of patients with ESKD receiving any form of home dialysis (panel D), home haemodialysis (panel E) or peritoneal dialysis (panel F) in European countries from 2012 to 2021, by age group. The scale on the y-axis is different for each panel. An upward or downward arrow indicates a statistically significant increase or decrease for at least part of the time period (see Table S2). Rates were standardised to the age and sex distribution of the EU27 reference population within the specific subgroups. Pmarp: per million age-related population.

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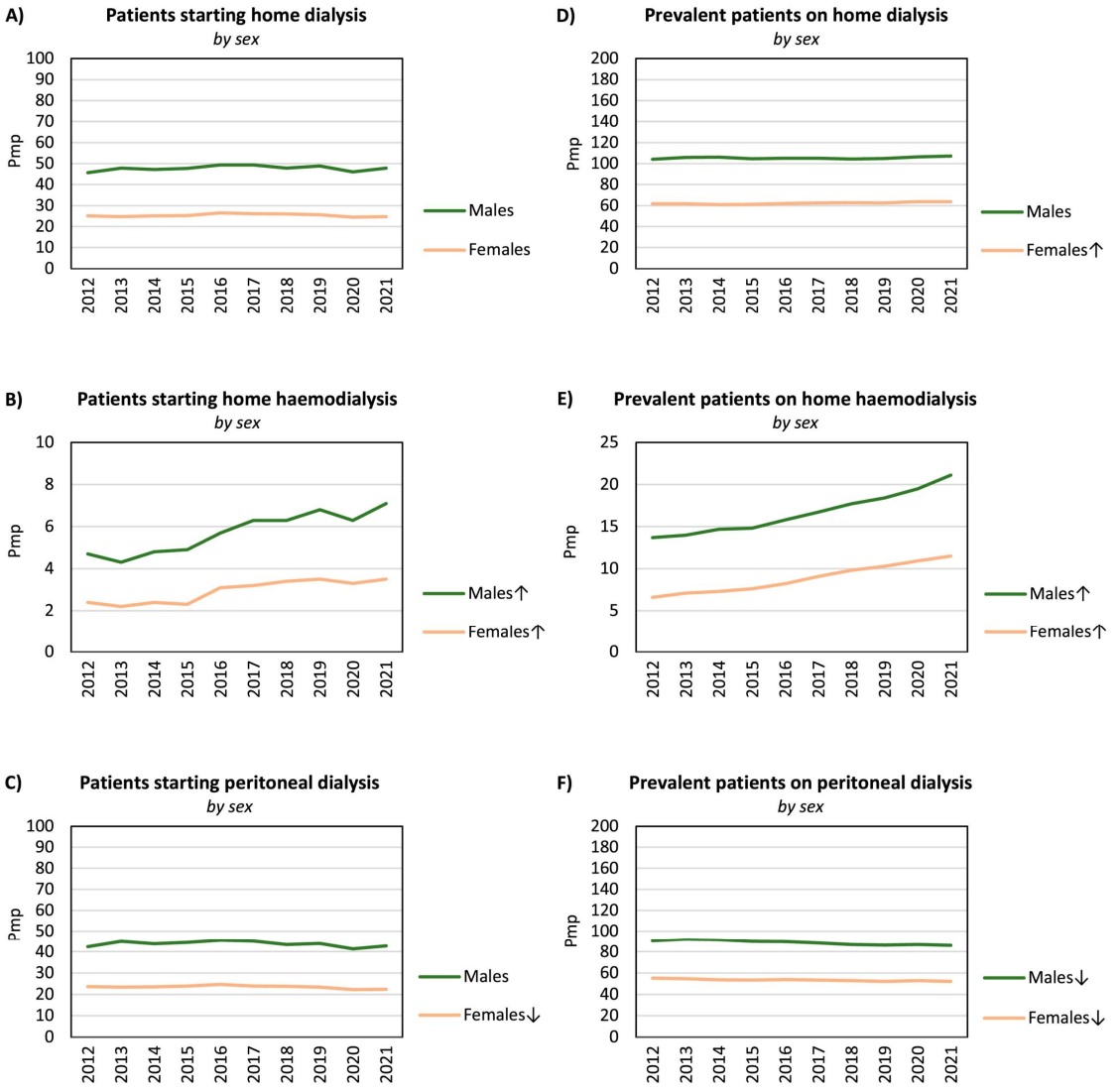

Figure 4. Standardised number pmp of ESKD patients starting any form of home dialysis (panel A), home haemodialysis (panel B) or peritoneal dialysis (panel C) for the first time, and the standardised prevalence pmarp of patients with ESKD receiving any form of home dialysis (panel D), home haemodialysis (panel E) or peritoneal dialysis (panel F) in European countries from 2012 to 2021, by sex. The scale on the y-axis is different for each panel. An upward or downward arrow indicates a statistically significant increase or decrease for at least part of the time period (see Table S3). Rates were standardised to the age distribution of the EU27 reference population within the specific subgroups. Pmp: per million population.

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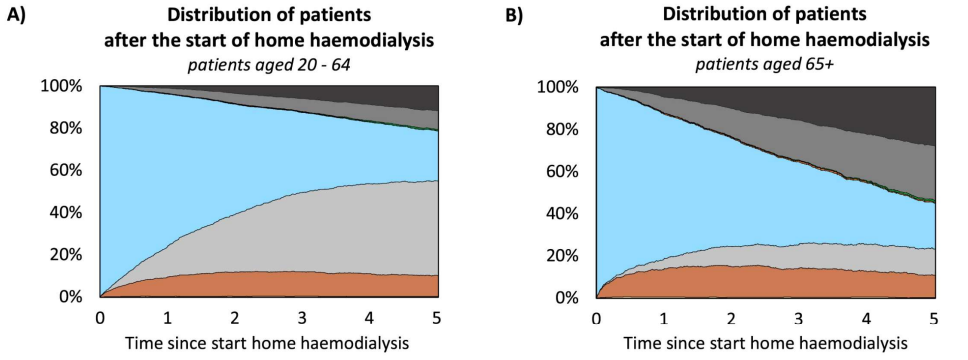
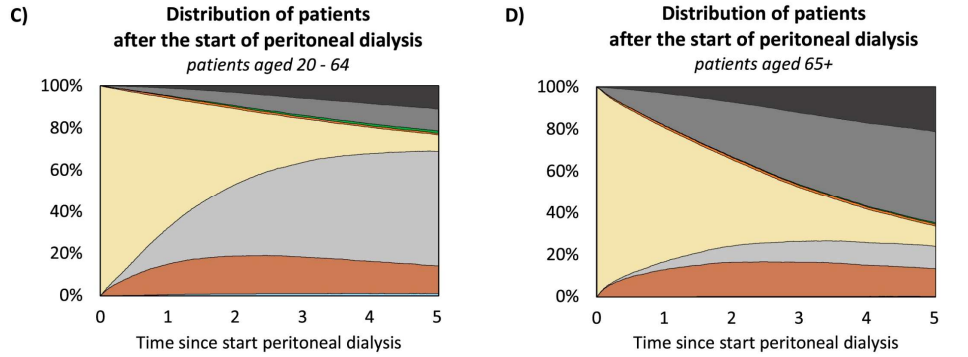


Death while on other KRT	0	1.0	3.4	5.9	8.7	11.6		0	4.6	10.0	15.6	22.3	27.6
Death while on HHD	0	2.4	4.8	6.2	7.7	8.9		0	7.6	13.5	19.0	22.4	26.0
Loss to follow-up	0	0.1	0.2	0.2	0.4	0.6		0	0.2	0.3	0.3	0.4	0.8
Recovery kidney function	0	0.2	0.2	0.2	0.2	0.1		0	0.4	0.4	0.6	0.5	0.6
Home haemodialysis	100	72.2	52.2	37.8	29.3	23.7		100	68.3	51.4	38.8	29.1	21.5
Functioning kidney graft	0	14.6	27.5	37.7	42.6	44.8		0	4.8	9.5	11.5	12.7	12.6
In-centre haemodialysis	0	10.4	12.3	12.1	11.1	10.1		0	13.7	14.5	13.9	12.2	10.6
Peritoneal dialysis	0	0.3	0.3	0.4	0.3	0.3		0	0.4	0.4	0.3	0.4	0.3



Death while on other KRT	0	1.0	3.1	5.8	8.3	10.9		0	2.9	7.1	12.1	16.9	21.2
Death while on PD	0	3.5	6.3	8.1	9.6	10.4		0	15.1	26.0	34.2	39.9	43.7
Loss to follow-up	0	0.3	0.6	0.8	1.0	1.1		0	0.2	0.3	0.4	0.4	0.6
Recovery kidney function	0	0.8	0.9	0.9	0.8	0.7		0	1.0	1.0	1.0	1.0	1.0
Peritoneal dialysis	100	62.1	35.8	20.8	12.5	7.7		100	64.1	41.4	25.9	15.9	9.6
Functioning kidney graft	0	17.2	34.4	45.3	51.5	54.9		0	3.8	7.8	9.9	10.8	10.8
In-centre haemodialysis	0	13.6	16.9	16.5	14.9	12.9		0	12.7	16.1	16.1	14.8	13.0
Home haemodialysis	0	0.5	0.9	1.0	1.1	1.0		0	0.1	0.2	0.3	0.3	0.3

Figure 5. Distribution of ESKD patients during the first five years after starting home haemodialysis (panel A and B) or peritoneal dialysis (panel C and D) for the first time in European countries from 2012 to 2021, by age group. HHD: Home haemodialysis, KRT: Kidney replacement therapy.

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