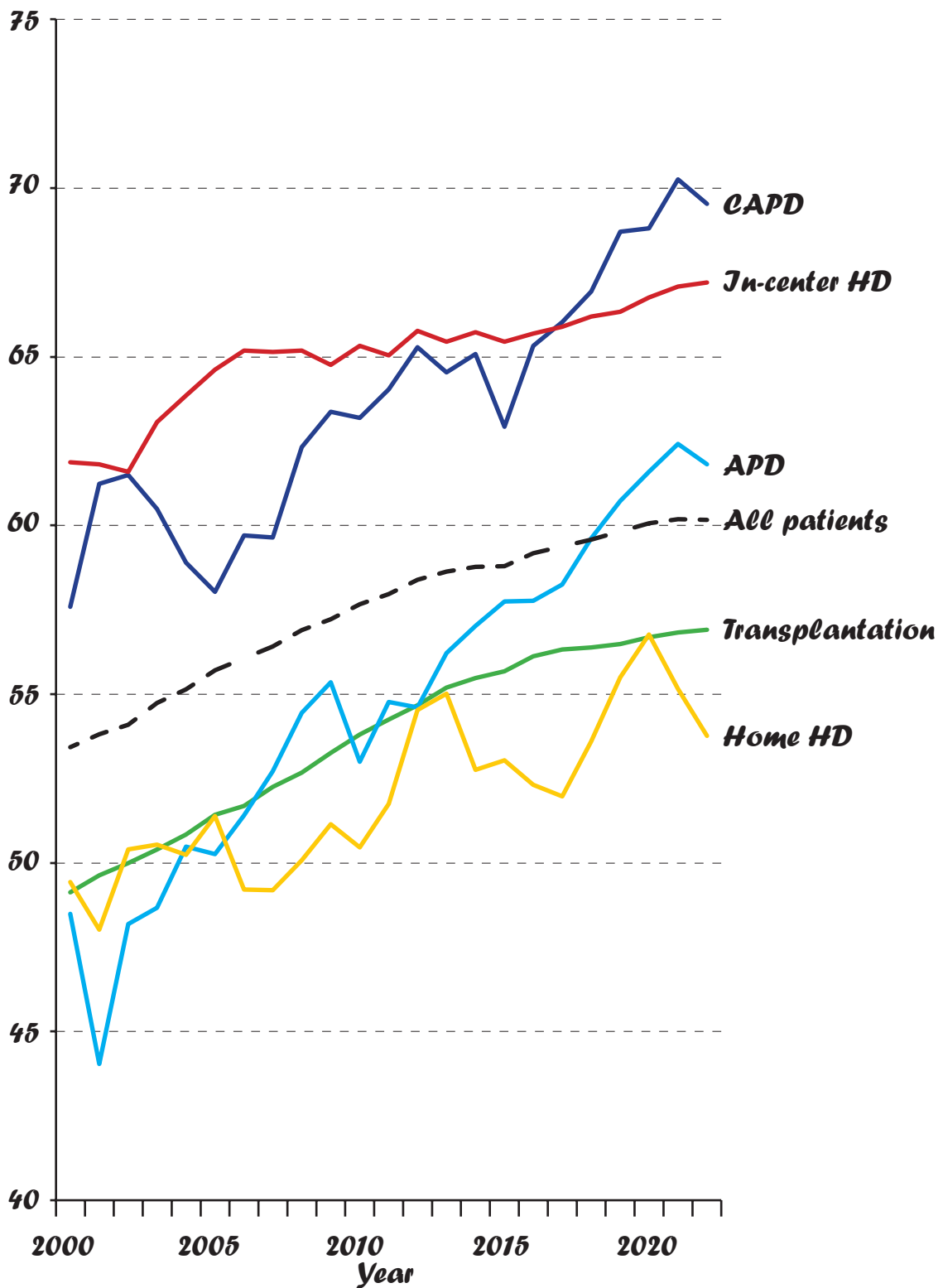


Report 2022

Finnish Registry for Kidney Diseases

Mean age on kidney replacement therapy (years)



Finnish Registry for Kidney Diseases – Report 2022

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Board of the Finnish Registry for Kidney Diseases

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Finnish Registry for Kidney Diseases 2022

The Finnish Registry for Kidney Diseases is one of the oldest registers measuring and reporting on the quality of care in Finland. The registry has collected data on almost all patients receiving chronic kidney replacement therapy in Finland since 1964 and has produced a report on the most important results for more than 30 years. Large changes took place in the operation of the registry in 2023. The registry was granted statutory status and during the year preparations were made for the transfer of responsibility for the registry from the Kidney and Liver Association to the Institute of Health and Welfare. An administrative decision authorizing the collection of data from wellbeing services counties entered into force in December 2023. This decision also obligates the delivery of data for the predialysis phase, but since the technical implementation of this data collection is still underway, the information will not be available for year 2023. For now, data are collected as previously through a separate data system. In the future, however, the goal will be to get information as widely as possible without duplicate recording from wellbeing services counties and partly from other databases, which would enable the expansion of the registry database without additional work in the units. From this point onwards, permission from the patient for data collection is no longer required.

In addition to the statutory status of the registry, reform of health and social services brought many changes last year. In the 2022 report, the results are presented by wellbeing services county and collaborative area. Although the new regional division only came into practice at the beginning of 2023, the report follows the new model also for previous years. As before, incidence and prevalence reports are prepared according to the region of the patient's hometown and reports related to the quality of treatment according to the region of the treating hospital.

In 2022, a total of 464 new patients started kidney replacement therapy, which is the same number as the year before, and the incidence was 84 patients per 1 million inhabitants. The prevalence decreased for the first time in history and was 943 patients per 1 million inhabitants. The number of hemodialysis patients decreased, and the number of kidney transplant

patients did not increase as before. In accordance with the goals, the number of peritoneal dialysis patients increased slightly, and patients were waitlisted for kidney transplantation faster than previously. The decrease in the number of kidney replacement therapy patients may partly be due to an increase in mortality after a decrease that had continued for years. Deaths related to corona infection explain a large part of the increased mortality. The mean age of both new patients and prevalent patients has increased significantly during this millennium, and the increase has been most significant in peritoneal dialysis patients. The decrease in prevalence can also be influenced by the lack of reporting related to the burden of health care personnel.

Legislation has secured the status of the Finnish Registry for Kidney Diseases, but there are challenges with funding due to the tightening financial situation in health care. There is still a lot of development work ahead, and this is not possible without sufficient resources. A comprehensive database is the basis of the registry, but the collected information is not useful if it is not comprehensively reported and utilized in, for example, peer development in order to improve quality of and equality in patient care.

International research has been a significant part of the registry's operations over recent decades. International peer-reviewed registry studies are one of the best ways to influence the development of treatments. The stricter regulations regarding the transfer of data threaten to hinder international research, but we will make every effort to enable this research to continue.

The operation of the registry would not be possible without excellent cooperation with all partners, which we hope will be even better in the coming years!

Jaakko Helve
Administrative Director

Patrik Finne
Chairman of the Board

Summary of Report

Finnish population (pages 9–10)

The Finnish population increased by 2.5% in 2012–2022. The population has grown most in collaborative area of Southern Finland and decreased in the collaborative area of Eastern Finland. The proportion of inhabitants older than 65 years has increased in all areas in 2012–2022. In 2022, the proportion of inhabitants aged under 20 years was highest (23%) in the collaboration area of Northern Finland, while the proportion of inhabitants aged 20–64 years was highest (59%) in the collaborative area of Southern Finland.

Incidence of KRT, number of patients entering KRT (pages 11–18)

In 2022, the incidence of kidney replacement therapy (KRT) was 84 patients per million inhabitants. Age- and sex-standardized incidence increased in 2013–2016, decreasing thereafter. Variation between collaborative areas has been small. However, significant variation has emerged between wellbeing service counties in 2018–2022 in the incidence of KRT, ranging from 66 patients per year per million inhabitants in Åland to 165 in Keski-Pohjanmaa. The difference is explained at least partly by differences in the age structure of the populations. Of new KRT patients in 2022, the incidence of KRT is the highest in the group of men aged 75 years or over. During the last five years the incidence of KRT in all patients was the highest in the age group 65–74 years. The mean age of the patients starting dialysis treatment during this millennium has increased, with the most significant change occurring in peritoneal dialysis patients. In international comparison, the incidence of RRT in Finland remains low.

In 2022, the most common kidney disease diagnosis of patients entering KRT was type 2 diabetes, as it has been for over 20 years. Glomerulonephritis and type 1 diabetes were the second and third most common kidney disease diagnoses. The incidence of nephrosclerosis has increased in this millennium. The incidence of polycystic disease has declined after a rise. The incidence of amyloidosis and tubulointers-

titial nephritis has decreased. In 2022, three months after the start of KRT, one-third of patients were on home dialysis (peritoneal dialysis or home hemodialysis) or had received a kidney transplantation; this proportion has increased slightly, with the proportion of kidney transplantation patients rising to 7% in 2022. The proportion of home dialysis has varied between 0% and 41% in wellbeing service counties in 2018–2022, but the variation was smaller between collaborative areas (25–34%).

Prevalence of KRT, number of patients at end of year (pages 19–27)

At the end of 2022, there were 1849 dialysis patients and 3391 kidney transplantation patients in Finland. There were 5240 patients receiving KRT, with this number decreasing for the first time in history. The number of dialysis patients decreased by 3% and the number of kidney transplantation patients remained stable relative to the end of 2021. The prevalence of KRT was 943 per million inhabitants. The prevalence has increased by 16% in ten years, increasing in all collaborative areas. The prevalence has increased the most in the age group 75 years and over (21%) and the least in the age group 65–74 years (2%). The mean age of KRT patients, especially those on peritoneal dialysis, increased in this millennium. The prevalence ranged from 809 to 1348 patients per million inhabitants in wellbeing service counties. Of all dialysis patients, 23% were on home dialysis at the end of 2022. In the wellbeing service counties, the proportion of home dialysis varied from 0% to 38%. The proportion of kidney transplant recipients of all KRT patients was 65%, increasing from previous years. The most frequent kidney disease diagnosis of all KRT patients and of kidney transplantation patients was glomerulonephritis. The most frequent kidney disease diagnosis of hemodialysis and peritoneal dialysis patients was type 2 diabetes and type 1 diabetes, respectively.

Changes in type of treatment (page 28)

In 2022, altogether 464 new patients started KRT, 509 patients died, and dialysis was discontinued in 11 patients after recovery of kidney function. Treatment was terminated in 79 patients, most of whom had been on hemodialysis (71 patients). During the year 250 patients received a kidney transplant, which is at the same level as in previous years. The number of home hemodialysis patients decreased by 5% and the number of in-center hemodialysis patients decreased by 4% in 2022. The number of peritoneal dialysis patients increased by 3%, while the number of kidney transplantation patients remained stable.

KRT patients' mortality (page 29)

In 2022, the mortality of KRT patients was 97 deaths per 1000 patient-years. This was higher than during the last years. Coronavirus infection was the cause of death in 53 patients, which partly explains the increased mortality.

Quality of care (pages 30–41)

For over ten years, since Report 2012, analyses of quality of care have been presented openly according to the healthcare district and region. The most central analyses are repeated in each annual report.

At the end of 2022, altogether 79% of dialysis patients reached a hemoglobin concentration of ≥ 100 g/l, but the proportion of patients with a hemoglobin concentration < 100 g/l has increased in ten years from 14% to 21%. In patients using erythropoiesis-stimulating agents, hemoglobin concentration was > 120 g/l in 15% and < 100 g/l in 23%. No temporal changes have occurred in serum phosphorus concentrations, but there are significant differences between areas in the treatment of hyperphosphatemia.

The median estimated glomerular filtration rate (GFR) of those who started KRT in 2022 was 7.5 ml/min/1.73 m². There were significant differences between areas in estimated GFR levels of patients star-

ting KRT between 2018 and 2022.

In 2022, the proportion of fistula or graft for vascular access in new hemodialysis patients was 45%. The proportion was at the same level as previously and varied significantly between areas. In all patients on hemodialysis, the proportion of catheters was 17% at the end of 2022.

Of patients on hemodialysis at the end of 2022, the proportion reaching therapeutic goals in blood pressure management of $< 140/90$ mmHg was 46% and no differences emerged between areas. The proportion of kidney transplant patients reaching the blood pressure target level of $< 130/80$ mmHg has increased gradually but was still only 24%.

The number of peritonitis episodes related to peritoneal dialysis (PD) has decreased between 2012 and 2022. Countrywide, the incidence rate was 0.31 peritonitis episodes per patient-year in 2018–2022, which is clearly below ISPD's 2022 international recommendation of less than 0.4 peritonitis episodes per patient-year.

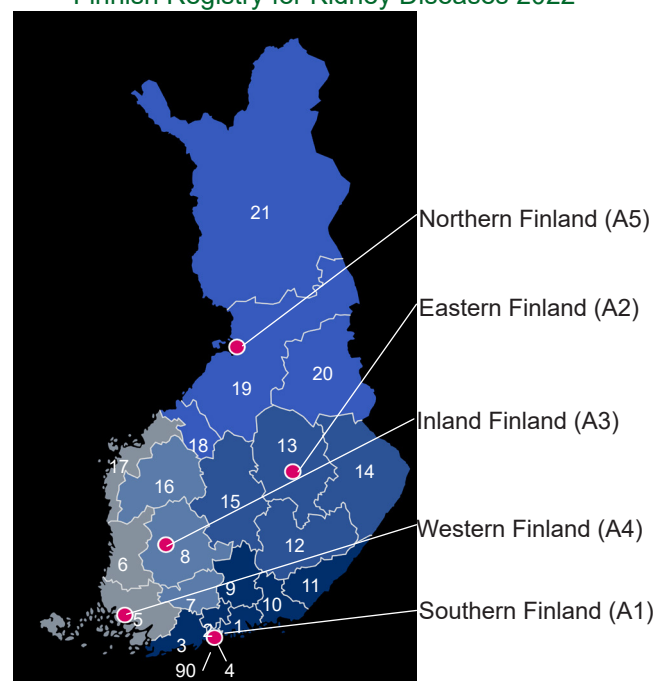
In 2022, 16% of patients were waitlisted for kidney transplantation at the beginning of KRT. The proportion has increased significantly from previous years. Also the proportion of those waitlisted within 180 days of start of KRT has increased slightly to 24%. Younger patients were waitlisted faster than older patients. Within 90 days of start of KRT in 2018–2022, 15% of patients had been waitlisted, but the proportion varied significantly by collaborative area (8–17%).

Nephrological follow-up had started with 79% of patients more than six months before the start of KRT in 2018–2022, but there was significant variation by area. In 2022, 10% of patients had nephrological follow-up less than a week before start of KRT.

Table 1. The Finnish population (as thousands of inhabitants) and its distribution in wellbeing services counties Finnish Registry for Kidney Diseases 2012–2022

| Wellbeing services county | | Year | | | | | Change (%) 2012–2022 |
|---------------------------|-------------------|------|------|------|------|------|-------------------------|
| | | 2012 | 2017 | 2020 | 2021 | 2022 | |
| 1 | Itä-Uusimaa | 95 | 97 | 98 | 99 | 99 | 4.0 |
| 2 | Keski-Uusimaa | 190 | 196 | 199 | 202 | 203 | 7.2 |
| 3 | Länsi-Uusimaa | 438 | 461 | 474 | 479 | 486 | 10.9 |
| 4 | Vantaa and Kerava | 240 | 259 | 274 | 276 | 280 | 17.0 |
| 5 | Varsinais-Suomi | 469 | 478 | 481 | 483 | 486 | 3.5 |
| 6 | Satakunta | 225 | 220 | 215 | 214 | 213 | -5.5 |
| 7 | Kanta-Häme | 175 | 173 | 171 | 170 | 170 | -3.4 |
| 8 | Pirkanmaa | 499 | 514 | 523 | 527 | 533 | 6.7 |
| 9 | Päijät-Häme | 210 | 208 | 206 | 205 | 205 | -2.4 |
| 10 | Kymenlaakso | 174 | 169 | 163 | 161 | 159 | -8.6 |
| 11 | Etelä-Karjala | 132 | 130 | 127 | 126 | 125 | -5.3 |
| 12 | Etelä-Savo | 144 | 139 | 133 | 132 | 130 | -9.7 |
| 13 | Pohjois-Savo | 254 | 252 | 248 | 248 | 248 | -2.3 |
| 14 | Pohjois-Karjala | 169 | 166 | 164 | 163 | 163 | -4.1 |
| 15 | Keski-Suomi | 273 | 274 | 273 | 273 | 272 | -0.1 |
| 16 | Etelä-Pohjanmaa | 199 | 196 | 192 | 192 | 191 | -4.1 |
| 17 | Pohjanmaa | 175 | 176 | 176 | 176 | 176 | 0.9 |
| 18 | Keski-Pohjanmaa | 69 | 69 | 68 | 68 | 68 | -1.2 |
| 19 | Pohjois-Pohjanmaa | 404 | 412 | 414 | 416 | 417 | 3.1 |
| 20 | Kainuu | 77 | 74 | 72 | 71 | 71 | -8.9 |
| 21 | Lappi | 183 | 179 | 177 | 176 | 176 | -3.9 |
| 90 | Helsinki | 604 | 643 | 657 | 658 | 664 | 9.9 |
| 91 | Åland | 29 | 29 | 30 | 30 | 30 | 6.5 |
| Area | | | | | | | |
| | Southern Finland | 2083 | 2162 | 2198 | 2207 | 2222 | 6.7 |
| | Eastern Finland | 840 | 831 | 817 | 816 | 813 | -3.2 |
| | Inland Finland | 873 | 883 | 886 | 889 | 893 | 2.2 |
| | Western Finland | 869 | 874 | 873 | 874 | 874 | 0.7 |
| | Northern Finland | 733 | 734 | 730 | 731 | 731 | -0.3 |
| Entire country | | 5427 | 5513 | 5534 | 5548 | 5564 | 2.5 |

Figure 1. Wellbeing services counties and collaborative areas in Finland Finnish Registry for Kidney Diseases 2022



On 31 December 2022, the population of Finland was 5.564 million (Table 1, Source: Statistics Finland). During the past ten years the population of the country has increased by 2.5%, with the fastest increase occurring in the Southern Finland collaborative area. The population in the Eastern Finland collaborative area has decreased. Among the wellbeing services counties, the population has increased most in Vantaa and Kerava, Länsi-Uusimaa, and Helsinki. In the wellbeing services counties of Etelä-Savo, Kainuu, and Kymenlaakso, the population has decreased especially rapidly.

The numbers in Figure 1 refer to the wellbeing services counties and collaborative areas listed in Table 1. In this report, for the first time, there is a division into wellbeing services counties and collaborative areas. It should be noted that the Western Finland collaborative area corresponds to the southwestern region of previous reports, and the Inland Finland collaborative area corresponds to the former western region.

Table 2. The Finnish population (as thousands of inhabitants) according to area, age group, and sex
Finnish Registry for Kidney Diseases 2012–2022

| Collaborative area | 2012 | | | | | 2022 | | | | |
|-----------------------|------------|-------------|-------------|-----------|------------|------------|-------------|-------------|-----------|------------|
| | 0–19 y (%) | 20–64 y (%) | 65–74 y (%) | ≥75 y (%) | Total | 0–19 y (%) | 20–64 y (%) | 65–74 y (%) | ≥75 y (%) | Total |
| Southern | | | | | | | | | | |
| Men | 235 (23) | 632 (62) | 94 (9) | 52 (5) | 1013 (100) | 235 (22) | 660 (61) | 112 (10) | 84 (8) | 1091 (100) |
| Women | 226 (21) | 638 (60) | 112 (10) | 95 (9) | 1071 (100) | 225 (20) | 645 (57) | 133 (12) | 128 (11) | 1131 (100) |
| Total | 461 (22) | 1270 (61) | 205 (10) | 147 (7) | 2083 (100) | 460 (21) | 1305 (59) | 245 (11) | 212 (10) | 2222 (100) |
| Eastern | | | | | | | | | | |
| Men | 91 (22) | 248 (60) | 46 (11) | 30 (7) | 415 (100) | 79 (20) | 223 (55) | 59 (15) | 42 (10) | 404 (100) |
| Women | 87 (21) | 236 (56) | 50 (12) | 52 (12) | 425 (100) | 76 (19) | 212 (52) | 62 (15) | 59 (15) | 409 (100) |
| Total | 178 (21) | 484 (58) | 96 (11) | 82 (10) | 840 (100) | 156 (19) | 435 (54) | 121 (15) | 101 (12) | 813 (100) |
| Inland | | | | | | | | | | |
| Men | 100 (23) | 258 (60) | 44 (10) | 29 (7) | 430 (100) | 94 (21) | 252 (57) | 54 (12) | 41 (9) | 442 (100) |
| Women | 96 (22) | 249 (56) | 49 (11) | 50 (11) | 443 (100) | 90 (20) | 241 (53) | 60 (13) | 60 (13) | 451 (100) |
| Total | 196 (22) | 506 (58) | 92 (11) | 79 (9) | 873 (100) | 184 (21) | 493 (55) | 115 (13) | 102 (11) | 893 (100) |
| Western | | | | | | | | | | |
| Men | 97 (23) | 253 (59) | 46 (11) | 31 (7) | 427 (100) | 90 (21) | 246 (57) | 54 (12) | 44 (10) | 433 (100) |
| Women | 92 (21) | 248 (56) | 51 (11) | 52 (12) | 442 (100) | 85 (19) | 234 (53) | 60 (14) | 62 (14) | 441 (100) |
| Total | 188 (22) | 501 (58) | 97 (11) | 82 (9) | 869 (100) | 175 (20) | 480 (55) | 114 (13) | 106 (12) | 874 (100) |
| Northern | | | | | | | | | | |
| Men | 93 (25) | 217 (59) | 35 (9) | 23 (6) | 368 (100) | 86 (23) | 203 (55) | 48 (13) | 32 (9) | 368 (100) |
| Women | 89 (24) | 202 (55) | 37 (10) | 37 (10) | 365 (100) | 82 (23) | 188 (52) | 49 (13) | 44 (12) | 363 (100) |
| Total | 182 (25) | 419 (57) | 72 (10) | 60 (8) | 733 (100) | 167 (23) | 391 (53) | 96 (13) | 77 (11) | 731 (100) |
| Entire country | | | | | | | | | | |
| Men | 619 (23) | 1616 (61) | 266 (10) | 166 (6) | 2667 (100) | 587 (21) | 1593 (58) | 329 (12) | 245 (9) | 2753 (100) |
| Women | 593 (21) | 1581 (57) | 300 (11) | 287 (10) | 2760 (100) | 561 (20) | 1529 (54) | 364 (13) | 356 (13) | 2810 (100) |
| Total | 1212 (22) | 3196 (59) | 565 (10) | 453 (8) | 5427 (100) | 1148 (21) | 3121 (56) | 694 (12) | 601 (11) | 5564 (100) |

Table 2 shows the age and sex distribution of the Finnish population at the end of 2012 and 2022. The mean age of the Finnish population has increased during the past ten years. The proportion of inhabitants older than 75 years has increased from 8% to 11%, and the proportion of 65–74-year-olds from 10% to 12%.

At the end of 2022, the proportion of inhabitants older than 65 years was the smallest, 21%, in the Southern Finland collaborative area, while it was 23–27% in the other areas. During the past ten years the proportion of inhabitants older than 65 years has increased by 27% in the entire country, and the growth has been the largest in the

Southern and Northern Finland collaborative areas.

The proportion of inhabitants aged 20–64 years was largest in the Southern Finland collaborative area, 59%, while it was 53–55% in the other areas. The proportion of 20–64-year-olds countrywide has decreased from 59% to 56%.

At the end of 2022, the proportion of inhabitants younger than 20 years was the largest, 23%, in the Northern Finland collaborative area, and it was 19–21% in the other areas. The number of inhabitants younger than 20 years has decreased by 5% during the past ten years.

Table 3. Number of new KRT patients and incidence of KRT by wellbeing services counties and collaborative areas Finnish Registry for Kidney Diseases 2012–2022

| Wellbeing services county | | Number of new KRT patients | | | | | Incidence of KRT/million inhabitants | | | | | | |
|---------------------------|-------------------|----------------------------|------|------|------|------|--------------------------------------|------|------|------|------|------|-------------------------|
| | | 2012 | 2017 | 2020 | 2021 | 2022 | 2018–2022 on average | 2012 | 2017 | 2020 | 2021 | 2022 | 2018–2022 on average |
| 1 | Itä-Uusimaa | 11 | 6 | 9 | 3 | 8 | 9 | 116 | 62 | 92 | 30 | 81 | 90 |
| 2 | Keski-Uusimaa | 13 | 23 | 22 | 20 | 12 | 17 | 69 | 117 | 110 | 99 | 59 | 87 |
| 3 | Länsi-Uusimaa | 31 | 29 | 24 | 36 | 24 | 32 | 71 | 63 | 51 | 75 | 49 | 67 |
| 4 | Vantaa and Kerava | 19 | 26 | 19 | 15 | 16 | 20 | 79 | 101 | 69 | 54 | 57 | 72 |
| 5 | Varsinais-Suomi | 44 | 56 | 46 | 42 | 38 | 43 | 94 | 117 | 96 | 87 | 78 | 88 |
| 6 | Satakunta | 24 | 28 | 17 | 24 | 23 | 22 | 107 | 127 | 79 | 112 | 108 | 104 |
| 7 | Kanta-Häme | 15 | 22 | 18 | 17 | 15 | 18 | 85 | 127 | 106 | 100 | 88 | 106 |
| 8 | Pirkanmaa | 44 | 55 | 58 | 48 | 51 | 54 | 88 | 107 | 111 | 91 | 96 | 102 |
| 9 | Päijät-Häme | 13 | 26 | 18 | 14 | 16 | 16 | 62 | 125 | 87 | 68 | 78 | 77 |
| 10 | Kymenlaakso | 16 | 9 | 16 | 9 | 16 | 14 | 92 | 53 | 98 | 56 | 100 | 86 |
| 11 | Etelä-Karjala | 12 | 14 | 12 | 19 | 14 | 14 | 91 | 108 | 95 | 151 | 112 | 113 |
| 12 | Etelä-Savo | 11 | 15 | 14 | 9 | 10 | 10 | 76 | 108 | 105 | 68 | 77 | 78 |
| 13 | Pohjois-Savo | 33 | 18 | 35 | 28 | 20 | 26 | 130 | 72 | 141 | 113 | 81 | 104 |
| 14 | Pohjois-Karjala | 7 | 23 | 15 | 12 | 25 | 18 | 41 | 138 | 92 | 73 | 154 | 110 |
| 15 | Keski-Suomi | 26 | 27 | 22 | 20 | 26 | 23 | 95 | 99 | 81 | 73 | 95 | 83 |
| 16 | Etelä-Pohjanmaa | 20 | 24 | 21 | 24 | 24 | 21 | 101 | 123 | 109 | 125 | 126 | 108 |
| 17 | Pohjanmaa | 16 | 23 | 16 | 17 | 3 | 14 | 92 | 130 | 91 | 97 | 17 | 78 |
| 18 | Keski-Pohjanmaa | 5 | 7 | 15 | 10 | 8 | 11 | 73 | 102 | 221 | 147 | 118 | 165 |
| 19 | Pohjois-Pohjanmaa | 31 | 40 | 51 | 39 | 40 | 43 | 77 | 97 | 123 | 94 | 96 | 103 |
| 20 | Kainuu | 6 | 6 | 8 | 4 | 7 | 8 | 77 | 81 | 112 | 56 | 99 | 106 |
| 21 | Lappi | 9 | 12 | 17 | 13 | 16 | 18 | 49 | 67 | 96 | 74 | 91 | 102 |
| 90 | Helsinki | 39 | 70 | 51 | 37 | 51 | 51 | 65 | 109 | 78 | 56 | 77 | 78 |
| 91 | Åland | 5 | 2 | 0 | 4 | 1 | 3 | 175 | 68 | 0 | 132 | 33 | 66 |
| Area | Southern Finland | 154 | 203 | 171 | 153 | 157 | 173 | 74 | 94 | 78 | 69 | 71 | 79 |
| | Eastern Finland | 77 | 83 | 86 | 69 | 81 | 77 | 92 | 100 | 105 | 85 | 100 | 94 |
| | Inland Finland | 79 | 101 | 97 | 89 | 90 | 92 | 90 | 114 | 110 | 100 | 101 | 104 |
| | Western Finland | 84 | 107 | 79 | 83 | 64 | 79 | 97 | 122 | 91 | 95 | 73 | 90 |
| | Northern Finland | 51 | 65 | 91 | 66 | 71 | 80 | 70 | 89 | 125 | 90 | 97 | 109 |
| Entire country | | 450 | 561 | 524 | 464 | 464 | 503 | 83 | 102 | 95 | 84 | 84 | 91 |
| | Children <15 y | 8 | 11 | 8 | 10 | 7 | 8 | 9 | 12 | 9 | 12 | 8 | 9 |

Table 3 shows the number of new KRT (dialysis and kidney transplantation) patients and the incidence of KRT according to wellbeing services county and collaborative area. The results on pages 11–29 are presented according to the patient's hometown. The numbers for the wellbeing services county of Åland have not been included in the collaborative areas.

In 2022, the incidence was 84 patients per million inhabitants. In 2018–2022, the average incidence was highest in the Inland Finland and Northern Finland collaborative areas and lowest in the Southern Finland collaborative area. In the wellbeing services counties, the average incidence during the same period was lowest in Åland (66 new KRT patients per million inhabitants) and highest in Keski-Pohjanmaa (165 per million inhabitants).

Table 4. Number of new KRT patients by age group in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2018–2022

| Wellbeing services county | | Average annual number of new KRT patients in 2018–2022 by age group (y) | | | | | | Incidence*/million inhabitants in 2018–2022 by age group (y) | | | | | |
|---------------------------|-------------------|---|-------|-------|-------|-------|-------|--|-------|-------|-------|-----|-------|
| | | 0–19 | 20–44 | 45–64 | 65–74 | ≥75 | Total | 0–19 | 20–44 | 45–64 | 65–74 | ≥75 | Total |
| 1 | Itä-Uusimaa | 0.2 | 0.8 | 2.2 | 3.2 | 2.4 | 9 | 9 | 30 | 79 | 256 | 253 | 90 |
| 2 | Keski-Uusimaa | 0.6 | 2.2 | 6.0 | 4.8 | 3.8 | 17 | 12 | 38 | 110 | 211 | 241 | 87 |
| 3 | Länsi-Uusimaa | 1.4 | 4.4 | 10.6 | 8.8 | 6.6 | 32 | 12 | 29 | 87 | 180 | 181 | 67 |
| 4 | Vantaa and Kerava | 0.4 | 4.2 | 6.6 | 5.0 | 3.4 | 20 | 6 | 42 | 99 | 194 | 186 | 72 |
| 5 | Varsinais-Suomi | 0.2 | 3.6 | 14.2 | 13.6 | 11.0 | 43 | 2 | 24 | 118 | 217 | 215 | 88 |
| 6 | Satakunta | 0.4 | 3.0 | 9.0 | 6.0 | 4.0 | 22 | 9 | 52 | 161 | 185 | 148 | 104 |
| 7 | Kanta-Häme | 0.4 | 3.0 | 6.2 | 3.8 | 4.6 | 18 | 11 | 66 | 135 | 154 | 237 | 106 |
| 8 | Pirkanmaa | 0.4 | 7.6 | 17.2 | 16.8 | 11.6 | 54 | 4 | 44 | 136 | 264 | 224 | 102 |
| 9 | Päijät-Häme | 0.6 | 1.2 | 6.0 | 4.8 | 3.2 | 16 | 15 | 22 | 111 | 153 | 130 | 77 |
| 10 | Kymenlaakso | 0.0 | 1.8 | 4.0 | 4.0 | 4.2 | 14 | 0 | 43 | 89 | 156 | 201 | 86 |
| 11 | Etelä-Karjala | 0.0 | 2.2 | 4.0 | 5.2 | 3.0 | 14 | 0 | 64 | 118 | 270 | 185 | 113 |
| 12 | Etelä-Savo | 0.0 | 1.8 | 3.0 | 3.4 | 2.2 | 10 | 0 | 57 | 82 | 147 | 116 | 78 |
| 13 | Pohjois-Savo | 1.0 | 4.6 | 9.4 | 6.2 | 4.6 | 26 | 20 | 65 | 145 | 171 | 165 | 104 |
| 14 | Pohjois-Karjala | 0.2 | 2.6 | 7.0 | 5.0 | 3.2 | 18 | 7 | 56 | 166 | 197 | 167 | 110 |
| 15 | Keski-Suomi | 0.8 | 3.8 | 8.8 | 7.6 | 1.6 | 23 | 14 | 45 | 132 | 211 | 57 | 83 |
| 16 | Etelä-Pohjanmaa | 0.8 | 2.8 | 6.8 | 6.4 | 4.0 | 21 | 19 | 54 | 140 | 232 | 180 | 108 |
| 17 | Pohjanmaa | 0.2 | 2.0 | 2.2 | 4.0 | 5.4 | 14 | 5 | 37 | 53 | 185 | 280 | 78 |
| 18 | Keski-Pohjanmaa | 0.0 | 1.0 | 3.0 | 3.2 | 4.0 | 11 | 0 | 53 | 186 | 352 | 562 | 165 |
| 19 | Pohjois-Pohjanmaa | 0.8 | 4.6 | 11.4 | 15.4 | 10.6 | 43 | 8 | 36 | 118 | 325 | 297 | 103 |
| 20 | Kainuu | 0.2 | 0.8 | 2.6 | 2.2 | 1.8 | 8 | 15 | 45 | 133 | 187 | 198 | 106 |
| 21 | Lappi | 0.4 | 3.0 | 6.6 | 6.0 | 2.0 | 18 | 11 | 61 | 141 | 228 | 102 | 102 |
| 90 | Helsinki | 0.8 | 9.4 | 18.8 | 11.6 | 11.0 | 52 | 7 | 35 | 123 | 184 | 216 | 79 |
| 91 | Åland | 0.0 | 0.0 | 1.2 | 0.2 | 0.6 | 2 | 0 | 0 | 149 | 52 | 193 | 66 |
| Area | Southern Finland | 4.0 | 26.2 | 58.2 | 47.4 | 37.6 | 173 | 9 | 35 | 104 | 190 | 195 | 79 |
| | Eastern Finland | 2.0 | 12.8 | 28.2 | 22.2 | 11.6 | 77 | 12 | 55 | 134 | 184 | 123 | 94 |
| | Inland Finland | 1.6 | 13.4 | 30.2 | 27.0 | 20.2 | 92 | 9 | 49 | 137 | 233 | 216 | 104 |
| | Western Finland | 0.8 | 8.6 | 25.4 | 23.6 | 20.4 | 79 | 5 | 33 | 117 | 202 | 209 | 90 |
| | Northern Finland | 1.4 | 9.4 | 23.6 | 26.8 | 18.4 | 80 | 8 | 44 | 132 | 283 | 258 | 109 |
| Entire country | | 9.8 | 70.4 | 166.8 | 147.2 | 108.8 | 503 | 8 | 41 | 120 | 210 | 197 | 91 |

*Average annual incidence of KRT in subgroup

Table 4 presents the average annual number of new KRT patients and the incidence of KRT in 2018–2022 according to wellbeing services county, collaborative area, and age group. The incidence was highest among 65–74-year-olds and varied in this age group from 52 to 352 in the wellbeing services counties.

In the age group of 75 years and over, the incidence was 197 KRT patients per million age-related inhabitants, with a range of 57–562 in wellbeing services counties and a range of 123–258 in collaborative areas.

Table 5. Number of new KRT patients by age group and sex
Finnish Registry for Kidney Diseases 2012–2022

| Age group | | Number of new KRT patients | | | | | Incidence of KRT/million inhabitants | | | | |
|-----------|-------|----------------------------|------|------|------|------|--------------------------------------|------|------|------|------|
| | | 2012 | 2017 | 2020 | 2021 | 2022 | 2012 | 2017 | 2020 | 2021 | 2022 |
| 0–19 y | Men | 7 | 9 | 7 | 8 | 4 | 11 | 15 | 12 | 14 | 7 |
| | Women | 2 | 6 | 4 | 4 | 3 | 3 | 10 | 7 | 7 | 5 |
| | Total | 9 | 15 | 11 | 12 | 7 | 7 | 13 | 9 | 10 | 6 |
| 20–44 y | Men | 37 | 49 | 45 | 45 | 43 | 43 | 55 | 51 | 50 | 48 |
| | Women | 20 | 32 | 42 | 21 | 19 | 24 | 38 | 50 | 25 | 23 |
| | Total | 57 | 81 | 87 | 66 | 62 | 34 | 47 | 50 | 38 | 36 |
| 45–64 y | Men | 120 | 118 | 104 | 96 | 94 | 159 | 166 | 149 | 138 | 136 |
| | Women | 51 | 69 | 63 | 49 | 59 | 67 | 96 | 91 | 71 | 86 |
| | Total | 171 | 187 | 167 | 145 | 153 | 113 | 131 | 120 | 105 | 111 |
| 65–74 y | Men | 86 | 113 | 106 | 88 | 79 | 324 | 351 | 316 | 264 | 240 |
| | Women | 30 | 61 | 53 | 47 | 46 | 100 | 171 | 142 | 127 | 126 |
| | Total | 116 | 174 | 159 | 135 | 125 | 205 | 257 | 225 | 192 | 180 |
| ≥75 y | Men | 64 | 66 | 71 | 84 | 78 | 385 | 340 | 325 | 362 | 319 |
| | Women | 35 | 40 | 32 | 24 | 40 | 122 | 130 | 97 | 70 | 112 |
| | Total | 99 | 106 | 103 | 108 | 118 | 219 | 211 | 188 | 187 | 196 |
| Total | Men | 314 | 355 | 333 | 321 | 298 | 118 | 131 | 122 | 117 | 108 |
| | Women | 138 | 208 | 194 | 145 | 167 | 50 | 74 | 69 | 52 | 59 |
| | Total | 452 | 563 | 527 | 466 | 465 | 83 | 102 | 95 | 84 | 84 |

Table 5 shows the number of new KRT patients and the incidence of KRT according to age group and sex in 2012–2022. The number of new KRT patients was at the same level in 2022 as 2021 but lower than in earlier years. The incidence has increased in the age groups of 65 years and

over during the last ten years. Of the new KRT patients in 2022, 64% were men.

The incidence of KRT was 84 patients per million inhabitants in 2022. The highest incidence was in the group of men aged 75 years and over.

Figure 2. Mean age at start of KRT according to dialysis modality
Finnish Registry for Kidney Diseases 2000–2022

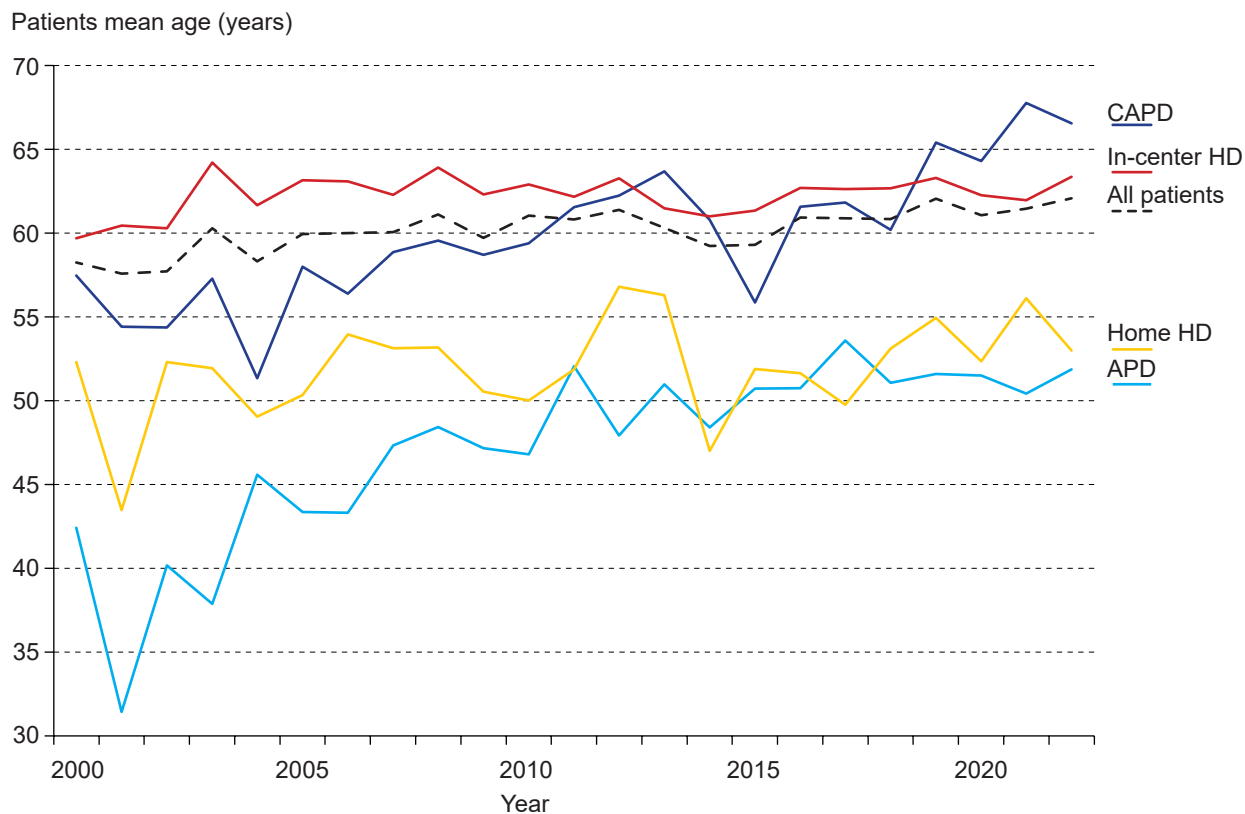


Figure 2 shows the mean age of patients who started dialysis in 2000–2022 according to first dialysis modality. The mean age at start of dialysis has increased from 58 years to 62 years in this millennium. There has been an increase in all dialysis modalities. The biggest change can be seen in peritoneal dialysis patients. The mean age of those who started continuous ambulatory peritoneal dialysis (CAPD) increased from 57 years to 67 years, and those receiving automatic peritoneal dialysis (APD) from 42 years to 52 years in 2000–2022.

Figure 3. Standardized incidence of KRT in collaborative areas Finnish Registry for Kidney Diseases 2012–2022

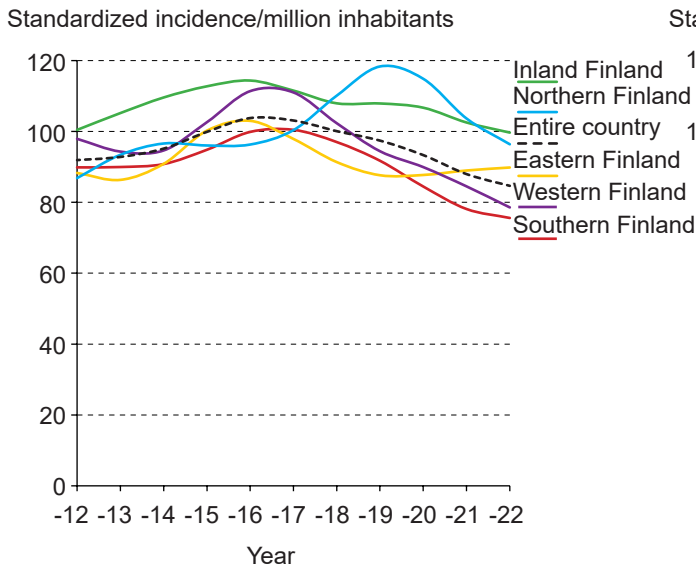


Figure 4. Standardized incidence of KRT in collaborative areas 90 days after start of KRT Finnish Registry for Kidney Diseases 2012–2022

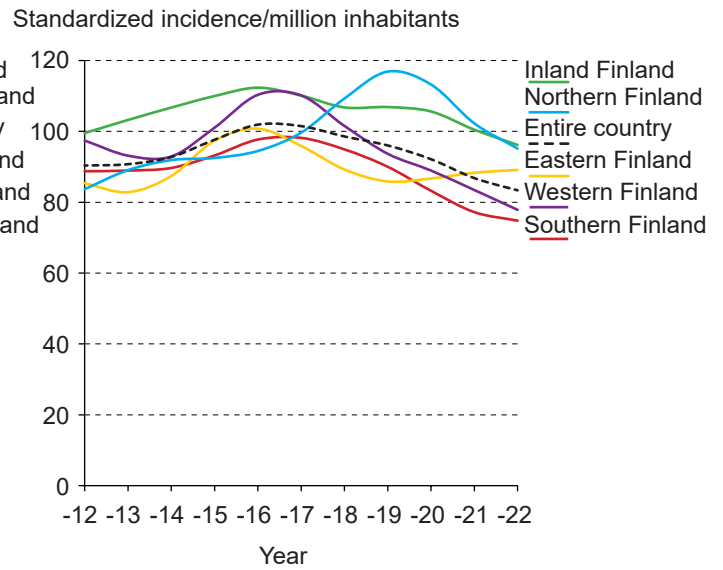
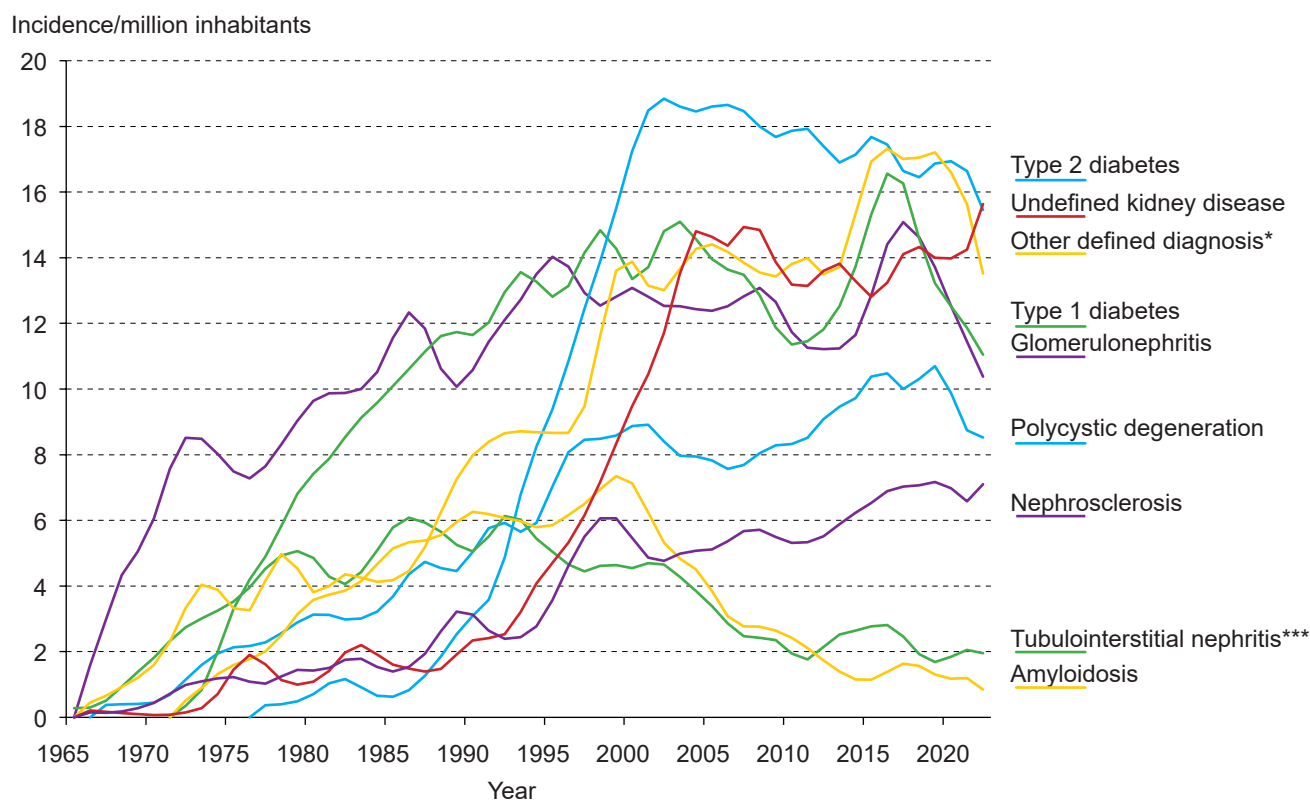


Figure 3 shows the regional incidence of KRT in 2012–2022 as smoothed averages. The incidence rates are age- and sex-standardized using the Finnish general population on 31 December 2022 as the reference. Population changes in 2012–2022 have been taken into consideration. Standardization removes the effect of age and sex on areas differences in incidence rates. Nationwide, the standardized incidence has increased since 2014, however, decreasing again after 2017. Differences in areas in standardized incidence are small.

Figure 4 shows the age- and sex-standardized incidence of KRT according to areas 90 days after the start of KRT. The Finnish Registry for Kidney Diseases does not store data on patients who have regained renal function within 90 days of start of KRT because in that case KRT is not considered chronic. However, the registry does store information on patients who died or moved abroad within 90 days of start of KRT, but these patients were excluded from Figure 4.

Figure 5. Incidence of KRT according to diagnosis
Finnish Registry for Kidney Diseases 1965–2022



*For example, other systemic diseases, urinary tract obstruction, congenital diseases, and malignancies

**ICD-10 codes I12, I13, I70.1, and N28.0

***ICD-10 codes N10, N11, and N12

The incidence of KRT according to diagnosis appears as smoothed averages in Figure 5. Until the end of the 1990s, the incidence increased in almost all diagnostic groups, but thereafter the increase stopped. At the beginning of the 2010s, the incidence of type 1 diabetes and glomerulonephritis was larger than before; now the incidence of these diagnoses has declined. The incidence of nephrosclerosis and polycystic degeneration has increased for many years, but the incidence of polycystic degeneration has now decreased. The incidence of tubulointerstitial nephritis and amyloidosis has decreased.

Type 2 diabetes has been the leading cause of end-stage renal disease since 1999, followed by glomerulonephritis and type 1 diabetes. The group of other defined diagnoses and undefined kidney disease has grown. In 2022, the

group of undefined kidney disease was the largest.

In 2022, altogether 69 new KRT patients had been assigned the "other defined diagnosis". The most common diagnoses were urinary tract obstruction (n=13), myeloma (n=8), vasculitis (n=7), urinary tract cancer (n=5), Finnish type nephrotic syndrome (n=4), and thrombotic microangiopathy (n=3).

Of the 69 patients, 11 had an ICD-10 code of N18.8, indicating other defined kidney disease, but no further specification was given. Of these patients, 10 had an ERA-diagnosis code, specifying the diagnosis for 6 patients.

Altogether 92 patients had an ICD-10 code of N18.9, indicating undefined kidney disease. Of these patients, ERA-diagnosis code specified the diagnosis for 16 patients.

Figure 6. Type of treatment at 90 days from start of KRT
Finnish Registry for Kidney Diseases 2012–2022

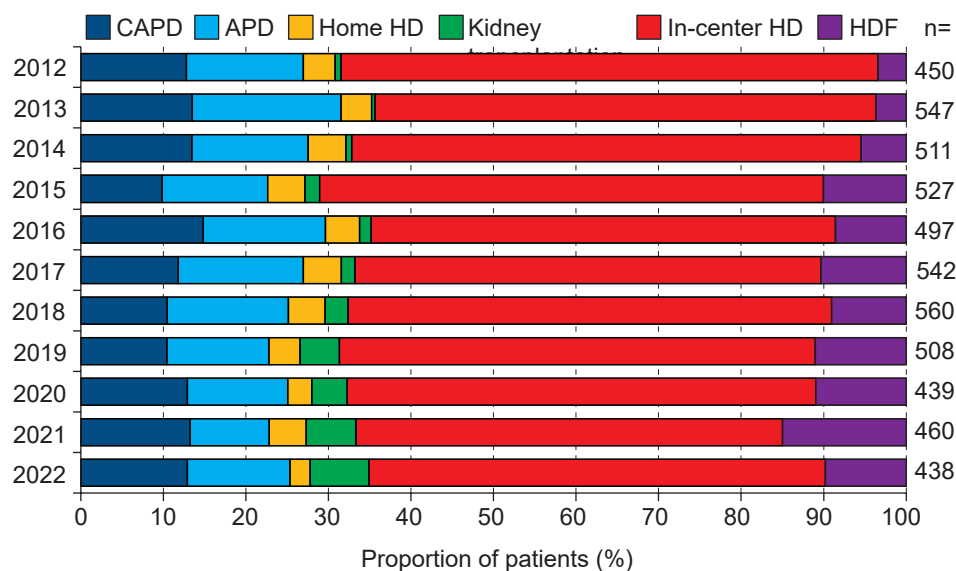
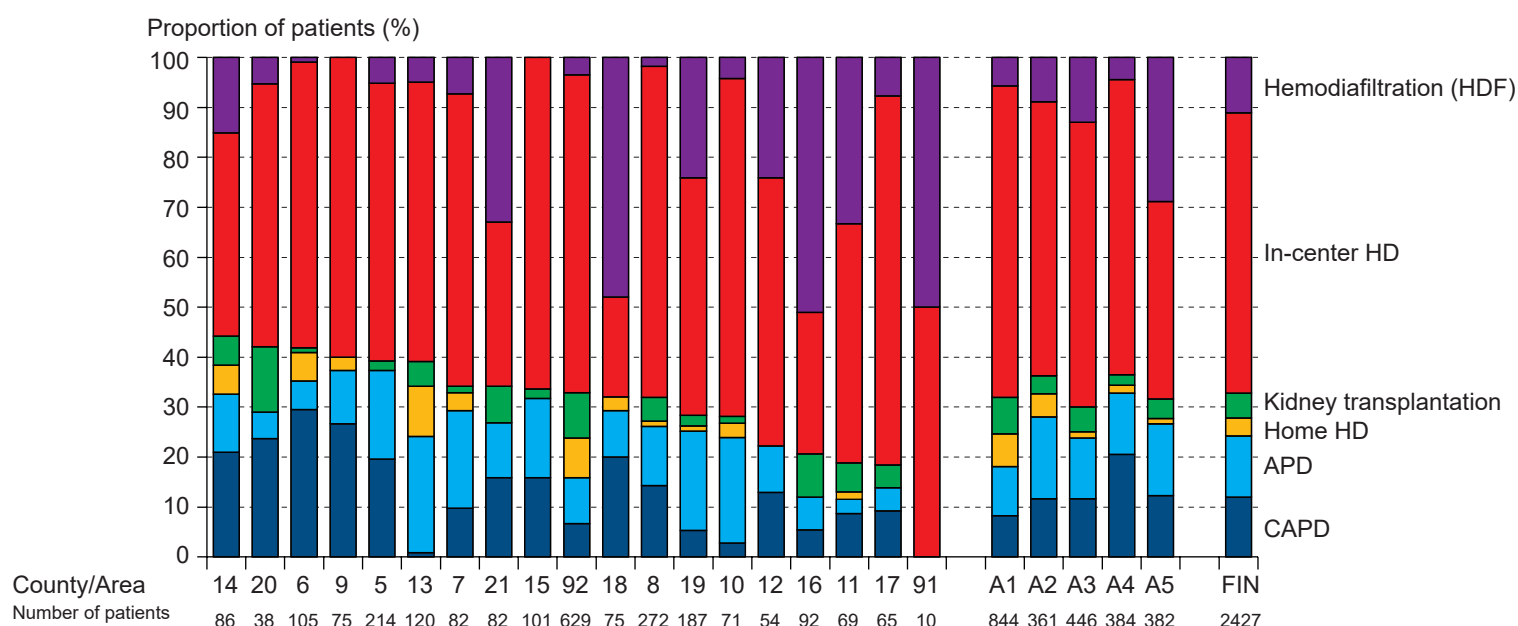


Figure 7. Type of treatment at 90 days from start of KRT in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2018–2022



The Finnish Society of Nephrology published the strategy for management of severe chronic kidney disease in 2021. The goal was to increase the proportion of home dialysis to at least 45% at 90 days from KRT start.

Figure 6 presents the number of KRT patients aged 20 years and over at 90 days from start of KRT in 2012–2022 according to type of treatment. The proportion of patients on in-center hemodialysis and hemodiafiltration has remained stable at an average of 67%. However, the proportion of patients on hemodiafiltration has increased. During the last years the proportion of patients on home hemodialysis (home HD) has ranged from 3% to 5%. The proportion of patients receiving a kidney transplant at 90 days from start of KRT has increased to 7%, previously being less than 1%. The proportion of patients on continuous ambulatory peritoneal dialysis (CAPD) or automated peritoneal dialysis (APD) has varied between 23% and 32%.

Figure 7 shows, according to wellbeing services county and collaborative area, the distribution of KRT modalities at 90 days from start of KRT in 2018–2022 of patients older than 20 years. The proportion of patients on home dialysis (CAPD, APD, or home HD) varied in wellbeing services counties from 0% to 41% ($p=0.002$). The proportion of APD patients of all patients on peritoneal dialysis varied between 16% and 97% in wellbeing services counties. In Southern Finland and Inland Finland collaborative areas, the proportion of home dialysis was 25%, compared with 33–34% in other areas ($p=0.25$). The proportion of patients receiving a kidney transplant was the highest in the Southern Finland collaborative area (7%). Otherwise, there was less variation in distribution of KRT modalities between collaborative areas than between wellbeing services counties. One-third of the patients were on home dialysis or had received a kidney transplant in Finland.

Figure 8. International comparison of incidence of KRT in 2021
Finnish Registry for Kidney Diseases 2022

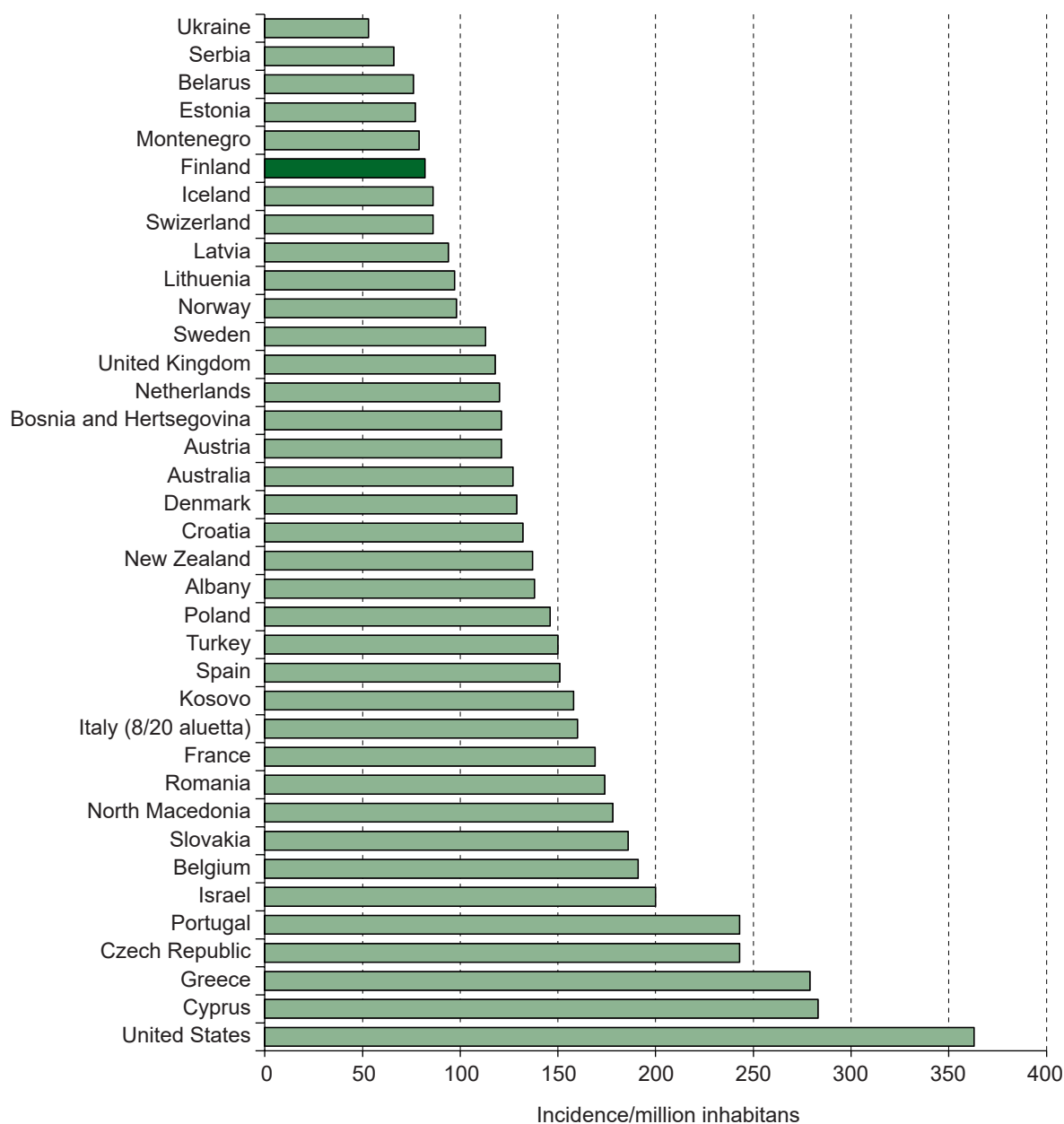


Figure 8 shows the incidence of KRT in 2021 in countries reporting to the ERA Registry (Annual Report 2021, <https://www.era-online.org/wp-content/uploads/2023/08/ERA-Registry-Annual-Report-2021.pdf>), in Australia and New Zealand (ANZDATA 45th Annual Report 2022, <https://www.anzdata.org.au/report/anzdata-45th-annual-report-2022-data-to-2021/>), and in the United States (USRDS 2023 Annual Data Report, <https://usrds-adr.niddk.nih.gov/2023>). In 2021, the incidence of KRT in Finland was one of the lowest in Europe. Relative to Finland, the incidence in Denmark was 57%, Sweden 38%, Norway 20%, and Iceland 5% higher. In Cyprus and Greece, the incidence was almost 3.5-fold and in the United States almost 4.5-fold that in Finland.

Table 6. Patients on KRT at end of year according to wellbeing services county and collaborative area
Finnish Registry for Kidney Diseases 2012–2022

| Wellbeing services county | | Number of KRT patients | | | | | Prevalence of KRT/million inhabitants | | | | |
|---------------------------|-------------------|------------------------|------|------|------|------|---------------------------------------|------|------|------|------|
| | | 2012 | 2017 | 2020 | 2021 | 2022 | 2012 | 2017 | 2020 | 2021 | 2022 |
| 1 | Itä-Uusimaa | 83 | 84 | 95 | 91 | 92 | 872 | 865 | 967 | 919 | 930 |
| 2 | Keski-Uusimaa | 126 | 155 | 167 | 174 | 172 | 665 | 791 | 838 | 862 | 846 |
| 3 | Länsi-Uusimaa | 332 | 374 | 403 | 417 | 403 | 757 | 812 | 851 | 871 | 829 |
| 4 | Vantaa and Kerava | 191 | 209 | 236 | 232 | 227 | 796 | 808 | 860 | 839 | 809 |
| 5 | Varsinais-Suomi | 405 | 451 | 460 | 454 | 435 | 864 | 944 | 956 | 939 | 896 |
| 6 | Satakunta | 227 | 244 | 236 | 236 | 240 | 1009 | 1107 | 1096 | 1101 | 1129 |
| 7 | Kanta-Häme | 145 | 175 | 188 | 191 | 186 | 826 | 1013 | 1102 | 1122 | 1097 |
| 8 | Pirkanmaa | 417 | 491 | 541 | 548 | 544 | 836 | 955 | 1035 | 1039 | 1021 |
| 9 | Päijät-Häme | 168 | 196 | 201 | 193 | 192 | 802 | 942 | 977 | 941 | 939 |
| 10 | Kymenlaakso | 137 | 130 | 133 | 132 | 133 | 785 | 771 | 817 | 818 | 834 |
| 11 | Etelä-Karjala | 152 | 167 | 161 | 167 | 169 | 1148 | 1286 | 1269 | 1324 | 1348 |
| 12 | Etelä-Savo | 140 | 151 | 145 | 135 | 134 | 970 | 1088 | 1093 | 1025 | 1027 |
| 13 | Pohjois-Savo | 249 | 277 | 298 | 298 | 294 | 982 | 1101 | 1200 | 1200 | 1187 |
| 14 | Pohjois-Karjala | 128 | 152 | 147 | 149 | 157 | 755 | 913 | 899 | 913 | 966 |
| 15 | Keski-Suomi | 193 | 229 | 236 | 246 | 245 | 708 | 836 | 866 | 902 | 899 |
| 16 | Etelä-Pohjanmaa | 136 | 161 | 175 | 178 | 179 | 684 | 823 | 911 | 928 | 938 |
| 17 | Pohjanmaa | 134 | 165 | 178 | 175 | 163 | 767 | 936 | 1012 | 994 | 924 |
| 18 | Keski-Pohjanmaa | 53 | 62 | 75 | 71 | 69 | 772 | 901 | 1103 | 1045 | 1018 |
| 19 | Pohjois-Pohjanmaa | 286 | 345 | 361 | 361 | 354 | 708 | 838 | 872 | 869 | 850 |
| 20 | Kainuu | 61 | 73 | 80 | 77 | 72 | 788 | 987 | 1116 | 1081 | 1021 |
| 21 | Lappi | 137 | 135 | 159 | 156 | 159 | 749 | 753 | 900 | 884 | 904 |
| 90 | Helsinki | 466 | 556 | 570 | 557 | 574 | 772 | 864 | 868 | 846 | 864 |
| 91 | Åland | 30 | 28 | 27 | 28 | 25 | 1053 | 950 | 896 | 923 | 823 |
| Area | Southern Finland | 1655 | 1871 | 1966 | 1963 | 1962 | 794 | 865 | 894 | 889 | 883 |
| | Eastern Finland | 710 | 809 | 826 | 828 | 830 | 845 | 974 | 1011 | 1015 | 1021 |
| | Inland Finland | 698 | 827 | 904 | 917 | 909 | 799 | 937 | 1021 | 1031 | 1018 |
| | Western Finland | 766 | 860 | 874 | 865 | 838 | 882 | 984 | 1002 | 990 | 958 |
| | Northern Finland | 537 | 615 | 675 | 665 | 654 | 733 | 838 | 924 | 909 | 895 |
| Entire country | | 4396 | 5010 | 5272 | 5266 | 5218 | 814 | 914 | 958 | 954 | 943 |

Table 6 presents the number of KRT patients and the prevalence of KRT on 31 December 2012–2022. In the entire country, the prevalence at the end of 2022 was 943 KRT patients per million inhabitants. On 31 December 2022, the prevalence was the highest in the Eastern and Inland Finland collaborative areas and the lowest in the Southern and Northern Finland collaborative areas. In the wellbeing services counties, the prevalence varied between 809 and 1348 patients per million inhabitants.

In the entire country, the prevalence has increased by 16% since 2012 and by 3% since 2017. In five years, the prevalence has increased in all collaborative areas, apart from the Western Finland, the most in the Inland Finland collaborative area (9%). In the wellbeing services counties, the prevalence has increased over 10% during the past five years in Etelä-Pohjanmaa, Keski-Pohjanmaa, and Lappi. The prevalence has decreased in Åland, Etelä-Savo, Varsinais-Suomi, and Pohjanmaa wellbeing services counties.

Table 7. Patients on KRT according to age group and sex
Finnish Registry for Kidney Diseases 2012–2022

| Age group | | Number of KRT patients | | | | | Prevalence of KRT/million inhabitants | | | | |
|-----------|-------|------------------------|------|------|------|------|---------------------------------------|------|------|------|------|
| | | 2012 | 2017 | 2020 | 2021 | 2022 | 2012 | 2017 | 2020 | 2021 | 2022 |
| 0–19 y | Men | 65 | 71 | 73 | 73 | 74 | 105 | 117 | 123 | 124 | 126 |
| | Women | 52 | 54 | 54 | 45 | 47 | 88 | 93 | 95 | 80 | 84 |
| | Total | 117 | 125 | 127 | 118 | 121 | 97 | 105 | 110 | 102 | 105 |
| 20–44 y | Men | 413 | 485 | 498 | 507 | 503 | 479 | 549 | 559 | 568 | 559 |
| | Women | 245 | 277 | 309 | 317 | 317 | 299 | 332 | 369 | 378 | 377 |
| | Total | 658 | 762 | 807 | 824 | 820 | 391 | 444 | 467 | 476 | 471 |
| 45–64 y | Men | 1227 | 1246 | 1242 | 1224 | 1210 | 1629 | 1748 | 1785 | 1764 | 1747 |
| | Women | 721 | 769 | 794 | 763 | 765 | 949 | 1072 | 1144 | 1106 | 1114 |
| | Total | 1948 | 2015 | 2036 | 1987 | 1975 | 1287 | 1409 | 1465 | 1436 | 1432 |
| 65–74 y | Men | 693 | 880 | 922 | 888 | 836 | 2610 | 2736 | 2747 | 2663 | 2539 |
| | Women | 374 | 482 | 508 | 529 | 507 | 1248 | 1354 | 1364 | 1432 | 1391 |
| | Total | 1067 | 1362 | 1430 | 1417 | 1343 | 1887 | 2010 | 2019 | 2016 | 1936 |
| ≥75 y | Men | 388 | 484 | 554 | 595 | 619 | 2334 | 2493 | 2535 | 2561 | 2531 |
| | Women | 225 | 276 | 338 | 344 | 362 | 785 | 897 | 1026 | 1001 | 1016 |
| | Total | 613 | 760 | 892 | 939 | 981 | 1354 | 1515 | 1628 | 1630 | 1633 |
| Total | Men | 2786 | 3166 | 3289 | 3287 | 3242 | 1045 | 1164 | 1203 | 1198 | 1177 |
| | Women | 1617 | 1858 | 2003 | 1998 | 1998 | 586 | 665 | 715 | 712 | 711 |
| | Total | 4403 | 5024 | 5292 | 5285 | 5240 | 811 | 911 | 956 | 953 | 942 |

Figure 9. Standardized prevalence of KRT in collaborative areas
Finnish Registry for Kidney Diseases 2012–2022

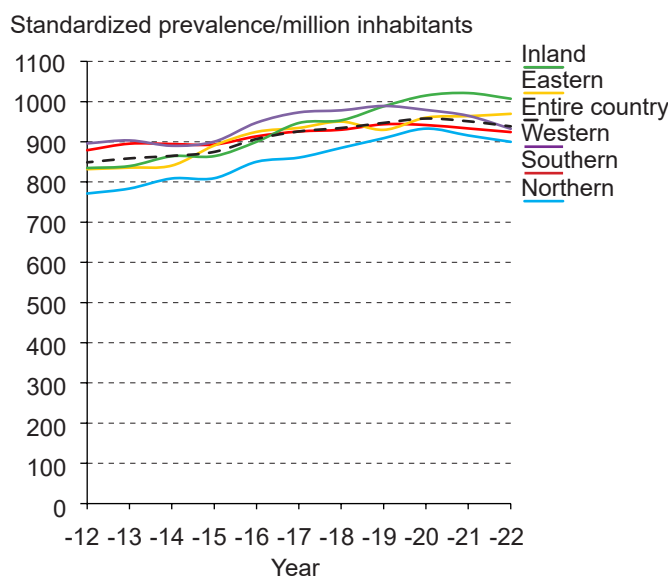


Table 7 shows the number of KRT patients and the prevalence of KRT on 31 December 2012–2022 according to age group and sex. The prevalence has increased by 21% in the age group 75 years and over, by 2% in 65–74-year-olds, by 11% in 45–64-year-olds, by 20% in 20–44-year-olds, and by 9% in 0–19-year-olds. The highest prevalence, observed among men aged 65–74 years at the end of 2022, was 2 539 cases per million age-related inhabitants. At the end of 2022, the prevalence was 66% greater among men than among women, and the sex difference was even more pronounced in the oldest age group, in which the prevalence was 2.5-fold higher in men than in women.

Figure 9 shows the age- and sex-standardized prevalence rates for 2012–2022 using the Finnish general population on 31 December 2022 as the reference. The changes in the distribution of age and sex in 2012–2022 have been taken into account. The standardized prevalence rates increased slowly for a long time, but have now started to decline, and the differences between collaborative areas are small.

Figure 10. Mean age among KRT patients at the end of year according to treatment type
Finnish Registry for Kidney Diseases 2000–2022

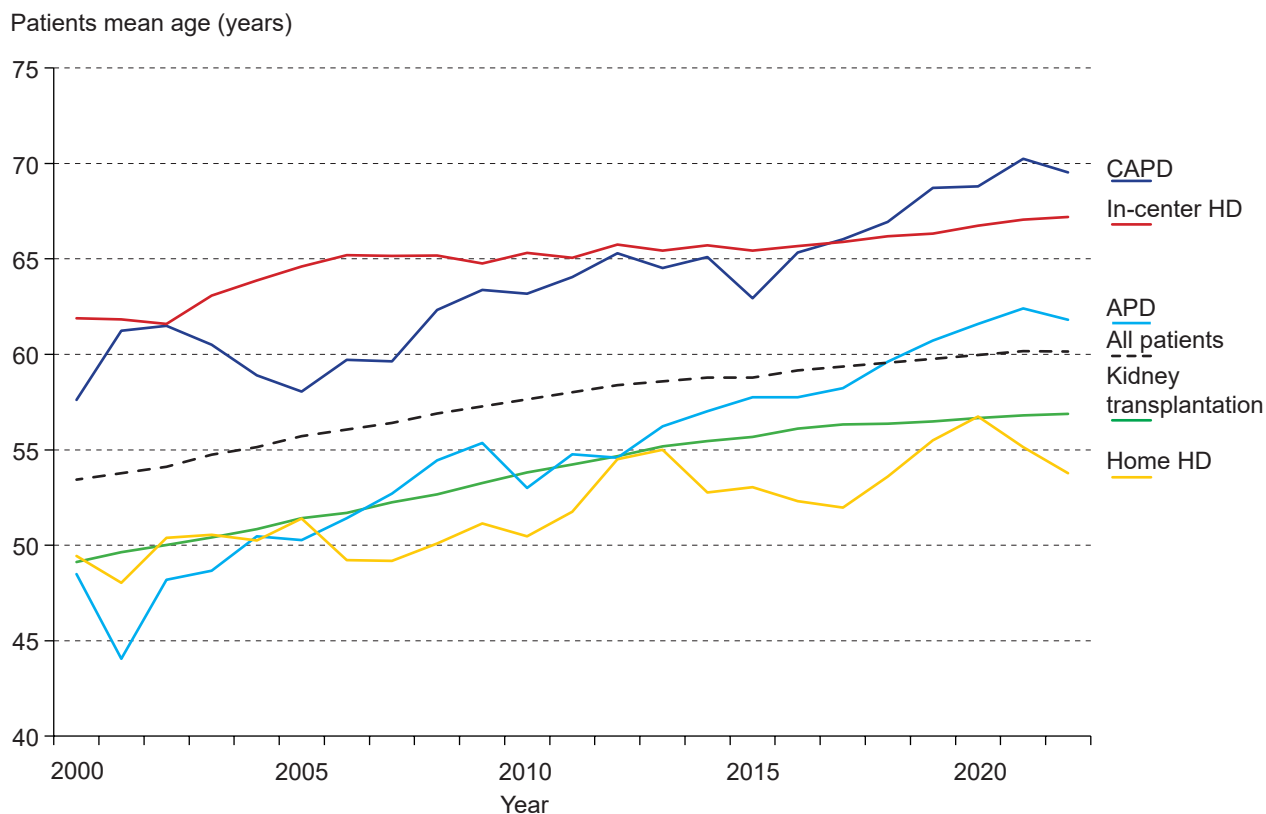


Figure 10 shows the mean age of KRT patients at the end of the year according to treatment during 2000–2022. The mean age of patients in KRT has increased from 53 to 60 years in this millennium. There has been an increase in all KRT modalities. The biggest change has been in peritoneal dialysis patients. The mean age of CAPD patients has increased from 58 to 70 years and of APD patients from 48 to 62 years in 2000–2022.

Figure 11. Prevalence of KRT at end of year according to type of treatment
Finnish Registry for Kidney Diseases 1965–2022

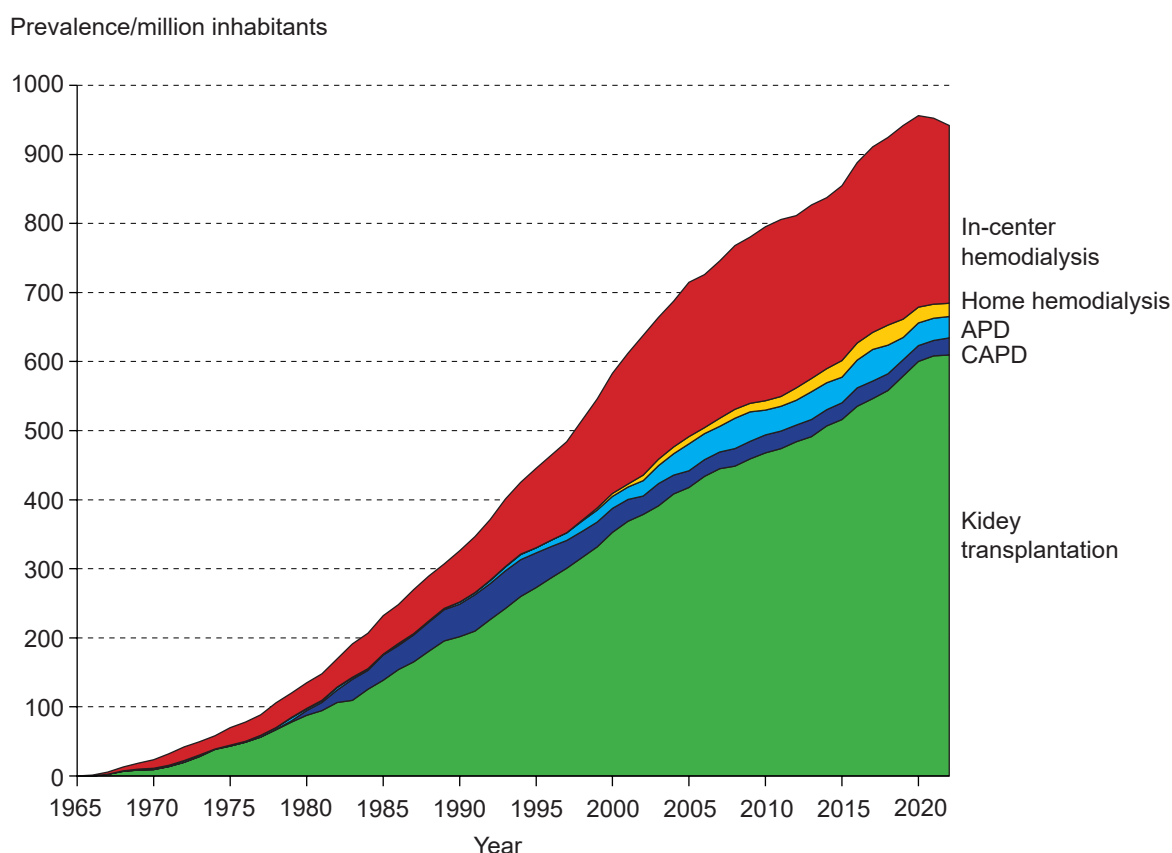


Figure 11 displays the prevalence of KRT according to treatment type. The prevalence of KTRT increased steadily until 2020, thereafter slightly declining. The prevalence of kidney transplantation has grown by 24% during 2012–2022. At the same time the prevalence of in-center hemodialysis patients increased by 3%, the prevalence of peritoneal dialysis patients decreased by 14%, and the prevalence of home hemodialysis patients remained virtually unchanged. In 2013–2022, the proportion of patients receiving in-center hemodialysis decreased from 30% to 27%, the proportion of patients with kidney transplantation increased from 60% to 65%, the proportion of patients on home hemodialysis stayed at 2%, and the proportion of patients on peritoneal

dialysis decreased from 8% to 6%. Since 2013, the proportion of APD patients of all PD patients has been about 61%.

Last year, it became possible to report information on assisted peritoneal dialysis and self-care in-center hemodialysis (also retrospectively). In assisted peritoneal dialysis, the patient needs help outside the home to perform dialysis. In self-care in-center hemodialysis, the patient performs dialysis in the unit independently. In 2022, about 3% of all peritoneal dialysis patients were on assisted peritoneal dialysis and 0.6% of all in-center hemodialysis patients performed self-care in-center hemodialysis.

Table 8. Prevalence of dialysis and kidney transplantation in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2012–2022

| Wellbeing services county | | Number of dialysis patients/ million inhabitants | | | | | Number of kidney transplant patients/ million inhabitants | | | | |
|---------------------------|-------------------|---|------|------|------|------|--|------|------|------|------|
| | | 2012 | 2017 | 2020 | 2021 | 2022 | 2012 | 2017 | 2020 | 2021 | 2022 |
| 1 | Itä-Uusimaa | 368 | 381 | 397 | 343 | 344 | 505 | 484 | 570 | 575 | 586 |
| 2 | Keski-Uusimaa | 248 | 362 | 331 | 357 | 325 | 417 | 428 | 507 | 505 | 522 |
| 3 | Länsi-Uusimaa | 276 | 310 | 304 | 305 | 267 | 481 | 502 | 547 | 566 | 561 |
| 4 | Vantaa and Kerava | 279 | 309 | 324 | 311 | 314 | 517 | 499 | 536 | 528 | 496 |
| 5 | Varsinais-Suomi | 356 | 404 | 372 | 366 | 336 | 508 | 540 | 584 | 573 | 560 |
| 6 | Satakunta | 387 | 440 | 344 | 392 | 419 | 622 | 667 | 752 | 709 | 710 |
| 7 | Kanta-Häme | 399 | 457 | 422 | 429 | 401 | 427 | 556 | 680 | 693 | 696 |
| 8 | Pirkanmaa | 347 | 369 | 388 | 364 | 344 | 489 | 585 | 646 | 675 | 678 |
| 9 | Päijät-Häme | 320 | 389 | 389 | 346 | 328 | 482 | 553 | 588 | 595 | 611 |
| 10 | Kymenlaakso | 395 | 338 | 362 | 341 | 370 | 390 | 433 | 455 | 477 | 464 |
| 11 | Etelä-Karjala | 521 | 554 | 457 | 508 | 534 | 627 | 732 | 812 | 817 | 814 |
| 12 | Etelä-Savo | 381 | 418 | 377 | 334 | 360 | 589 | 670 | 716 | 691 | 667 |
| 13 | Pohjois-Savo | 390 | 322 | 383 | 391 | 371 | 592 | 779 | 818 | 809 | 816 |
| 14 | Pohjois-Karjala | 260 | 403 | 312 | 276 | 345 | 496 | 511 | 587 | 637 | 621 |
| 15 | Keski-Suomi | 308 | 332 | 312 | 334 | 345 | 400 | 504 | 554 | 568 | 554 |
| 16 | Etelä-Pohjanmaa | 322 | 424 | 396 | 422 | 419 | 362 | 399 | 515 | 506 | 519 |
| 17 | Pohjanmaa | 315 | 420 | 392 | 381 | 318 | 452 | 516 | 620 | 613 | 607 |
| 18 | Keski-Pohjanmaa | 292 | 334 | 500 | 456 | 398 | 481 | 567 | 603 | 589 | 619 |
| 19 | Pohjois-Pohjanmaa | 267 | 350 | 367 | 334 | 302 | 441 | 488 | 505 | 534 | 547 |
| 20 | Kainuu | 245 | 270 | 279 | 267 | 199 | 542 | 717 | 837 | 814 | 822 |
| 21 | Lappi | 334 | 240 | 306 | 266 | 250 | 416 | 513 | 594 | 618 | 654 |
| 90 | Helsinki | 291 | 330 | 311 | 269 | 273 | 480 | 535 | 557 | 577 | 592 |
| 91 | Åland | 526 | 271 | 232 | 264 | 231 | 526 | 678 | 664 | 659 | 593 |
| Area | Southern Finland | 313 | 348 | 336 | 319 | 311 | 482 | 517 | 558 | 570 | 571 |
| | Eastern Finland | 336 | 358 | 344 | 339 | 355 | 509 | 616 | 667 | 675 | 665 |
| | Inland Finland | 351 | 399 | 396 | 389 | 371 | 448 | 538 | 624 | 642 | 647 |
| | Western Finland | 356 | 416 | 369 | 375 | 352 | 526 | 567 | 633 | 615 | 606 |
| | Northern Finland | 284 | 313 | 356 | 323 | 289 | 449 | 525 | 568 | 587 | 606 |
| Entire country | | 327 | 363 | 354 | 342 | 330 | 484 | 545 | 599 | 607 | 607 |

Table 8 presents the prevalence of dialysis and kidney transplantation per million inhabitants in wellbeing services counties and collaborative areas in 2012–2022. The prevalence of dialysis has increased by 1% and that of kidney transplantation by 26% during the past ten years. Over the last five years, the prevalence of kidney transplantation has increased by 11%, but the prevalence of dialysis has decreased by 1%. At the end of 2022, the prevalence of dialysis varied in wellbeing services counties between

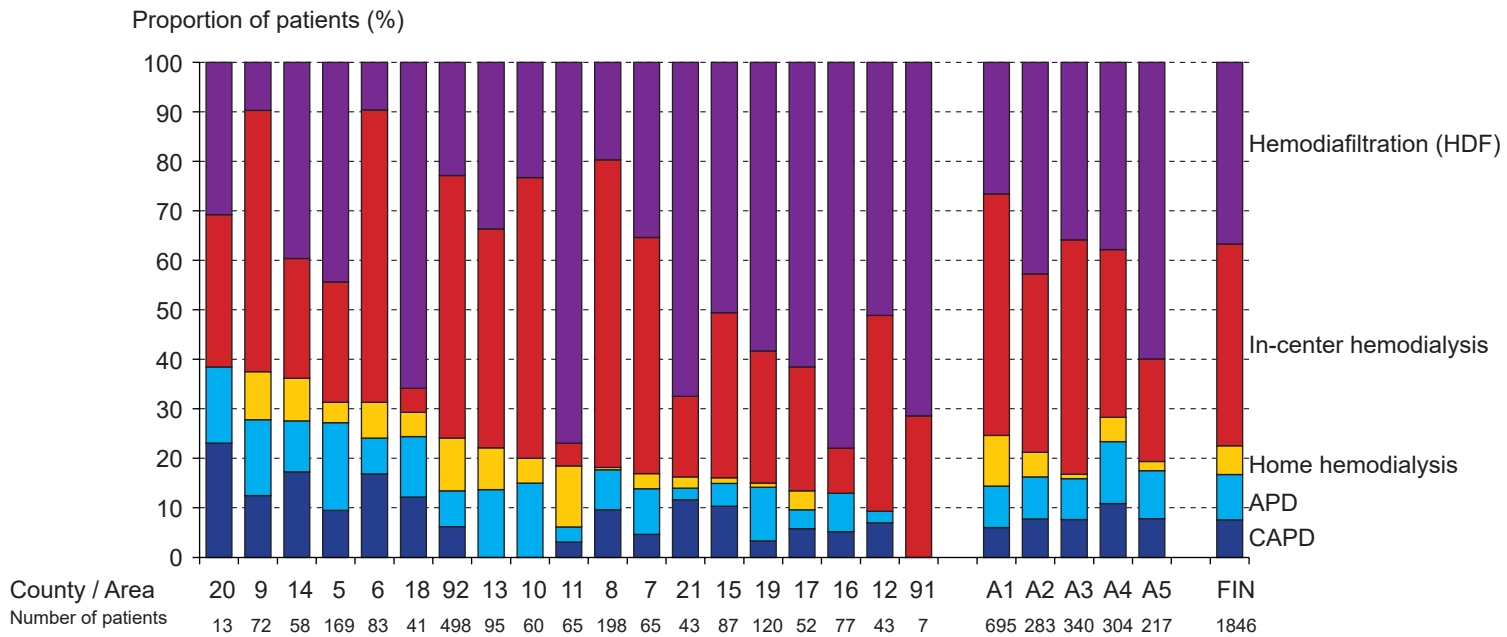
199 and 534 per million inhabitants and the prevalence of kidney transplantation between 464 and 822 per million inhabitants. In collaborative areas, the prevalence of dialysis varied between 289 and 371 per million inhabitants and that of kidney transplantation between 571 and 665 per million inhabitants. The proportion of kidney transplantation of all KRT patients increased from 60% to 65% between 2012 and 2022.

Table 9. Number of KRT patients at end of year according to type of treatment in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2022

| Wellbeing services area | | Number of patients on 31 December 2022 (%) | | | | | | |
|-------------------------|-------------------|--|---------|---------|--------------|----------|-----------|------------|
| | | CAPD | APD | Home HD | In-center HD | HDF | Tx | Total |
| 5 | Varsinais-Suomi | 16 (4) | 30 (7) | 7 (2) | 41 (9) | 75 (17) | 274 (62) | 443 (100) |
| 6 | Satakunta | 14 (6) | 6 (3) | 6 (3) | 49 (21) | 8 (4) | 145 (64) | 228 (100) |
| 7 | Kanta-Häme | 3 (2) | 6 (3) | 2 (1) | 31 (17) | 23 (13) | 115 (64) | 180 (100) |
| 8 | Pirkanmaa | 19 (3) | 16 (3) | 1 (0) | 123 (22) | 39 (7) | 366 (65) | 564 (100) |
| 9 | Päijät-Häme | 9 (5) | 11 (6) | 7 (4) | 38 (20) | 7 (4) | 118 (62) | 190 (100) |
| 10 | Kymenlaakso | 0 (0) | 9 (7) | 3 (2) | 34 (26) | 14 (11) | 69 (53) | 129 (100) |
| 11 | Etelä-Karjala | 2 (1) | 2 (1) | 8 (5) | 3 (2) | 50 (30) | 101 (61) | 166 (100) |
| 12 | Etelä-Savo | 3 (2) | 1 (1) | 0 (0) | 17 (13) | 22 (17) | 85 (66) | 128 (100) |
| 13 | Pohjois-Savo | 0 (0) | 13 (5) | 8 (3) | 42 (15) | 32 (11) | 184 (66) | 279 (100) |
| 14 | Pohjois-Karjala | 10 (6) | 6 (4) | 5 (3) | 14 (8) | 23 (14) | 110 (65) | 168 (100) |
| 15 | Keski-Suomi | 9 (4) | 4 (2) | 1 (0) | 29 (13) | 44 (19) | 139 (62) | 226 (100) |
| 16 | Etelä-Pohjanmaa | 4 (2) | 6 (4) | 0 (0) | 7 (4) | 60 (37) | 86 (53) | 163 (100) |
| 17 | Pohjanmaa | 3 (2) | 2 (1) | 2 (1) | 13 (9) | 32 (22) | 92 (64) | 144 (100) |
| 18 | Keski-Pohjanmaa | 5 (6) | 5 (6) | 2 (2) | 2 (2) | 27 (30) | 49 (54) | 90 (100) |
| 19 | Pohjois-Pohjanmaa | 4 (1) | 13 (4) | 1 (0) | 32 (10) | 70 (21) | 207 (63) | 327 (100) |
| 20 | Kainuu | 3 (4) | 2 (3) | 0 (0) | 4 (6) | 4 (6) | 57 (81) | 70 (100) |
| 21 | Lappi | 5 (3) | 1 (1) | 1 (1) | 7 (4) | 29 (19) | 113 (72) | 156 (100) |
| 91 | Åland | 0 (0) | 0 (0) | 0 (0) | 2 (8) | 5 (20) | 18 (72) | 25 (100) |
| 92 | HUS | 31 (2) | 37 (2) | 53 (3) | 266 (17) | 114 (7) | 1063 (68) | 1564 (100) |
| Area | Southern Finland | 42 (2) | 59 (3) | 71 (3) | 341 (17) | 185 (9) | 1351 (66) | 2049 (100) |
| | Eastern Finland | 22 (3) | 24 (3) | 14 (2) | 102 (13) | 121 (15) | 518 (65) | 801 (100) |
| | Inland Finland | 26 (3) | 28 (3) | 3 (0) | 161 (18) | 122 (13) | 567 (63) | 907 (100) |
| | Western Finland | 33 (4) | 38 (5) | 15 (2) | 103 (13) | 115 (14) | 511 (63) | 815 (100) |
| | Northern Finland | 17 (3) | 21 (3) | 4 (1) | 45 (7) | 130 (20) | 426 (66) | 643 (100) |
| Entire country | | 140 (3) | 170 (3) | 107 (2) | 754 (14) | 678 (13) | 3391 (65) | 5240 (100) |

Table 9 presents the number of KRT patients according to type of treatment in wellbeing services counties and collaborative areas at the end of 2022. Of all dialysis patients, 23% were on home dialysis (CAPD, APD, or home HD) at the end of 2022. Of patients on in-center hemodialysis, 47% were on hemodiafiltration, and this proportion varied between 14% and 94% in wellbeing services counties and between 35% and 74% in collaborative areas. The proportion of kidney transplantation patients varied between 53% and 81% in wellbeing services counties and between 63% and 66% in collaborative areas.

Figure 12. Dialysis modality in patients older than 20 years on 31 December 2022
in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2022



The Finnish Society of Nephrology published a strategy for management of severe chronic kidney disease in 2022. The goal was to increase the proportion of home dialysis of all dialysis patients to at least 40% by the end of the year 2025.

Figure 12 shows the distribution of dialysis modalities in patients older than 20 years in wellbeing services counties and collaborative areas at the end of 2022. Of all dialysis patients, 23% were on home dialysis (CAPD, APD, or home HD) at the end of 2022. The proportion of home dialysis was highest (38%) in the wellbeing services county of Kainuu and higher than 30% also in Päijät-Häme, Pohjois-Karjala, Varsinais-Suomi, and Satakunta, but lower than 10% in two healthcare districts. The proportion of peritoneal dialysis patients was the greatest in the wellbeing services county of Kainuu, where 38% of all dialysis patients were receiving either continuous ambulatory peritoneal dialysis (CAPD) or automated peritoneal dialysis (APD). The proportion of dialysis patients on home hemodialysis was largest, 12%, in the wellbeing services county of Etelä-Karjala. Three wellbeing services counties had no home hemodialysis patients.

Figure 13. International comparison of prevalence of KRT on 31 December 2021
Finnish Registry for Kidney Diseases 2022

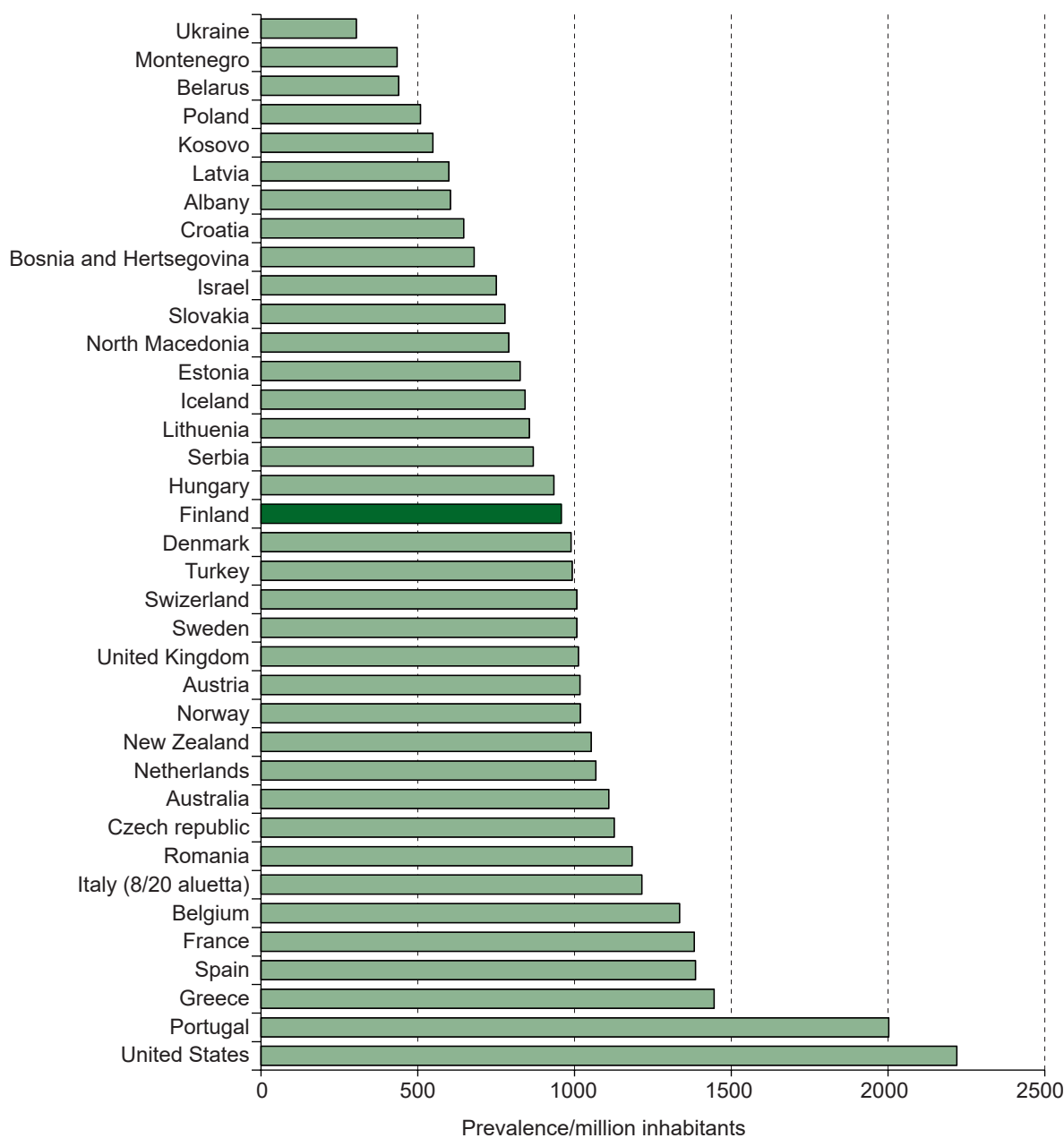


Figure 13 displays the prevalence of KRT on 31 December 2021 in countries reporting to the ERA Registry (Annual Report 2021, <https://www.era-online.org/wp-content/uploads/2023/08/ERA-Registry-Annual-Report-2021.pdf>), in Australia and New Zealand (ANZDATA 45th Annual Report 2022, <https://www.anzdata.org.au/report/anzdata-45th-annual-report-2022-data-to-2021/>) and in the United States (USRDS 2023 Annual Data Report, <https://usrds-adr.niddk.nih.gov/2023>). The prevalence rates in the Nordic countries were similar. Relative to Finland, the prevalence in Denmark was 3% higher, in Sweden 5% higher, in Norway 6% higher, and in Iceland 12% lower. In Portugal and in the United States the prevalence was more than twofold that in Finland.

Table 10. Number of patient-years of all KRT patients according to diagnosis and type of treatment
Finnish Registry for Kidney Diseases 2012–2022

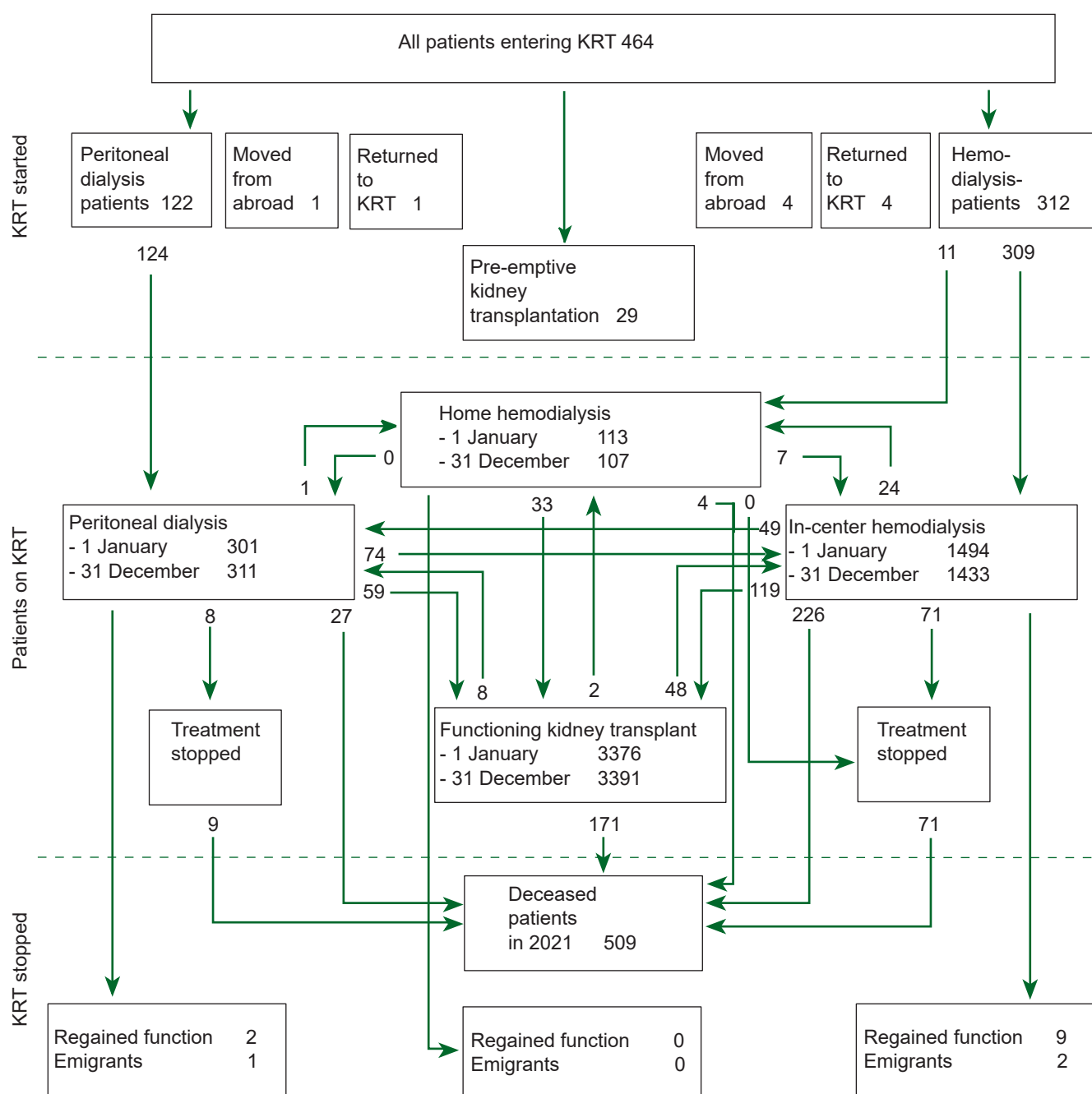
| Diagnosis | Number of patient-years in 2012 (%) | | | | Number of patient-years in 2022 (%) | | | |
|------------------------------------|-------------------------------------|-------------------|-------------------|-------------------|-------------------------------------|-------------------|-------------------|-------------------|
| | Peritoneal dialysis | Hemo-dialysis | Trans-plantation | Total | Peritoneal dialysis | Hemo-dialysis | Trans-plantation | Total |
| Glomerulonephritis | 62 (19.1) | 222 (15.4) | 689 (26.5) | 973 (22.3) | 43 (14) | 228 (14.4) | 849 (25.2) | 1119 (21.3) |
| Type 1 diabetes | 72 (22.3) | 161 (11.2) | 482 (18.5) | 715 (16.4) | 49 (16) | 182 (11.5) | 579 (17.2) | 810 (15.4) |
| Polycystic degeneration | 22 (6.8) | 121 (8.4) | 446 (17.1) | 589 (13.5) | 26 (8.6) | 137 (8.7) | 622 (18.4) | 785 (14.9) |
| Undefined kidney disease | 43 (13.4) | 237 (16.4) | 125 (4.8) | 406 (9.3) | 43 (14.2) | 254 (16.1) | 227 (6.7) | 524 (10) |
| Type 2 diabetes | 44 (13.6) | 292 (20.2) | 84 (3.2) | 420 (9.6) | 45 (15) | 310 (19.6) | 106 (3.1) | 461 (8.8) |
| Nephrosclerosis | 17 (5.2) | 82 (5.7) | 68 (2.6) | 167 (3.8) | 35 (11.7) | 111 (7.1) | 115 (3.4) | 262 (5) |
| Other kidney diseases | 8 (2.6) | 59 (4.1) | 64 (2.4) | 131 (3) | 15 (5.1) | 99 (6.2) | 110 (3.3) | 224 (4.3) |
| Urinary tract obstruction | 10 (3) | 56 (3.9) | 98 (3.7) | 163 (3.7) | 12 (4.1) | 63 (4) | 148 (4.4) | 223 (4.2) |
| Tubulointerstitial nephritis | 11 (3.3) | 47 (3.3) | 188 (7.2) | 246 (5.6) | 10 (3.4) | 33 (2.1) | 172 (5.1) | 215 (4.1) |
| Other systemic diseases | 15 (4.7) | 63 (4.4) | 103 (4) | 182 (4.2) | 11 (3.6) | 62 (3.9) | 138 (4.1) | 211 (4) |
| Congenital diseases | 8 (2.4) | 21 (1.4) | 105 (4) | 134 (3.1) | 9 (3) | 21 (1.3) | 145 (4.3) | 175 (3.3) |
| Congenital nephrosis. Finnish type | 5 (1.5) | 5 (0.4) | 74 (2.8) | 84 (1.9) | 0 (0.2) | 7 (0.4) | 108 (3.2) | 116 (2.2) |
| Malignancies | 3 (1.1) | 29 (2) | 11 (0.4) | 44 (1) | 2 (0.7) | 42 (2.7) | 11 (0.3) | 56 (1.1) |
| Amyloidosis | 2 (0.7) | 33 (2.3) | 38 (1.5) | 74 (1.7) | 1 (0.4) | 20 (1.2) | 21 (0.6) | 42 (0.8) |
| Metabolic diseases | 2 (0.5) | 5 (0.3) | 15 (0.6) | 21 (0.5) | 0 (0.1) | 6 (0.4) | 13 (0.4) | 18 (0.4) |
| Pyelonephritis | 0 (0) | 9 (0.6) | 15 (0.6) | 24 (0.5) | 0 (0) | 6 (0.4) | 11 (0.3) | 16 (0.3) |
| Total | 324 (100) | 1442 (100) | 2605 (100) | 4371 (100) | 303 (100) | 1579 (100) | 3376 (100) | 5258 (100) |

Table 10 presents the number of patient-years according to diagnosis of kidney disease and type of treatment in 2012 and 2022. The number of patient-years indicates time spent by patients in KRT during the year. Overall, the number of patient-years has increased by 20% since 2012. The number of patient-years has increased by 10% in hemodialysis and by 30% in kidney transplantation and decreased by 6% in peritoneal dialysis.

Glomerulonephritis is the most common diagnosis among all KRT patients and among kidney transplantation patients; the proportion of patient-years due to glomerulonephritis

was 21% in 2022. Type 1 diabetes is the second most common diagnosis among all KRT patients and the most common diagnosis among peritoneal dialysis patients. Type 2 diabetes is the most common kidney disease diagnosis of hemodialysis patients. The number of patient-years of all KRT patients with nephrosclerosis and a group of other kidney disease diagnoses has increased by over 50% during the last ten years. The number of patient-years of all KRT patients with amyloidosis and pyelonephritis has decreased by over 30% in this same period.

Figure 14. Net changes in type of treatment
Finnish Registry for Kidney Diseases 2022



During 2022 altogether 464 new patients entered KRT (Figure 14), five patients returned to KRT, and five patients moved to Finland from abroad. In all, 5285 patients were receiving KRT at the beginning of the year and 5240 at the end of the year. Altogether 509 patients died, and dialysis was discontinued for 11 patients because the patient's own kidney function resumed. Of those who died, 171 had a functioning kidney transplant, 27 were receiving peritoneal dialysis, 4 were on home hemodialysis, and 226 were on in-center hemodialysis. During 2022 KRT was discontinued for 79 uremic patients. One patient was lost to follow-up during the year. At the end of 2022, the number of home hemodialysis patients was 5% smaller and the number of in-center hemodialysis patients 4% smaller than at the beginning of the year. The number of peritoneal dialysis patients was 2% larger and the number of kidney transplantation patients remained unchanged. At the end of 2022,

there were 18 patients on self-care in-center hemodialysis and 21 patients on assisted peritoneal dialysis.

A total of 250 patients received a kidney transplant, which is at the same level as in previous years. Of these patients, 20 received a combined pancreas and kidney transplantation and two a combined liver and kidney transplantation (source: Kidney Transplantation Unit, Helsinki University Central Hospital). Forty-two kidney transplants were received from living donors, of which 31 were from relatives and five were ABO-incompatible. Of the kidney transplantations, 189 came from donors after brain death and 19 from donors after circulatory death.

Seven patients who were already on dialysis, but the time of dialysis start was unknown, received a kidney transplant during the year. They have been taken into account in the prevalence in 2022 in this report but not in the incidence or prevalence of previous years.

Table 11. Mortality of KRT patients by collaborative area
Finnish Registry for Kidney Diseases 2012–2022

| Collaborative area | Deaths/1000 patient-years | | | | | | Deaths/1000 patient-years ¹⁾ | | | | | |
|--------------------|---------------------------|------|------|------|------|-----------|---|------|------|------|------|-----------|
| | 2012 | 2017 | 2020 | 2021 | 2022 | 2018–2022 | 2012 | 2017 | 2020 | 2021 | 2022 | 2018–2022 |
| Southern Finland | 74 | 78 | 71 | 76 | 79 | 76 | 72 | 76 | 71 | 74 | 78 | 74 |
| Eastern Finland | 107 | 85 | 80 | 86 | 96 | 91 | 105 | 84 | 80 | 85 | 95 | 89 |
| Inland Finland | 98 | 76 | 76 | 87 | 104 | 87 | 98 | 74 | 76 | 86 | 102 | 86 |
| Western Finland | 95 | 98 | 97 | 106 | 113 | 98 | 95 | 97 | 95 | 104 | 113 | 97 |
| Northern Finland | 102 | 85 | 102 | 113 | 128 | 111 | 98 | 85 | 99 | 113 | 128 | 110 |
| Entire country | 90 | 83 | 81 | 89 | 97 | 88 | 88 | 82 | 81 | 87 | 97 | 87 |

¹⁾Patients who died within 90 days of start of KRT excluded

Figure 15. Standardized mortality of KRT patients by collaborative area
Finnish Registry for Kidney Diseases 2012–2022

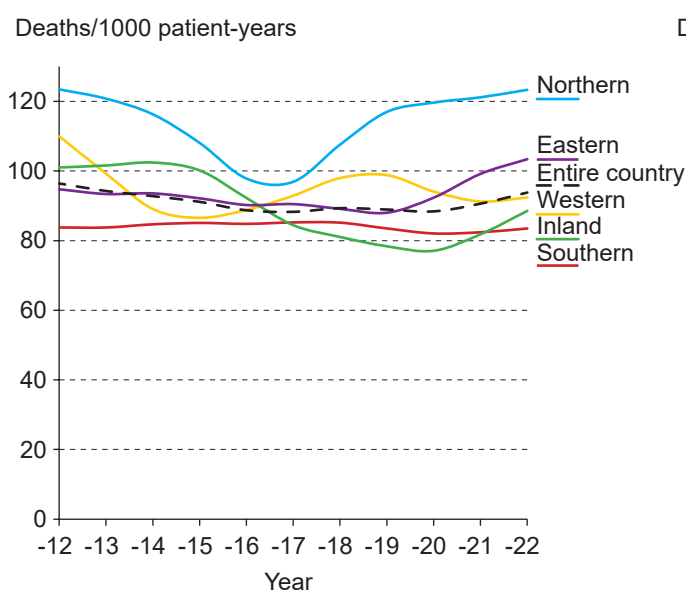


Figure 16. Standardized mortality of KRT patients by collaborative area (patients who died within 90 days of start of KRT excluded)
Finnish Registry for Kidney Diseases 2012–2022

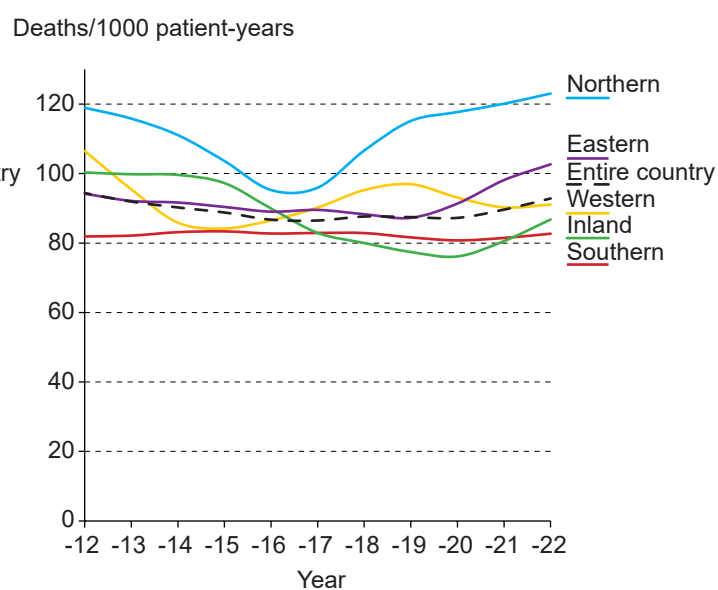


Table 11 shows KRT patients' mortality in 2012–2022 according to collaborative area. The mortality of patients who had been on KRT for at least 90 days is presented separately. The average mortality in 2018–2022 was lower in the Southern Finland collaborative area than elsewhere.

Figures 15 and 16 show regional mortality as smoothed averages. The regional mortality rates for 2012–2022 have been age- and sex-standardized using all patient-years in 2022 as the reference. Changes in age and sex distribution during this ten-year period have been taken into consideration. Patients who died within 90 days of start of KRT

were excluded from Figure 16. The standardized mortality rate had long been on the decline, but in recent years it has risen.

In 2022, there were a total of 509 deaths, and coronavirus infection was the cause of death in 53 patients (ICD-10 diagnosis code U07.1), partially explaining the increased mortality. Of the patients who died of coronavirus infection, 76% were under 75 years of age. The proportion of infection-related deaths was 31% in 2022, while it varied between 18% and 25% in the previous ten years.

Table 12. Number of KRT patients older than 20 years in hospitals
Finnish Registry for Kidney Diseases 2022

| Collaborative Area | Wellbeing services county | Hospital | KRT patients (> 20 y) on 31/12/2022 | | | |
|------------------------------|---------------------------|--|-------------------------------------|-------------|-------------|-------------|
| | | | PD | HD | Tx | Total |
| Southern Finland (A1) | | | 100 | 595 | 1235 | 1930 |
| | Päijät-Häme (9) | | 20 | 52 | 118 | 190 |
| | | Päijät-Häme Central Hospital | 20 | 52 | 118 | 190 |
| | Kymenlaakso (10) | | 9 | 51 | 69 | 129 |
| | | Kymenlaakso Central Hospital | 9 | 51 | 69 | 129 |
| | Etelä-Karjala (11) | | 4 | 61 | 101 | 166 |
| | | South Karelia Central Hospital | 4 | 41 | 101 | 146 |
| | | Honkajarju Hospital | | 20 | | 20 |
| | HUS (92) | | 67 | 431 | 947 | 1445 |
| | | Helsinki University Central Hospital | 67 | 312 | 807 | 1186 |
| | | Nephrology Polyclinic | | | 807 | 807 |
| | | Dialysis unit DHK | | 57 | | 57 |
| | | Dialysis unit DOK | 67 | 75 | | 142 |
| | | Malmi | | 94 | | 94 |
| | | Pitäjänmäki | | 86 | | 86 |
| | | Hyvinkää Hospital | | 38 | 43 | 81 |
| | | Lohja Hospital | | 34 | 41 | 75 |
| | | Länsi-Uudenmaa Hospital | | 21 | 18 | 39 |
| | | Porvoo Hospital | | 26 | 38 | 64 |
| Eastern Finland (A2) | | | 46 | 237 | 518 | 801 |
| | Etelä-Savo (12) | | 4 | 39 | 85 | 128 |
| | | Mikkeli Central Hospital | 4 | 27 | 53 | 84 |
| | | Savonlinna Central Hospital | | 12 | 32 | 44 |
| | Pohjois-Savo (13) | | 13 | 82 | 184 | 279 |
| | | Kuopio University Hospital | 13 | 59 | 159 | 231 |
| | | Regional Hospital of Iisalmi | | 11 | 11 | 22 |
| | | Regional Hospital of Varkaus | | 12 | 14 | 26 |
| | Pohjois-Karjala (14) | | 16 | 42 | 110 | 168 |
| | | North Karelia Central Hospital | 16 | 42 | 110 | 168 |
| | Keski-Suomi (15) | | 13 | 74 | 139 | 226 |
| | | Central Finland Central Hospital | 13 | 74 | 139 | 226 |
| Inland Finland (A3) | | | 54 | 286 | 566 | 906 |
| | Kanta-Häme (7) | | 9 | 56 | 115 | 180 |
| | | Central Hospital of Tavastia | 9 | 56 | 115 | 180 |
| | Pirkanmaa (8) | | 35 | 163 | 365 | 563 |
| | | Tampere University Hospital | 35 | 163 | 365 | 563 |
| | Etelä-Pohjanmaa (16) | | 10 | 67 | 86 | 163 |
| | | Southern Ostrobothnia Central Hospital | 10 | 67 | 86 | 163 |
| Western Finland (A4) | | | 71 | 233 | 510 | 814 |
| | Varsinais-Suomi (5) | | 46 | 123 | 272 | 441 |
| | | Turku University Central Hospital | 46 | 123 | 272 | 441 |
| | Satakunta (6) | | 20 | 63 | 145 | 228 |
| | | Satakunta Central Hospital | 20 | 63 | 146 | 229 |
| | Pohjanmaa (17) | | 5 | 47 | 92 | 144 |
| | | Vaasa Central Hospital | 5 | 32 | 90 | 127 |
| | | Pietarsaari Hospital | | 15 | 2 | 17 |
| Northern Finland (A5) | | | 38 | 179 | 426 | 643 |
| | Keski-Pohjanmaa (18) | | 10 | 31 | 49 | 90 |
| | | Central Hospital of Keski-Pohjanmaa | 10 | 31 | 49 | 90 |
| | Pohjois-Pohjanmaa (19) | | 17 | 103 | 207 | 327 |
| | | Oulu University Hospital | 17 | 103 | 207 | 327 |
| | Kainuu (20) | | 5 | 8 | 57 | 70 |
| | | Kainuu Central Hospital | 5 | 8 | 57 | 70 |
| | Lappi (21) | | 6 | 37 | 113 | 156 |
| | | Lapland Central Hospital | 5 | 21 | 77 | 103 |
| | | Central Hospital of Länsi-Pohja | 1 | 16 | 36 | 53 |
| Åland (91) | | | | 7 | 18 | 25 |
| | | Åland Central Hospital | | 7 | 18 | 25 |
| Entire Country | | | 309 | 1537 | 3273 | 5119 |

At the end of 2022, dialysis and kidney transplantation patients were treated and followed up in 29 hospitals of 18 wellbeing services counties in five collaborative areas (Table 12). The wellbeing services county of Åland does not belong to any collaborative area. In the first part of this

report, the wellbeing services county of the patient is determined according to place of residence. However, in the analysis of treatment quality on pages 31–41, wellbeing services county of the patient is determined according to treating unit.

Figure 17. Hemoglobin distribution of dialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2012–2022

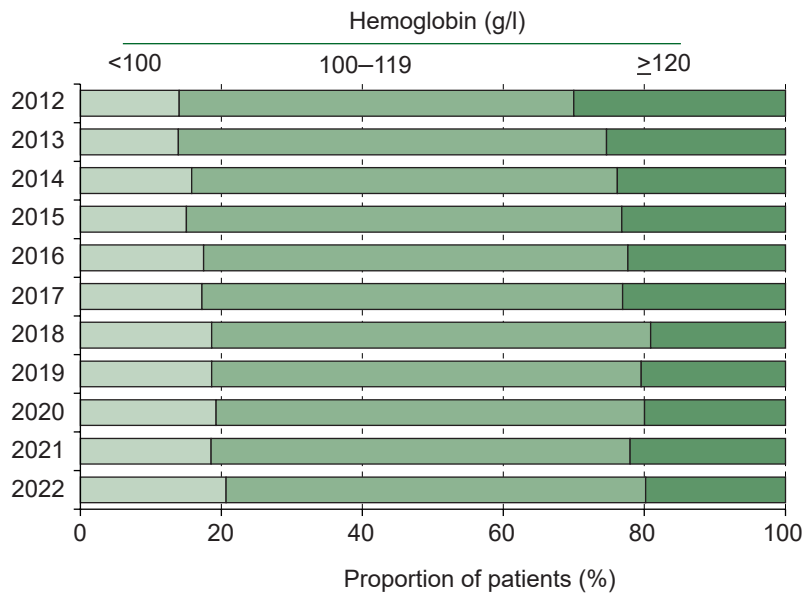
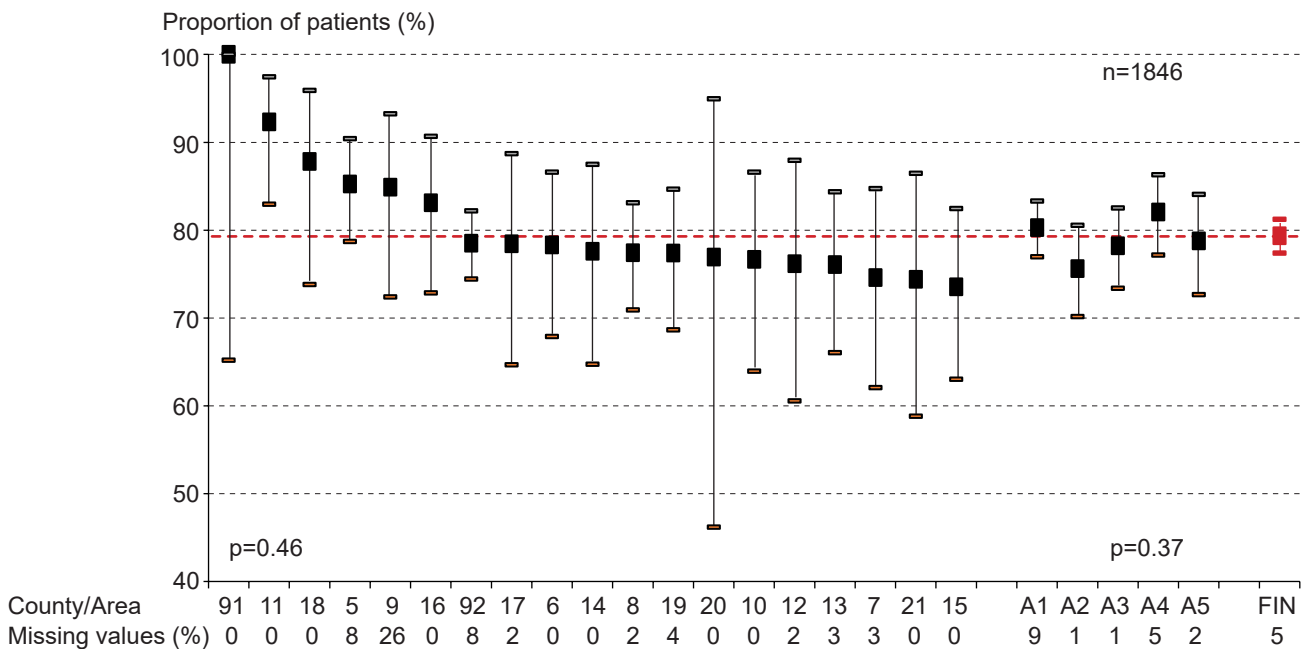


Figure 18. Proportion of dialysis patients older than 20 years with hemoglobin concentration ≥ 100 g/l in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2022



Several guidelines exist regarding the target for blood hemoglobin concentration in dialysis patients: the European Best Practice Guidelines (EBPG) and the guidelines of the Kidney Disease Outcome Quality Initiative (KDOQI) and the Kidney Disease Global Outcomes (KDIGO). KDIGO published new guidelines on renal anemia in 2012, according to which erythropoiesis-stimulating agents (ESAs) should be used to keep dialysis patients' hemoglobin in the range of 100–115 g/l. The renal registries in the UK and Sweden have in their reports used target hemoglobin levels of either 100–120 g/l or ≥ 100 g/l. For sake of comparison, we have chosen these same cut-offs.

The distribution of dialysis patients' hemoglobin concentration has changed during 2012–2022 (Figure 17). The proportion of patients with a hemoglobin concentration

<100 g/l has increased from 14% to 21%, while the proportion of patients with a hemoglobin concentration ≥ 120 g/l has decreased from 30% to 20%. Figures 17 and 18 include all hemodialysis patients, also those who did not use ESAs. In 2022, 82% of the patients used ESAs and hemoglobin concentration was <100 g/l in 23% and >120 g/l in 15% of these patients.

In Figure 18, the hemoglobin target is ≥ 100 g/l. At the end of 2022, the proportion of dialysis patients reaching this target was 79%, varying from 74% to 100% in the wellbeing services counties ($p=0.46$) and from 76% to 82% in the collaborative areas ($p=0.37$). No significant difference was present in the proportions of men and women with hemoglobin concentration ≥ 100 g/l.

Figure 19. Distribution of serum phosphate among dialysis patients older than 20 years at end of year Finnish Registry for Kidney Diseases 2012–2022

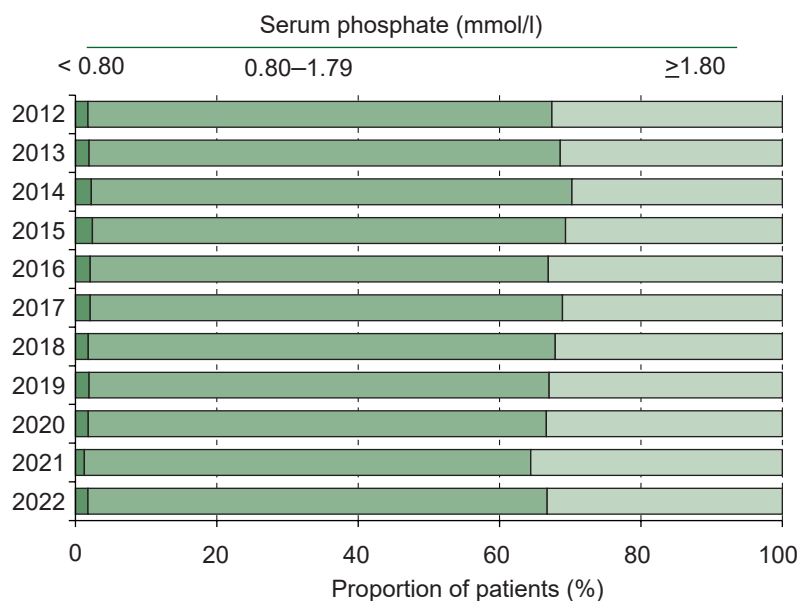
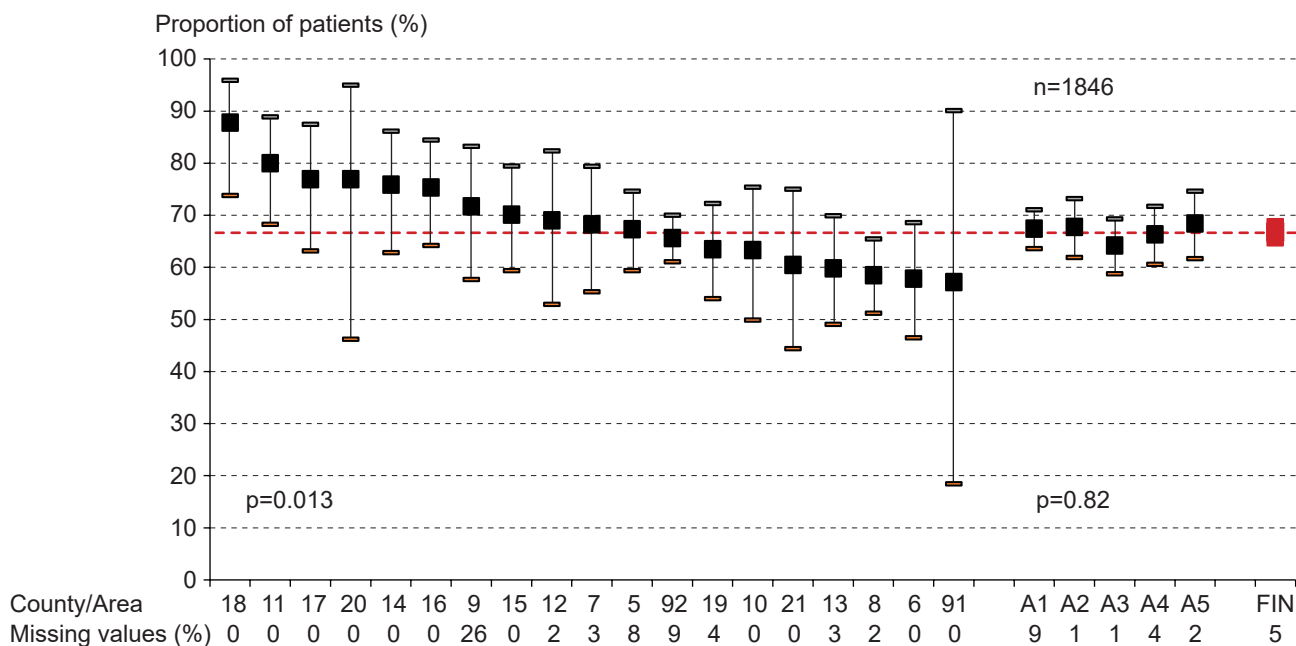


Figure 20. Proportion of dialysis patients older than 20 years with serum phosphate <1.8 mmol/l in wellbeing services counties and collaborative areas Finnish Registry for Kidney Diseases 2022



Hyperphosphatemia among patients with kidney disease is associated with vascular calcification and increased mortality. The guideline of the Kidney Disease Global Outcomes (KDIGO) suggests that elevated serum phosphate of dialysis patients should be lowered towards the normal range with diet, intensified dialysis treatment, and phosphate binders if needed.

At the end of 2022, 67% of hemodialysis and peritoneal dialysis patients had serum phosphate concentrations <1.8 mmol/l; this proportion has increased slightly relative to the

previous year (Figure 19). Only 2% of dialysis patients had an excessively low concentration of serum phosphate (<0.8 mmol/l).

The proportion of patients with serum phosphate <1.8 mmol/l varied between 57% and 88% in the wellbeing services counties (p=0.013) and between 64% and 68% in the collaborative areas (p=0.82) (Figure 20). No significant difference was present in the proportions of men and women with a phosphate concentration <1.8 mmol/l.

Figure 21. Estimated GFR of new KRT patients older than 20 years
Finnish Registry for Kidney Diseases 2012–2022

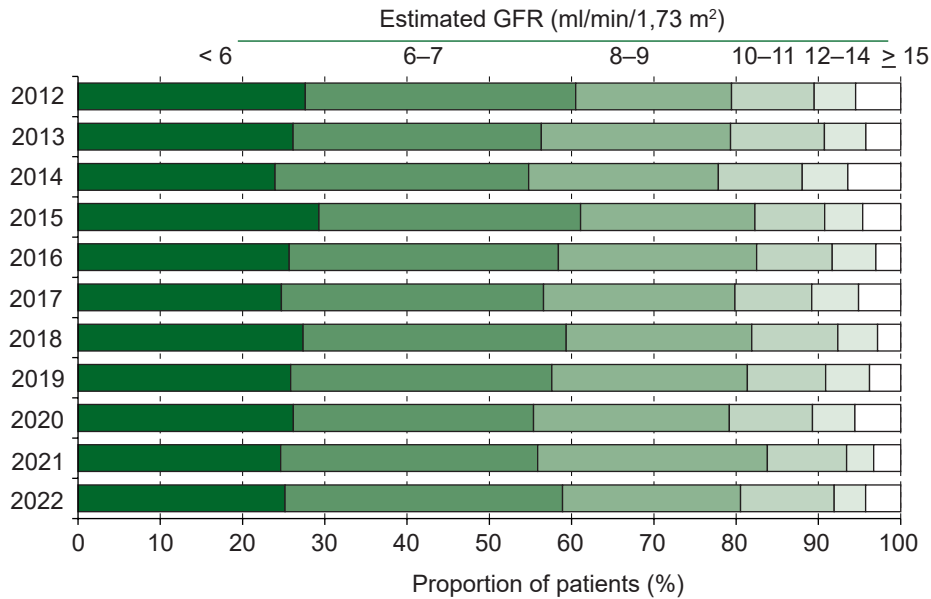


Figure 22. Estimated GFR of new KRT patients older than 20 years in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2018–2022

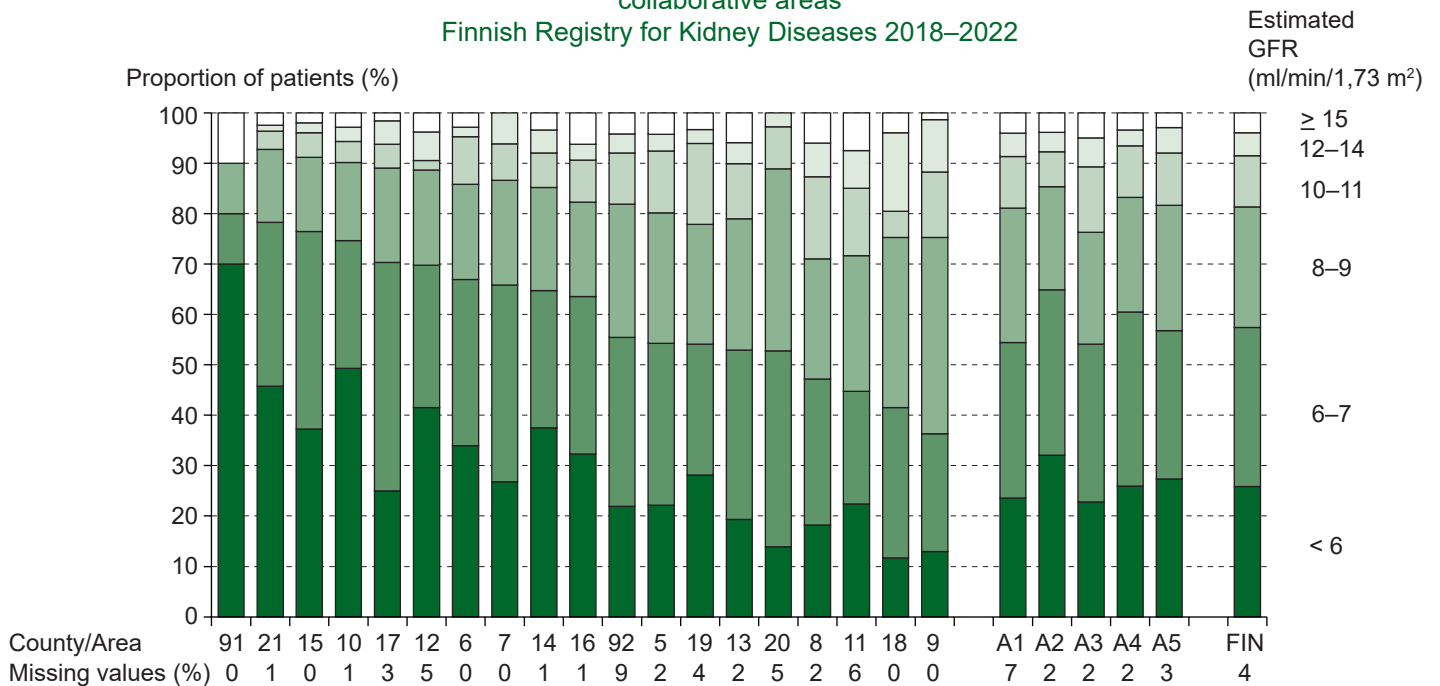


Figure 21 shows the estimated glomerular filtration rate (GFR), calculated with the CKD-EPI formula, of patients who entered KRT in 2012–2022. The estimated GFR is based on serum creatinine concentration measured before the first KRT. The decision to start KRT is not based on estimated GFR alone; the patient’s symptoms and clinical condition also affect the decision. Research on timing of KRT start has not supported a very early start (at high estimated GFR).

In 2012, the median estimated GFR was 7.4 ml/min/1.73 m² and in 2022 it was 7.5 ml/min/1.73 m².

Figure 22 presents estimated GFR of patients who entered KRT in 2018–2022 according to wellbeing services county and collaborative area. The wellbeing services counties are sorted based on the proportion of patients with an estimated GFR <8 ml/min/1.73 m². This proportion for the entire country was 57% but varied by wellbeing services counties in the range of 36–80% (p<0.001) and by collaborative area in the range of 54–65% (p=0.005). Estimated GFR was <8 ml/min/1.73 m² in women more often than in men (p=0.001).

Figure 23. Vascular access of new hemodialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2014–2022

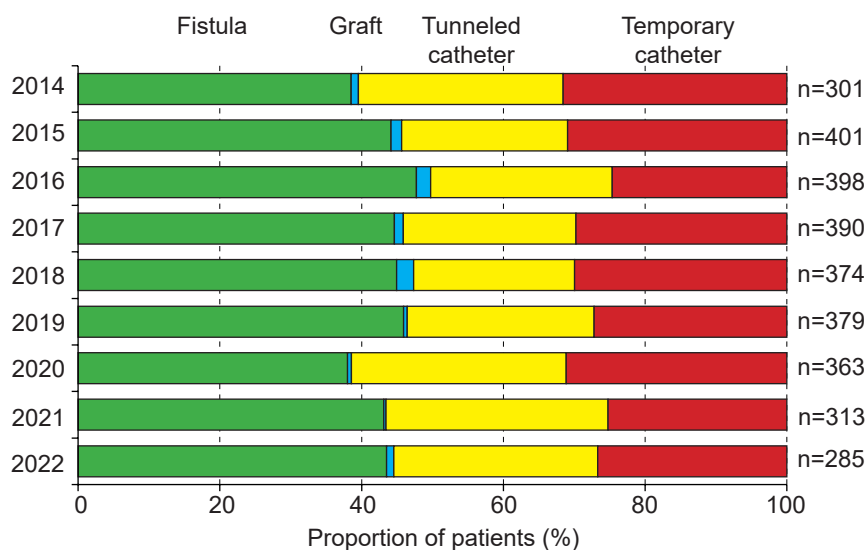
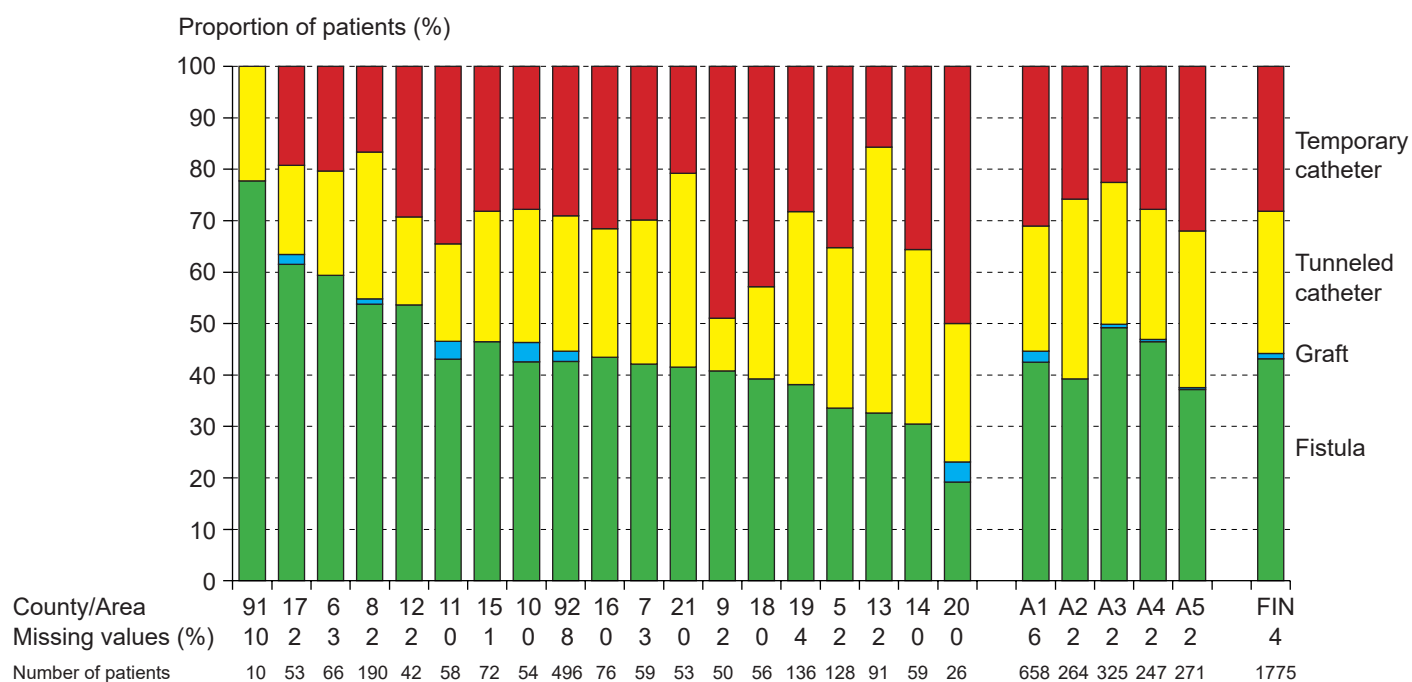


Figure 24. Vascular access of new hemodialysis patients older than 20 years in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2017–2021



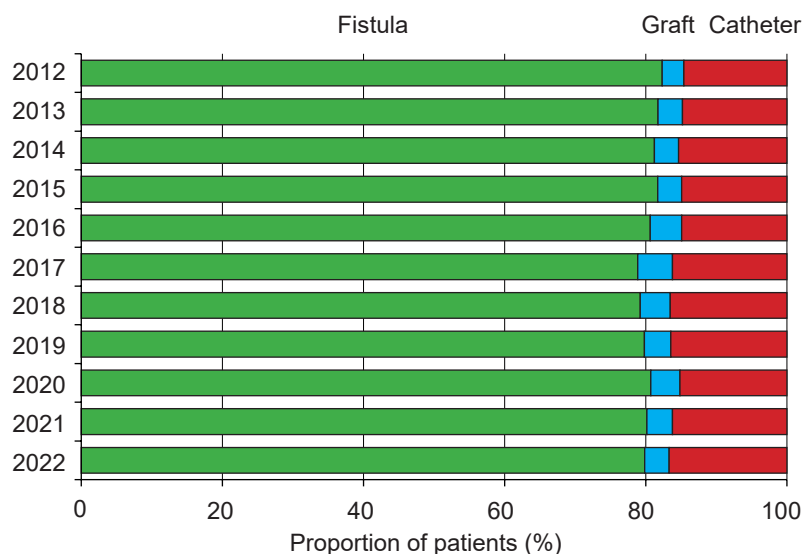
The Finnish Registry for Kidney Diseases has since 2014 collected data on vascular access of patients entering hemodialysis as the first type of KRT. The recommended type of vascular access is an arteriovenous fistula or graft. A tunneled central venous catheter is a better alternative than a temporary (non-cuffed) central venous catheter, which is recommended only when dialysis is started acutely and other types of vascular access are not possible.

In 2022, 45% of patients older than 20 years who entered hemodialysis had an arteriovenous fistula or graft, and the proportion was at the same level as in previous years (Fig-

ure 23). Of new hemodialysis patients in 2022, 27% started with a temporary catheter, and this proportion was virtually the same as earlier.

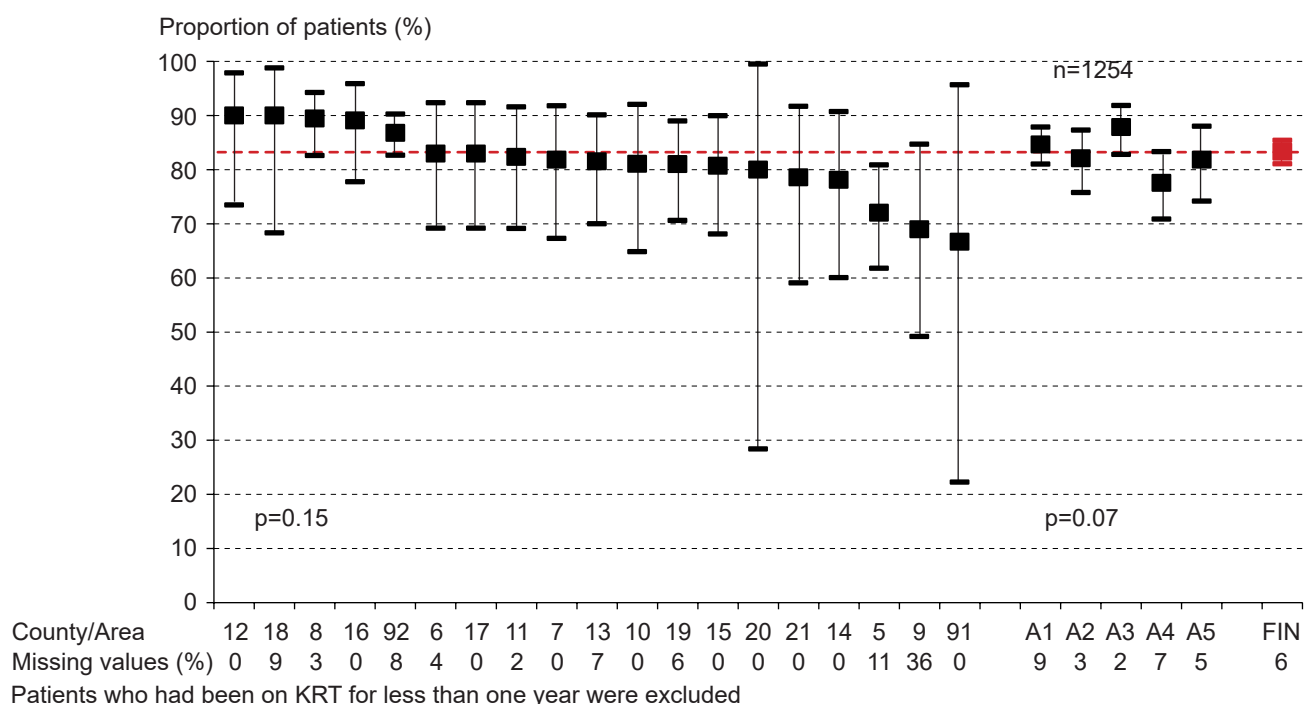
Figure 24 presents the distribution of types of first vascular access among patients who entered hemodialysis in 2018–2022. In the entire country, 44% of patients had a fistula or graft, but the proportion varied between 23% and 78% in wellbeing services counties ($p < 0.001$) and between 38% and 50% in collaborative areas ($p = 0.017$). The proportion of patients with a fistula or graft did not differ between the sexes.

Figure 25. Vascular access of hemodialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2012–2022



Patients who had been on KRT less than one year were excluded

Figure 26. Proportion of hemodialysis patients older than 20 years with a fistula or graft
in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2022



Vascular access is one of the most important quality measures of hemodialysis. Use of a central venous catheter is associated with complications, and the goal is for hemodialysis patients to have an arteriovenous fistula or graft. However, especially in elderly patients, a tunneled catheter can sometimes be the best option.

Of hemodialysis patients aged 20 years or over who had been on KRT for at least one year, the proportion with a fistula or graft had decreased from 85% in 2012 to 83% in

2022 (Figure 25).

At the end of 2022, the proportion of patients with a fistula or graft varied between 67% and 90% in wellbeing services counties ($p=0.15$) and between 78% and 88% in collaborative areas ($p=0.07$) (Figure 26). At the end of that year, the proportion of patients with a fistula or graft did not differ between the sexes. A fistula or graft was as common in patients aged over 75 years as in younger patients.

Figure 27. Distribution of predialytic blood pressure among hemodialysis patients older than 20 years Finnish Registry for Kidney Diseases 2012–2022

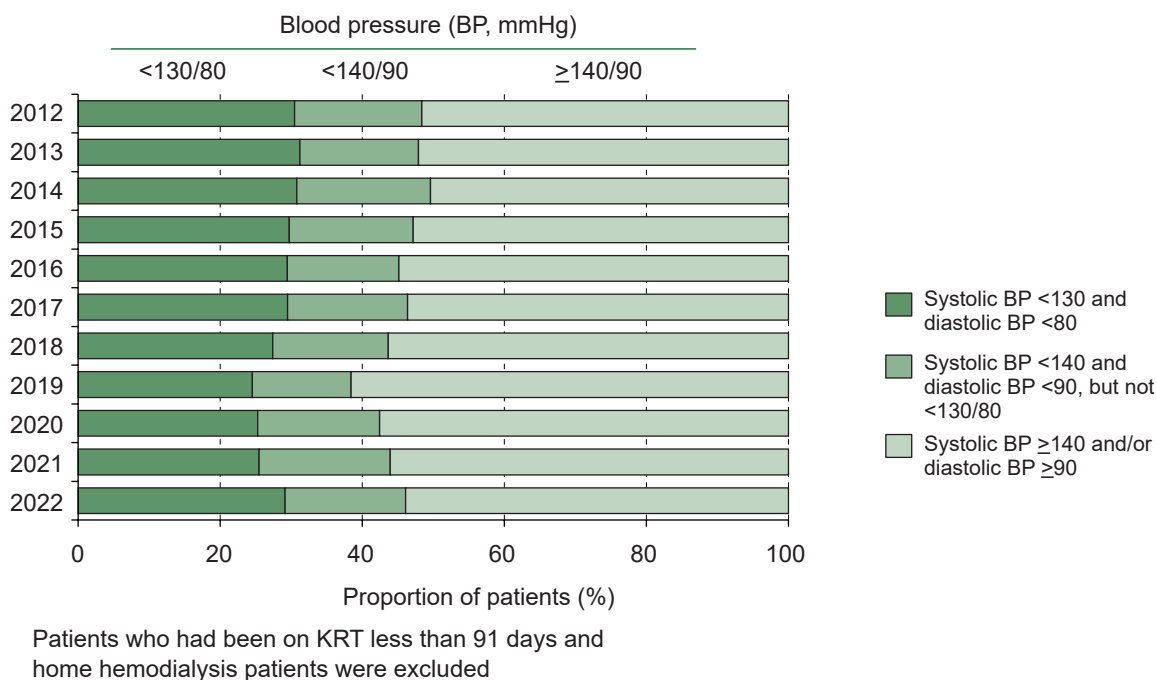
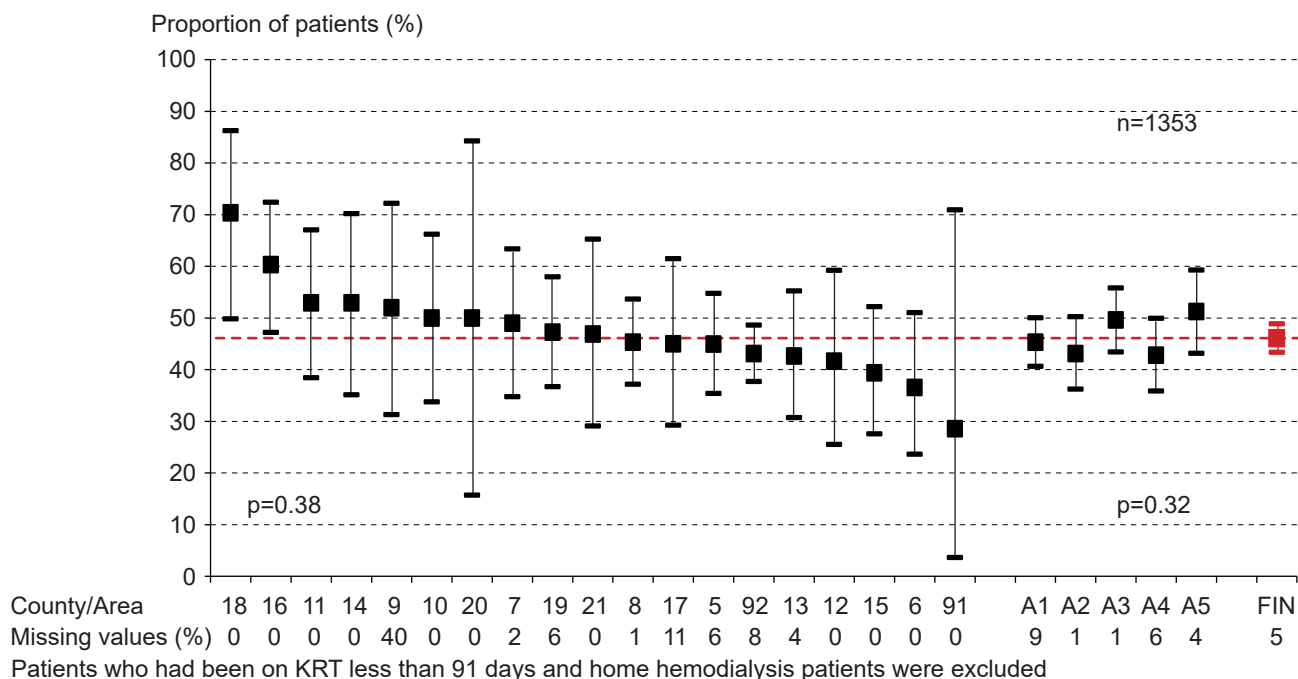


Figure 28. Proportion of hemodialysis patients older than 20 years with predialytic blood pressure <140/90 mmHg in wellbeing services counties and collaborative areas Finnish Registry for Kidney Diseases 2022



According to the guidelines of the Kidney Disease Outcome Quality Initiative (KDOQI), hemodialysis patients' target predialytic blood pressure is <140/90 mmHg. In hemodialysis patients, however, blood pressure often varies significantly during and after dialysis compared with predialytic blood pressure, and thus, optimal blood pressure level for the patient is also affected by these values.

At the end of 2022, 46% of hemodialysis patients reach-

ed this target and the proportion has increased slightly in recent years (Figure 27).

The proportion of patients attaining the target varied between 29% and 70% in wellbeing services counties ($p=0.38$) and between 43% and 51% in collaborative areas ($p=0.32$) (Figure 28). No significant difference was observed between the sexes.

Figure 29. Distribution of blood pressure in kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2012–2022

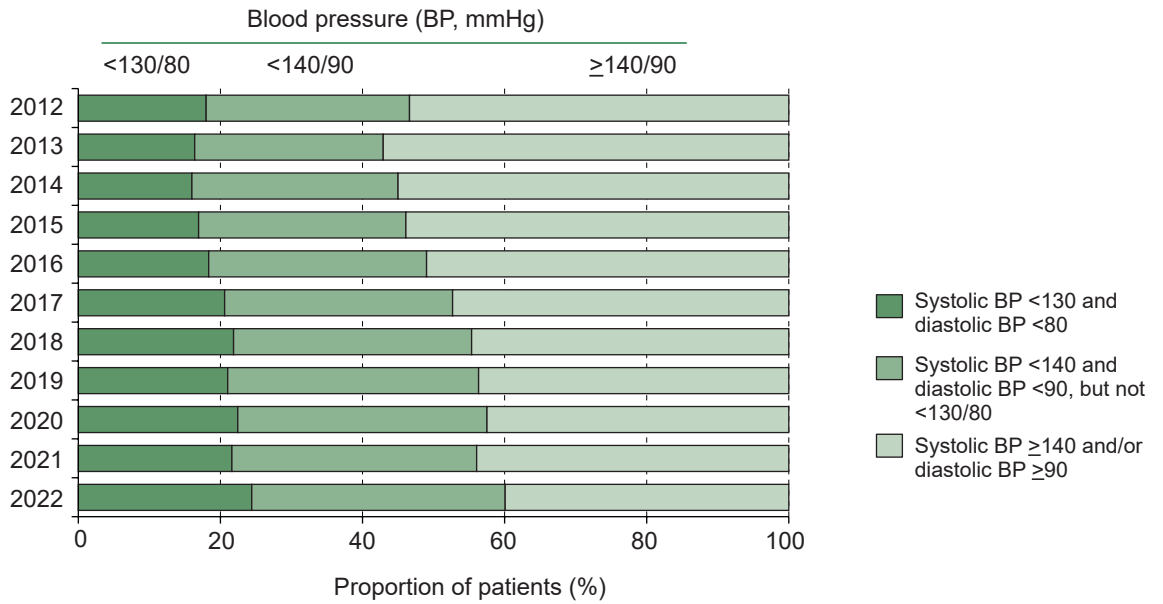
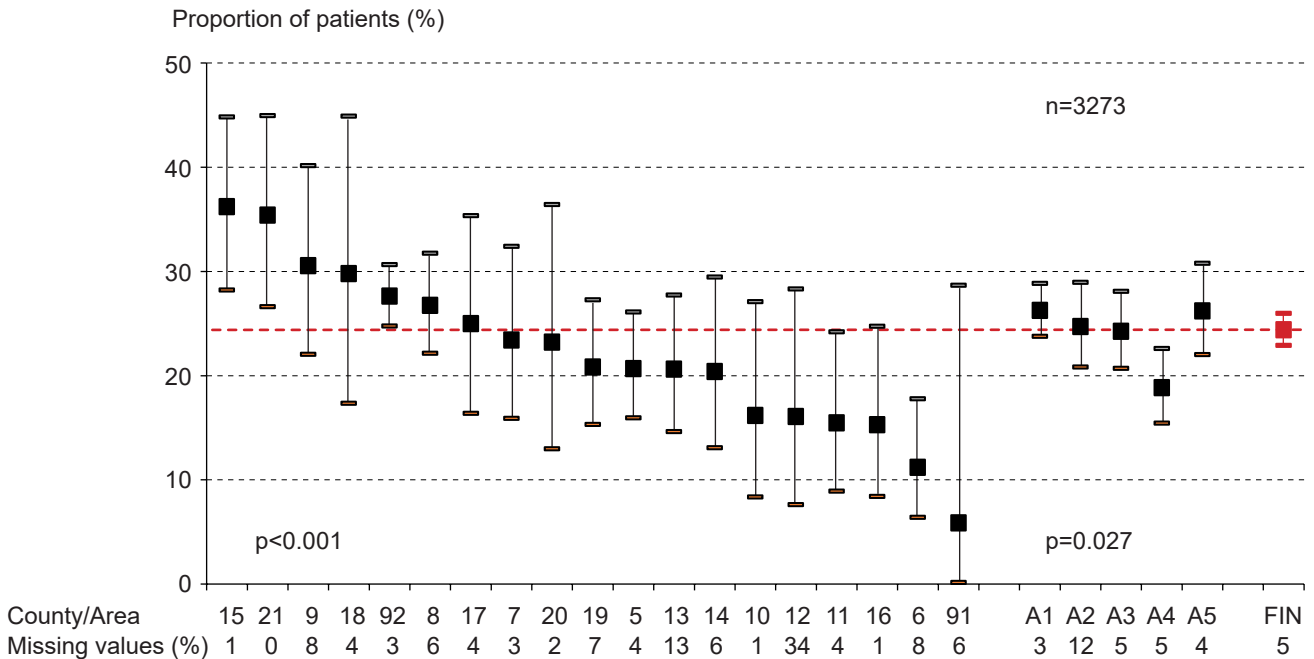


Figure 30. Proportion of kidney transplantation patients older than 20 years with blood pressure <130/80 mmHg in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2022



The KDIGO guidelines suggest that the blood pressure target of kidney transplantation patients be <130 mmHg for systolic blood pressure and <80 mmHg for diastolic blood pressure. Figure 29 shows the blood pressure distribution of kidney transplantation patients at the end of years 2012–2022. The proportion of patients reaching the target (<130/80 mmHg) was 18% in 2012 and 24% in 2022. The proportion of patients with blood pressure <140/90 mmHg

increased from 47% in 2012 to 60% in 2022.

At the end of 2022, the proportion of kidney transplantation patients attaining the blood pressure target varied between 6% and 36% in wellbeing services counties (p<0.001) and between 19% and 26% in collaborative areas (p=0.027) (Figure 34). No significant difference was observed between the sexes.

Figure 31. Number of PD peritonitis patients older than 20 years according to annual number of episodes of peritonitis Finnish Registry for Kidney Diseases 2012–2022

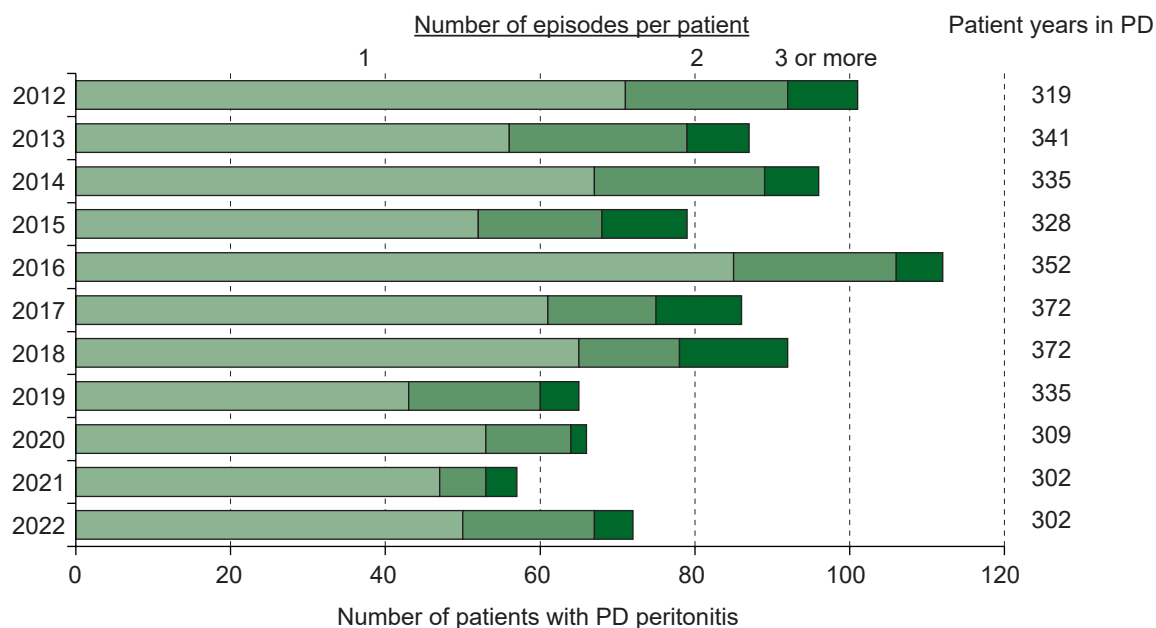


Figure 32. Incidence density of peritonitis among PD patients older than 20 years in collaborative areas Finnish Registry for Kidney Diseases 2013–2022

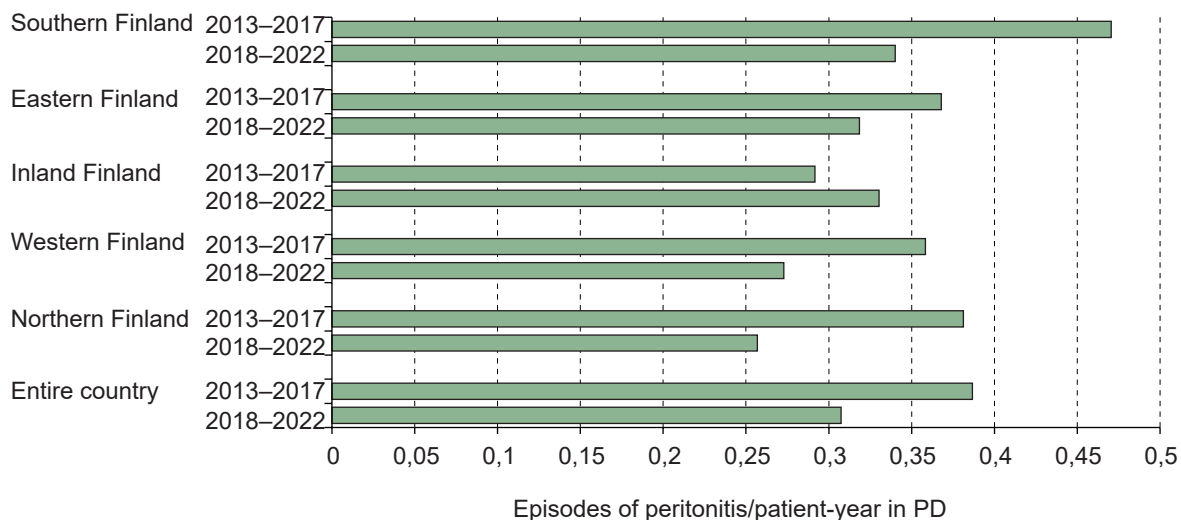


Figure 31 presents the number of peritoneal dialysis (PD) patients who had had at least one episode of peritonitis per calendar year during 2012–2022. Of PD patients with peritonitis in 2022, 31% had had more than one episode, and this proportion was at the same level as previously.

According to the recommendation of the International Society for Peritoneal Dialysis (ISPD) in 2022, the number of peritonitis episodes should be less than 0.4 per patient-year. Figure 32 shows PD patients' incidence density of

peritonitis, i.e. the number of peritonitis episodes per patient-year in PD. If the patient had more than three episodes of peritonitis during one calendar year, only the first three episodes were considered. In the entire country, the incidence density of PD peritonitis was 0.31 per patient-year in 2018–2022, and this was 21% less than in 2013–2017. The incidence density of PD peritonitis has declined in most collaborative areas.

Figure 33. Time to waitlisting for kidney transplantation of new KRT patients older than 20 years
Finnish Registry for Kidney Diseases 2012–2022

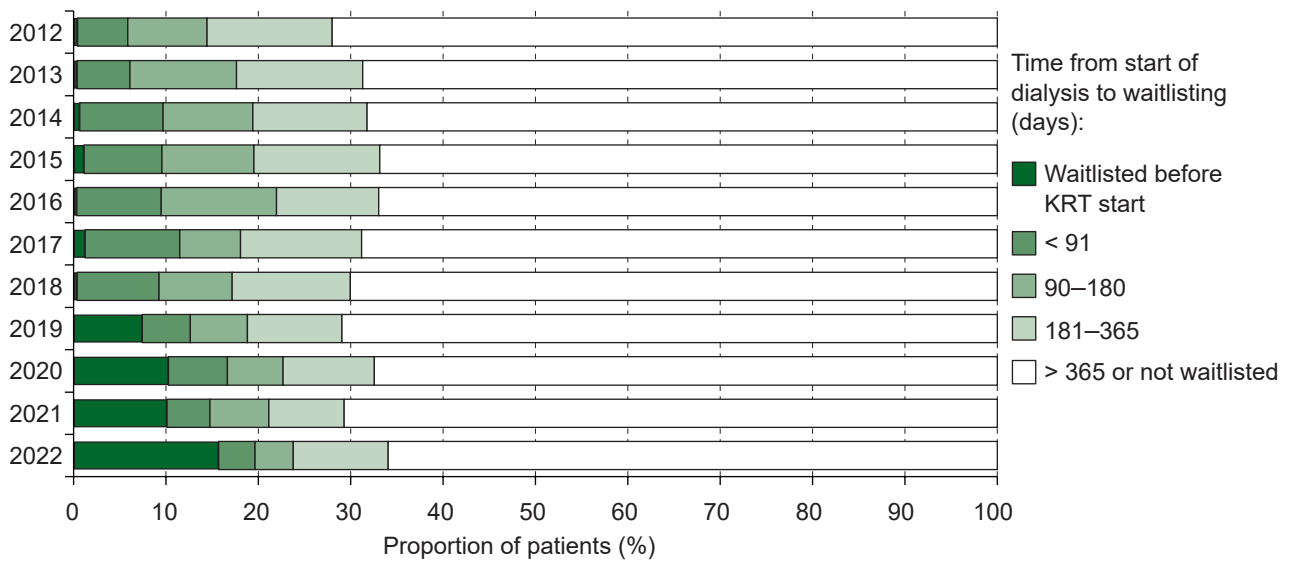
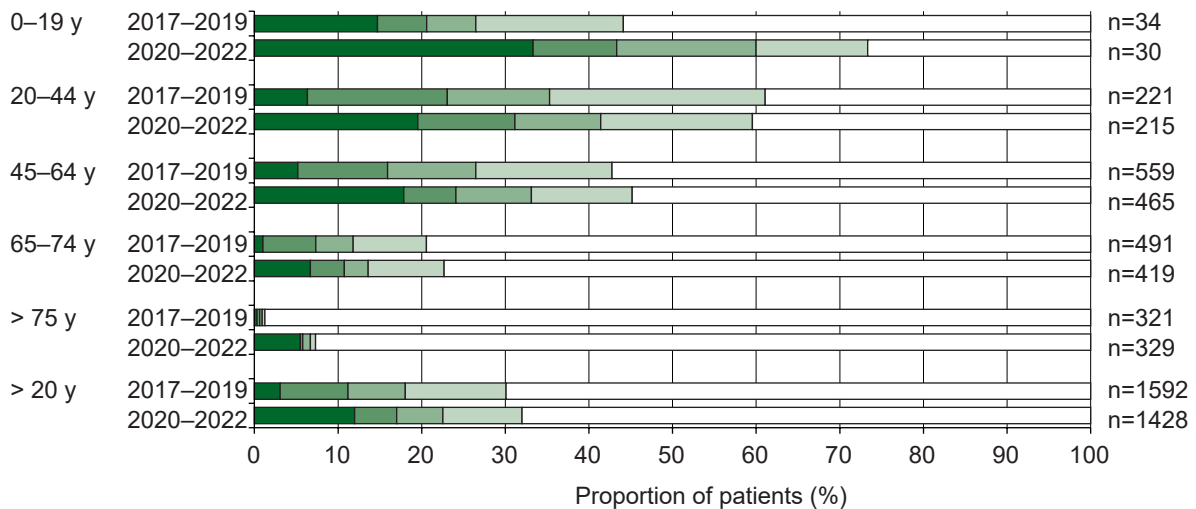


Figure 34. Time to waitlisting for kidney transplantation by age group of new KRT patients
Finnish Registry for Kidney Diseases 2017–2022



The colors of the columns in the figure correspond to the explanations of the colors in figure 33

In 2012–2022, altogether 5483 patients older than 20 years entered KRT. Figure 33 shows the time from initiation of KRT to waitlisting for kidney transplantation. Since 1 September 2018, it has been possible to waitlist patients for kidney transplantation from a deceased donor before start of dialysis. Of those who started KRT in 2022, 16% were already waitlisted at the start of KRT, and this proportion has increased markedly, as has the proportion of patients waitlisted within 90 days of KRT start. The proportion of patients waitlisted within 180 days of KRT initiation, which was 24% in 2022, has also increased slightly.

Information on waitlisting received from the Transplantation Registry at Helsinki University Hospital covered the period from 1 January 2012 to 24 October 2023. Because of this, complete follow-up data for 365 days of waitlisting

for kidney transplantation were not available for patient starting KRT after 24 October 2022 (n=87) in the analyses of Figures 33–36. Had the follow-up period been complete, the proportion of patients who started KRT in 2022 and were waitlisted in less than a year would have increased by about 2% in Figure 33.

Figure 34 shows the time from start of KRT until waitlisting for kidney transplantation by age groups in 2017–2019 and in 2020–2022. Patients aged 0–19 years were waitlisted the most quickly in 2020–2022, with the proportion of patients waitlisted decreasing in older age groups. In patients who started KRT in 2020–2022, 18% of those aged 20–64 years, 7% of those aged 65–74 years, and 5% of those aged over 75 years were waitlisted before start of KRT, and there has been an increase in all age groups.

Figure 35. Time to waitlisting for kidney transplantation of new KRT patients older than 20 years in collaborative areas
Finnish Registry for Kidney Diseases 2017–2022

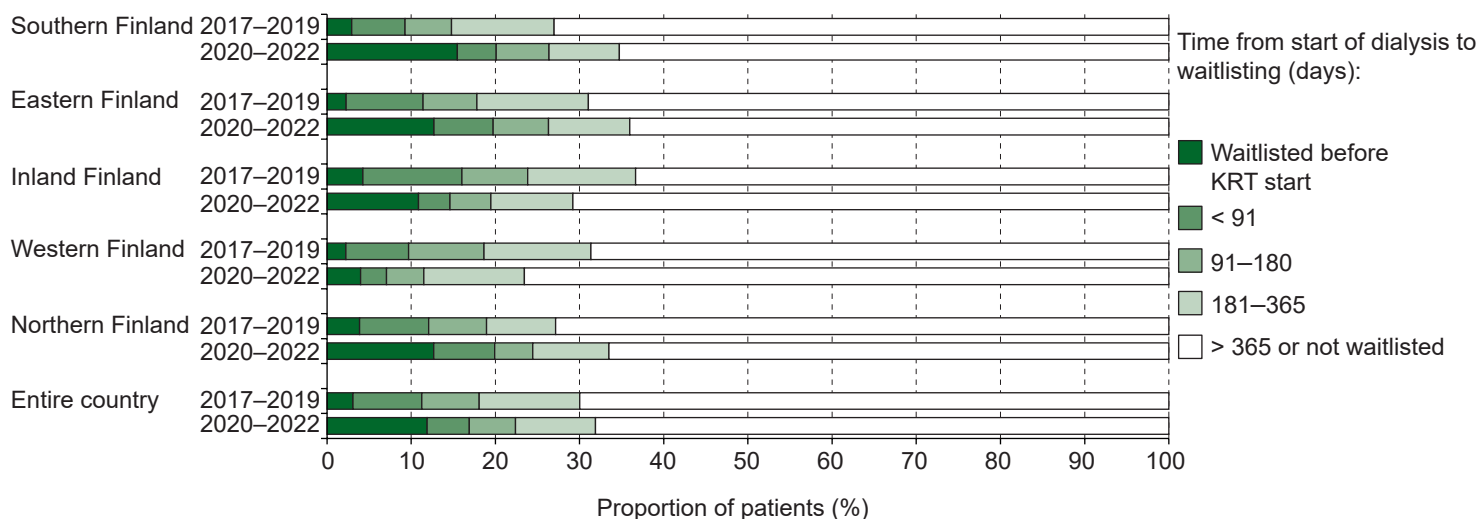
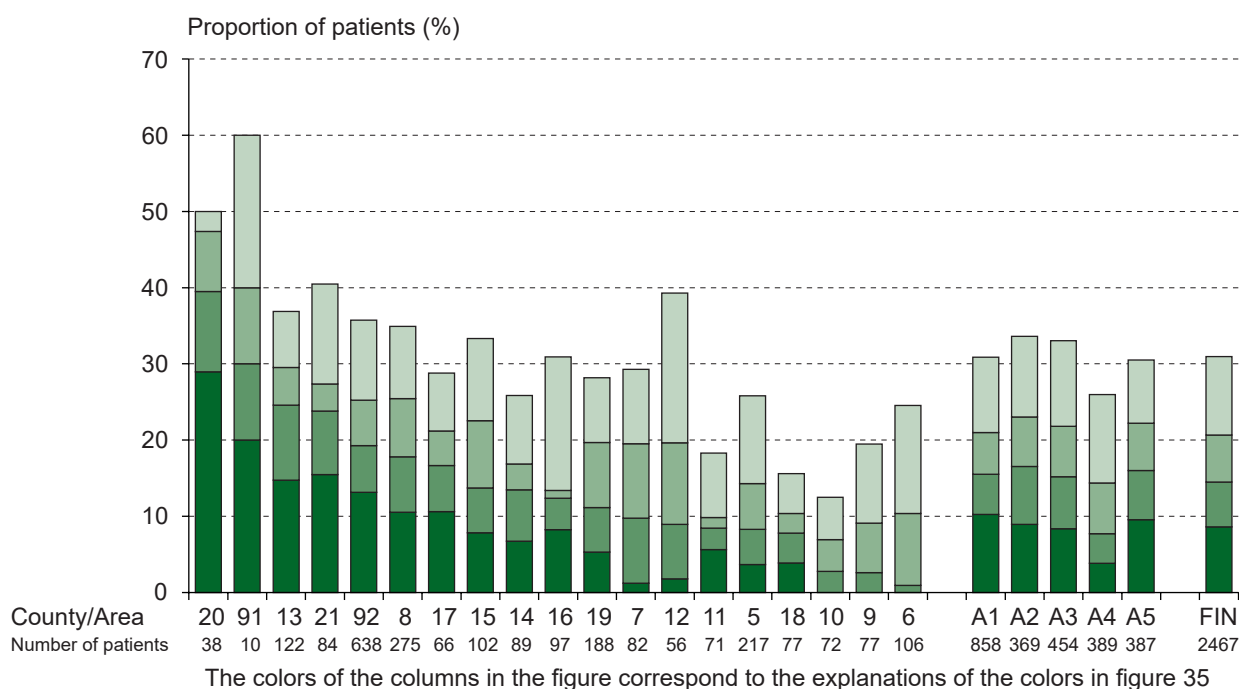


Figure 36. Time to waitlisting for kidney transplantation of new KRT patients older than 20 years in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2018–2022



The colors of the columns in the figure correspond to the explanations of the colors in figure 35

Figure 35 shows the time from start of KRT until waitlisting for kidney transplantation by region in 2017–2019 and in 2020–2022. In all collaborative areas, a new practice had been adopted, according to which patients can be wait-listed for kidney transplantation from a deceased donor after 1 September 2018. In 2020–2022, 12% of patients who started KRT had been waitlisted before start of KRT. The proportion was lowest in the Western Finland collaborative area (4%) and highest in the Southern Finland collaborative area (15%), with a significant difference between the collaborative areas ($p=0.001$). In the entire country, 14% of women and 11% of men who started KRT in 2020–2022 had been waitlisted before start of KRT ($p=0.07$).

Figure 36 shows the proportions of patients waitlisted

within one year of start of KRT in 2018–2022. Of the patients, 15% were waitlisted (or had already received a kidney transplant) within 90 days of start of KRT. This proportion ranged from 1% to 39% in wellbeing services counties ($p<0.001$) and from 8% to 17% in collaborative areas ($p=0.002$). Within 90 days of start of KRT, 17% of women and 13% of men were waitlisted for kidney transplantation ($p=0.01$).

Within 180 days of start of KRT, 21% of patients were waitlisted, with the proportion varying between 7% and 47% in wellbeing services counties ($p<0.001$) and between 14% and 23% in collaborative areas ($p=0.02$). Of women, 25%, and of men, 19%, had been waitlisted within 180 days of start of KRT ($p<0.001$).

Figure 37. Nephrological follow-up before start of KRT of patients older than 20 years
Finnish Registry for Kidney Diseases 2012–2022

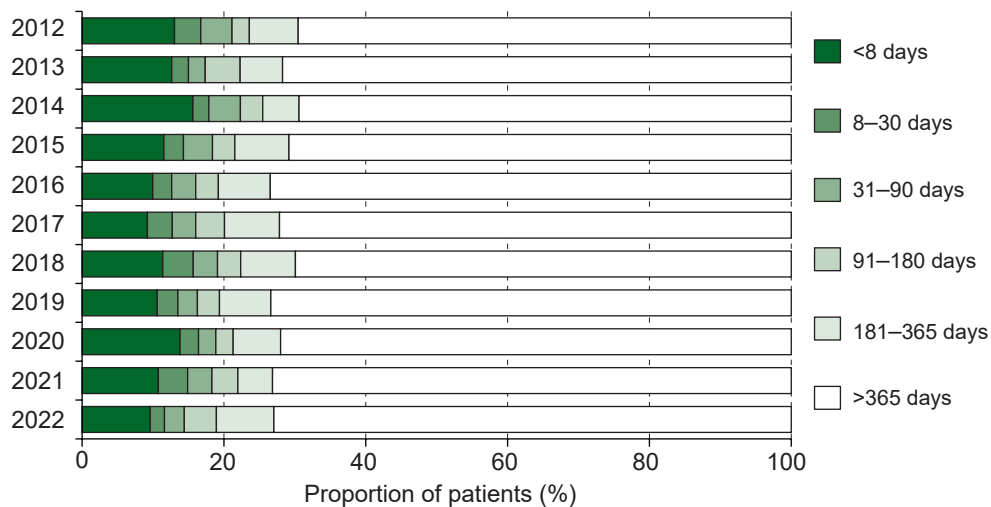
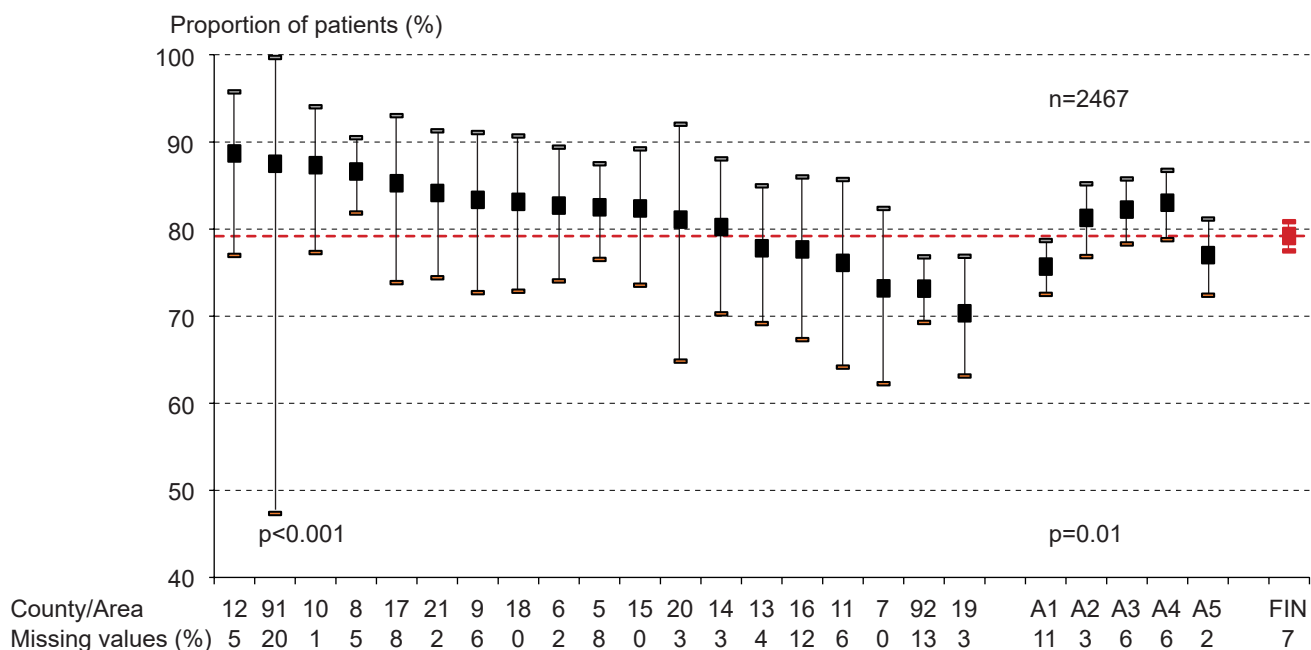


Figure 38. Proportion of patients older than 20 years with nephrological follow-up longer than 180 days before start of KRT in wellbeing services counties and collaborative areas
Finnish Registry for Kidney Diseases 2018–2022



The Finnish Society of Nephrology published a strategy for management of severe chronic kidney disease in 2022. One of the goals was to begin preparations 6–12 months before the start of KRT to ensure that the planned start of treatment is possible. The goal for 2023 was that at least 65% of the initiations of KRT would be planned and patients would undergo nephrological follow-up. The first date of nephrological follow-up is provided to the Finnish Registry for Kidney Diseases. Sometimes, however, follow-up can be arranged in another unit between that visit and the start of KRT, which can affect the results presented here.

Figure 37 shows the time in nephrological follow-up before the start of KRT in 2012–2022 in patients older than 20 years. The proportion of patients starting KRT who had

been followed up for no more than one week before the start of KRT was 10%, and the proportion of patients who had been followed up for more than one year was 73% in 2022. No significant change in these proportions occurred during the follow-up period.

Between 2018 and 2022, an average of 79% of patients older than 20 years who started KRT had been followed up by a nephrologist for more than 180 days. The proportion varied between 70% and 89% in wellbeing services counties ($p<0.001$) and between 76% and 83% in collaborative areas ($p=0.01$) (Figure 38). No significant difference was present between the sexes in achieving the goal.

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