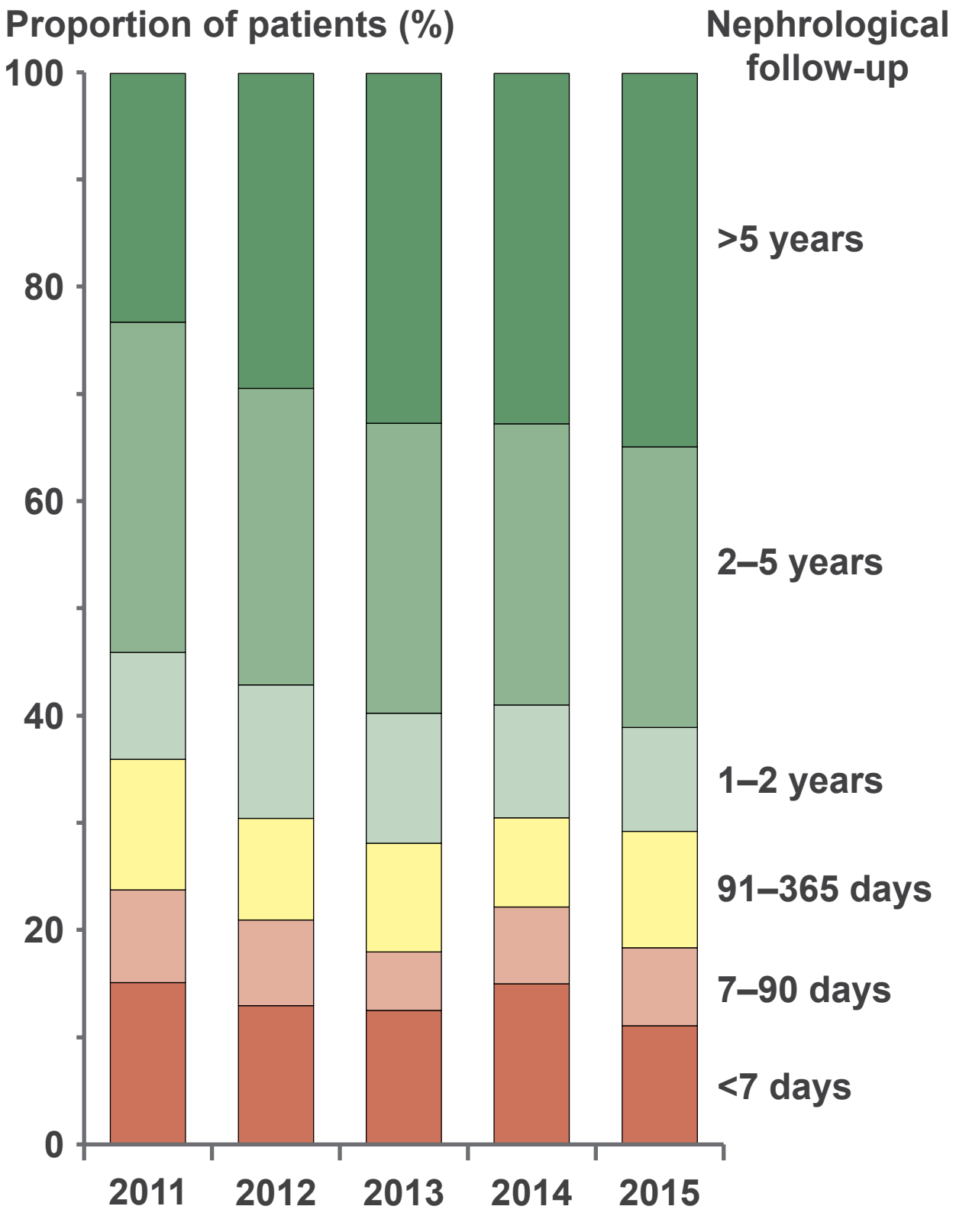
Report 2015

Finnish Registry for Kidney Diseases



Finnish Registry for Kidney Diseases – Report 2015

Content

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The Registry has a new chairman

After having served as the chair of the Board since the Finnish Registry for Kidney Diseases was founded in the late 1980s, Professor Carola Grönhagen-Riska resigned from her position in 2016. Under her leadership, the Registry developed into what it is today, an established national renal registry highly regarded both in Finland and internationally.

In its meeting in December 2016, the Board of the Finnish Registry for Kidney Diseases elected Professor Per-Henrik Groop as its new chairman. He serves as a Professor of Internal Medicine at the University of Helsinki and Chief Physician at the Department of Nephrology, Helsinki University Central Hospital.

Finnish Registry for Kidney Diseases 2015

The Finnish Registry for Kidney Diseases contains data on dialysis and kidney transplantation patients in Finland since 1964. Since the beginning of the 1990s, the registry has published an annual report with information on the number of patients currently on renal replacement therapy (RRT, i.e. dialysis or kidney transplantation) as well as those entering RRT. Information on quality of treatment is presented for healthcare districts and regions. The report gives updates on causes of end-stage renal disease, e.g. specifying the renal diseases that are becoming more common, which is important information for disease prevention. Every few years (most recently Report 2014), projections on future numbers of RRT patients are also presented, which assists in planning of healthcare resources.

The data provided by the Finnish Registry for Kidney Diseases enable international comparisons of, for instance, incidence of RRT and survival of RRT patients. In recent years, the registry data have been used extensively for research, and dozens of articles on such topics as factors affecting patients' survival on RRT have been published in international medical journals.

The basis for the Finnish Registry for Kidney Diseases is cooperation with the staff of nephrology units, who send data to the registry when a patient enters RRT and thereafter at the end of each year. We thank the nephrology units for excellent data reporting; for many of the variables, the national coverage is more than 99%!

The Finnish Registry for Kidney Diseases is a national healthcare registry maintained by the Finnish Kidney and Liver Association. Since the beginning of the 1990s, the registry has been financed by the Finnish government, first through the Slot Machine Association and since 2010 by the National Institute of Health and Welfare (THL). In 2016, our registry also received support from the Liv och Hälsa Association. In 2016 THL has decided to gradually withdraw its support. The total annual budget of the registry has for many years been 80 000 euros. In 2017, THL will pay half of that, in 2018 one-fourth, and in 2019 the funding will cease.

Because of the funding problem, we have asked the healthcare districts for support, and 18 of 21 districts have agreed to pay 10 euros per RRT patient for the year 2017. Some of the districts have already notified that this support will not continue beyond 2017, as they in principle will not take on the financial responsibility for healthcare registries from the government. Thus, the funding for 2018 is uncertain. We are trying to find a new source of funding and this work will continue in 2017. The treatment of all dialysis and kidney transplantation patients in Finland is estimated to cost more than 100 million euros. The budget of the Finnish Registry for Kidney Diseases is less than 0.1% of that and corresponds to the annual costs of treating 1–2 dialysis patients. We hope that the Finnish Registry for Kidney Diseases will receive funding and be able to continue its activities.

Patrik Finne
Administrative Director

Anniina Pylsy
Registry Coordinator

Per-Henrik Groop
Chairman of the Board

Summary of Report

Finnish population (pages 7–8)
The Finnish population increased by 4.4% in 2005–2015, but the trend is not uniform over the entire country; in 11 healthcare districts, the population decreased. The Finnish population has in ten years become older and the proportion of inhabitants older than 65 years has increased from 16% to 20%. According to Statistics Finland, the population will continue to become older over the next few years.

Incidence of RRT, number of patients entering RRT (pages 9–15)
In 2015, the incidence of RRT was 95 new RRT patients per million inhabitants, which was 11% larger than the year before. In an international comparison, the incidence in Finland is low. In the age group 75 years and older, the incidence is especially low, 190 per million age-related inhabitants, whereas it is 350–500 per million age-related inhabitants in the other Nordic countries. The most frequent kidney disease diagnoses of patients who entered RRT are type 2 diabetes, type 1 diabetes, glomerulonephritis, and polycystic degeneration. Three months after start of RRT, 30% of patients were on home dialysis (peritoneal dialysis or home hemodialysis), but the proportion varied significantly between healthcare districts. Three months after start of RRT, 2% had received a kidney transplant, which is a substantially smaller proportion than in the other Nordic countries (9–15%).

Prevalence of RRT, number of patients at end of year (pages 16–24)
At end of 2015, there were 1836 dialysis patients and 2833 kidney transplantation patients in Finland. The prevalence of RRT was 851 patients per million inhabitants, which is lower than in most other European countries. In healthcare districts, the prevalence of RRT varied between 654 and 1 174 patients per million inhabitants. During the past ten years the number of dialysis patients had increased by 18% and the number of kidney transplantation patients by 29%. The most frequent kidney disease diagnosis of kidney transplantation patients was glomerulonephritis (22% of patients), of hemodialysis patients it was type 2 diabetes (20%), and of peritoneal dialysis patients it was type 1 diabetes (21%).

RRT patients' mortality (page 25)
In 2011–2015, the mortality of RRT patients was 87 deaths per 1000 patient-years. Mortality was slightly higher in the northern and western regions than elsewhere. During the past ten years mortality has decreased in all regions.

Quality of care (pages 26–42)
This is the fourth year that analyses of quality of care are presented in the Report. The results are given according to healthcare district and region, and the most essential analyses are repeated every year. New analyses in this Report are length of nephrological follow-up before start of RRT, vascular access at start of hemodialysis, peritoneal dialysis patients' peritonitis episodes, and dialysis patients' incidence density of kidney transplantation.

In 2011–2015, 13% of patients older than 20 years entering RRT had been followed up by a nephrologist for less than seven days before start of RRT. Of patients older than 20 years who started hemodialysis, 46% had an arteriovenous fistula or graft, but 31% had a temporary non-cuffed central venous catheter, which is recommended only when dialysis is started acutely.

In 2011–2015, peritoneal dialysis patients' incidence density of peritonitis was 420 per 1000 patient-years. Risk of peritonitis had decreased by 15% since 2005–2010. Males, diabetes patients, and patients older than 75 years had an increased risk of peritonitis.

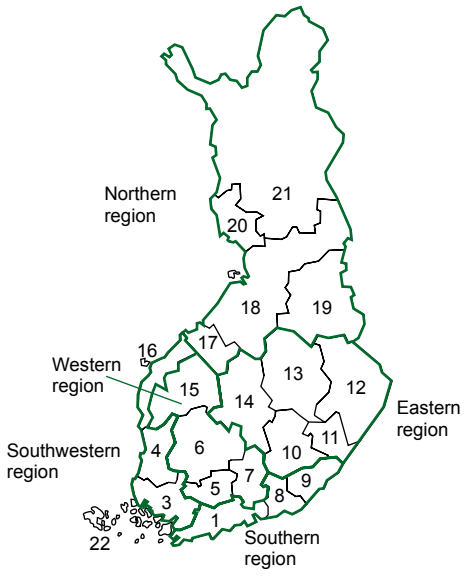
Of dialysis patients, 69% reached the target of serum phosphorus (<1.8 mmol/l), but the proportion of those reaching the target varied significantly between healthcare districts and regions.

In the entire country, 7% of patients had been waitlisted for kidney transplantation within 90 days since start of RRT in 2011–2015. Incidence density of kidney transplantation among dialysis patients was higher in 2014–2015 than in earlier years. The frequency of kidney transplantation was similar in all regions. Of kidney transplantation patients, 64% reached the treatment target of LDL cholesterol (serum concentration <2.6 mmol/l), but the proportion reaching the target varied in the range of 22–76% in healthcare districts.

Table 1. The Finnish population (as thousands of inhabitants) and its distribution in healthcare districts
Finnish Registry for Kidney Diseases 2005–2015

Healthcare district		Year					Change (%) 2005–2015
		2005	2010	2013	2014	2015	
1	Helsinki-Uusimaa	1448	1528	1581	1599	1616	11.6
3	Varsinais-Suomi	459	468	474	476	477	4.0
4	Satakunta	229	226	225	224	223	–2.5
5	Kanta-Häme	168	175	175	175	175	3.8
6	Pirkanmaa	492	511	522	524	527	7.0
7	Päijät-Häme	210	213	213	213	212	1.0
8	Kymenlaakso	178	175	174	173	172	–3.5
9	Etelä-Karjala	135	133	132	132	131	–2.7
10	Etelä-Savo	109	106	104	104	103	–5.5
11	Itä-Savo	48	46	44	44	43	–9.0
12	Pohjois-Karjala	173	170	169	169	168	–2.5
13	Pohjois-Savo	250	248	248	248	248	–0.8
14	Keski-Suomi	242	248	251	251	252	3.9
15	Etelä-Pohjanmaa	199	198	199	198	197	–0.7
16	Vaasa	162	166	169	170	170	5.2
17	Keski-Pohjanmaa	78	78	78	78	79	1.4
18	Pohjois-Pohjanmaa	382	395	404	406	407	6.7
19	Kainuu	82	79	77	76	75	–7.7
20	Länsi-Pohja	67	65	64	64	63	–5.2
21	Lappi	119	118	118	118	118	–1.2
22	Åland	27	28	29	29	29	8.3
Region	South	1761	1837	1888	1904	1919	9.0
	Southwest	876	888	896	898	900	2.7
	West	1070	1097	1109	1111	1111	3.9
	East	822	818	817	816	815	–0.9
	North	727	736	741	742	742	2.1
Entire country		5256	5375	5451	5472	5487	4.4

Figure 1. Healthcare districts and regions in Finland
Finnish Registry for Kidney Diseases 2015



On 31 December 2015, the population of Finland was 5.487 million (Table 1, Source: Statistics Finland). During the past ten years the population of the country has increased by 4.4%, with the fastest increase occurring in the southern region. The population in the eastern region has decreased. Of the healthcare districts, the population has increased most (more than 5%) in Helsinki-Uusimaa, Åland, Pirkanmaa, Pohjois-Pohjanmaa, and Vaasa. In the healthcare districts of Itä-Savo, Kainuu, Etelä-Savo, and Länsi-Pohja, the population has decreased especially rapidly.

The numbers in Figure 1 refer to the healthcare districts listed in Table 1. In this report, “region” refers to a university hospital region.

Table 2. The Finnish population (as thousands of inhabitants) according to region, age group, and sex
Finnish Registry for Kidney Diseases 2005–2015

Region	2005					2015				
	0–19 y (%)	20–64 y (%)	65–74 y (%)	>75 y (%)	Total	0–19 y (%)	20–64 y (%)	65–74 y (%)	>75 y (%)	Total
South										
Men	208 (24)	550 (65)	58 (7)	35 (4)	852 (100)	213 (23)	578 (62)	93 (10)	51 (5)	935 (100)
Women	201 (22)	563 (62)	73 (8)	73 (8)	909 (100)	205 (21)	581 (59)	111 (11)	87 (9)	984 (100)
Total	409 (23)	1113 (63)	131 (7)	108 (6)	1761 (100)	418 (22)	1160 (60)	204 (11)	138 (7)	1919 (100)
Southwest										
Men	102 (24)	264 (62)	37 (9)	26 (6)	428 (100)	98 (22)	257 (58)	54 (12)	34 (8)	443 (100)
Women	96 (21)	259 (58)	43 (10)	50 (11)	448 (100)	93 (20)	251 (55)	58 (13)	55 (12)	456 (100)
Total	198 (23)	523 (60)	80 (9)	76 (9)	876 (100)	190 (21)	508 (56)	112 (12)	89 (10)	900 (100)
West										
Men	125 (24)	324 (62)	44 (8)	29 (6)	523 (100)	123 (23)	318 (58)	66 (12)	40 (7)	547 (100)
Women	121 (22)	314 (57)	53 (10)	59 (11)	547 (100)	118 (21)	308 (55)	73 (13)	66 (12)	565 (100)
Total	246 (23)	638 (60)	97 (9)	89 (8)	1070 (100)	241 (22)	626 (56)	138 (12)	106 (10)	1111 (100)
East										
Men	95 (23)	250 (62)	36 (9)	24 (6)	405 (100)	86 (21)	235 (58)	51 (13)	32 (8)	403 (100)
Women	91 (22)	237 (57)	43 (10)	46 (11)	417 (100)	82 (20)	224 (54)	54 (13)	52 (13)	412 (100)
Total	186 (23)	487 (59)	79 (10)	70 (9)	822 (100)	168 (21)	459 (56)	105 (13)	83 (10)	815 (100)
North										
Men	96 (26)	221 (61)	29 (8)	18 (5)	364 (100)	93 (25)	214 (57)	41 (11)	25 (7)	373 (100)
Women	92 (25)	205 (57)	33 (9)	32 (9)	362 (100)	88 (24)	200 (54)	42 (11)	39 (11)	369 (100)
Total	188 (26)	426 (59)	61 (8)	51 (7)	727 (100)	180 (24)	414 (56)	83 (11)	64 (9)	742 (100)
Entire country										
Men	627 (24)	1609 (63)	204 (8)	133 (5)	2572 (100)	612 (23)	1603 (59)	304 (11)	182 (7)	2701 (100)
Women	601 (22)	1578 (59)	244 (9)	260 (10)	2683 (100)	585 (21)	1564 (56)	338 (12)	298 (11)	2786 (100)
Total	1228 (23)	3187 (61)	448 (9)	393 (7)	5256 (100)	1197 (22)	3167 (58)	642 (12)	481 (9)	5487 (100)

Table 2 shows the age and sex distribution of the Finnish population at the end of 2005 and 2015. At the end of 2015, 20% of the population was older than 65 years. In 2005, this proportion was 16%. In the southern region, the proportion of inhabitants older than 65 years was the smallest, 18%, whereas in the other regions it was 20–23%. The proportion of inhabitants aged 20–64 years was largest in the southern region, 60%, while it was 56% in all other regions. In the northern region, the proportion of inhabitants younger than 20 years was the largest, 24%.

The age of the Finnish population has increased during the past ten years. The proportion of inhabitants older than 75 years has increased from 7% to 9%, and the proportion of 65–74-year-olds from 9% to 12%. The proportion of inhabitants older than 65 years has increased equally in all regions. The proportion of 20–64-year-olds has decreased from 61% to 58%.

Table 3. Number of new RRT patients and incidence of RRT by healthcare district and region
Finnish Registry for Kidney Diseases 2005–2015

Healthcare district		Number of new RRT patients						Incidence of RRT/million inhabitants					
		2005	2010	2013	2014	2015	2011–2015 on average	2005	2010	2013	2014	2015	2011–2015 on average
1	Helsinki-Uusimaa	113	117	135	124	125	122	78	77	85	78	77	77
3	Varsinais-Suomi	39	33	37	49	46	43	85	70	78	103	96	91
4	Satakunta	20	19	17	20	23	21	87	84	76	89	103	93
5	Kanta-Häme	20	20	22	26	21	23	119	115	125	148	120	129
6	Pirkanmaa	45	45	58	51	48	50	91	88	111	97	91	96
7	Päijät-Häme	35	22	15	23	16	17	166	103	70	108	75	81
8	Kymenlaakso	27	17	7	16	18	13	152	97	40	93	105	75
9	Etelä-Karjala	23	21	16	9	17	14	171	158	121	68	130	103
10	Etelä-Savo	8	8	5	8	16	8	73	76	48	77	155	81
11	Itä-Savo	7	5	7	2	7	6	147	110	158	45	161	126
12	Pohjois-Karjala	18	14	18	11	23	14	104	82	106	65	137	85
13	Pohjois-Savo	21	21	26	22	31	29	84	85	105	89	125	118
14	Keski-Suomi	18	22	16	19	21	20	74	89	64	76	83	80
15	Etelä-Pohjanmaa	19	18	12	19	19	19	96	91	60	96	96	96
16	Vaasa	11	15	22	7	18	15	68	90	130	41	106	89
17	Keski-Pohjanmaa	8	7	9	10	13	9	103	90	115	128	165	117
18	Pohjois-Pohjanmaa	42	35	39	30	24	29	110	89	97	74	59	71
19	Kainuu	15	6	11	8	13	9	184	76	143	105	173	113
20	Länsi-Pohja	10	5	7	8	8	6	150	77	109	126	127	88
21	Lappi	9	6	8	5	7	9	75	51	68	42	59	73
22	Åland	2	2	3	0	5	3	75	71	105	0	173	119
Region	South	163	155	158	149	160	148	93	84	84	78	83	79
	Southwest	72	69	79	76	92	82	82	78	88	85	102	92
	West	119	105	107	119	104	109	111	96	96	107	94	98
	East	72	70	72	62	98	78	88	86	88	76	120	95
	North	84	59	74	61	65	61	116	80	100	82	88	82
Entire country		510	458	490	467	519	478	97	85	90	85	95	88
	Children <15 y	10	8	8	11	13	9	11	9	9	12	15	10

Table 3 shows the number of new RRT patients and the incidence of RRT according to healthcare district and region. In the entire country, the incidence of RRT in 2015 was 95 new RRT patients per million inhabitants, which was larger than in 2014 and also larger than the average incidence in 2011–2015. However, the incidence in 2015 was somewhat smaller than in 2005. In 2011–2015, the average incidence was highest in the western region and lowest in the southern region. In Table 3 and in the entire report, results are presented according to the region as of 1 January 2013 (when Vaasa healthcare district became part of the southwestern region instead of the western region).

In the healthcare districts, the average incidence in 2011–2015 was lowest in Pohjois-Pohjanmaa and Lapland (<75 new RRT patients per million inhabitants) and highest in Kanta-Häme and Itä-Savo (>125/million inhabitants).

Table 4. Number of new RRT patients by age group in healthcare districts and regions
Finnish Registry for Kidney Diseases 2011–2015

Healthcare district		Average annual number of new RRT patients in 2010–2014 by age group (y)						Incidence*/million inhabitants in 2010–2014 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	Helsinki-Uusimaa	4.0	17.0	48.2	31.2	21.4	122	11	30	115	211	217	77
3	Varsinais-Suomi	1.4	4.8	17.0	12.0	7.8	43	14	33	132	223	178	91
4	Satakunta	0.4	2.4	7.4	6.0	4.6	21	9	39	115	211	193	93
5	Kanta-Häme	0.4	2.2	7.8	6.2	6.0	23	10	45	155	304	361	129
6	Pirkanmaa	2.0	5.6	18.8	11.8	11.6	50	18	33	137	209	256	96
7	Päijät-Häme	0.2	2.8	6.4	5.2	2.6	17	4	47	104	190	128	81
8	Kymenlaakso	0	2.6	5.4	3.2	1.8	13	0	56	104	142	98	75
9	Etelä-Karjala	0.4	1.6	5.2	4.4	2.0	14	15	44	133	263	139	103
10	Etelä-Savo	0	0.6	3.0	3.0	1.8	8	0	23	93	211	148	80
11	Itä-Savo	0	1.2	1.4	2.0	1.0	6	0	116	100	315	179	126
12	Pohjois-Karjala	0.4	2.2	5.8	3.0	3.0	14	12	48	114	147	174	85
13	Pohjois-Savo	0.2	6.0	11.6	9.2	2.2	29	4	86	159	322	89	118
14	Keski-Suomi	0.8	2.8	8.6	5.8	2.0	20	14	36	128	215	92	80
15	Etelä-Pohjanmaa	1.2	1.6	7.4	4.6	4.2	19	26	30	134	204	206	96
16	Vaasa	0.4	1.4	4.8	4.2	4.2	15	10	27	113	229	259	89
17	Keski-Pohjanmaa	0.6	1.2	2.8	2.0	2.6	9	30	54	136	230	366	117
18	Pohjois-Pohjanmaa	0.6	5.2	10.4	7.2	5.4	29	6	41	102	196	186	71
19	Kainuu	0	1.0	4.0	2.6	1.0	9	0	52	166	272	120	112
20	Länsi-Pohja	0	0.6	2.4	1.8	0.8	6	0	36	125	241	126	87
21	Lappi	0	1.0	3.2	2.4	2.0	9	0	31	87	178	178	73
22	Åland	0	0.4	1.6	1.4	0	3	0	47	198	430	0	119
Region	South	4.4	21.2	58.8	38.8	25.2	148	11	33	116	207	192	79
	Southwest	2.2	9.0	30.8	23.6	16.6	82	11	33	126	227	193	92
	West	3.8	12.2	40.4	27.8	24.4	109	16	37	133	219	238	98
	East	1.4	12.8	30.4	23.0	10.0	78	8	56	128	238	123	95
	North	1.2	9.0	22.8	16.0	11.8	61	7	42	112	211	190	82
Entire country		13.0	64.2	183.2	129.2	88.0	478	11	38	122	219	190	88

*Average annual incidence of RRT in subgroup

Table 4 presents the average annual number of new RRT patients and incidence of RRT in 2011–2015 according to healthcare district, region, and age group. The incidence was highest among 65–74-year-olds.

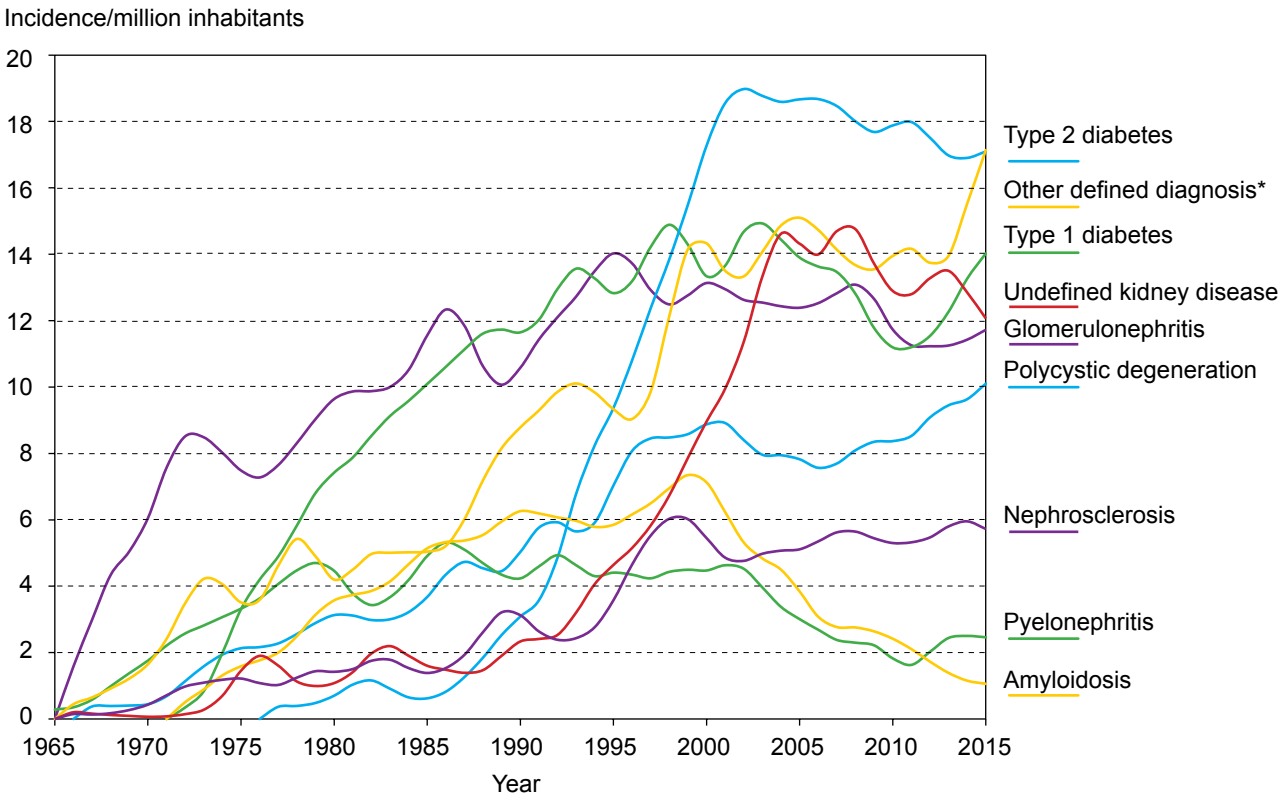
In the age group of 75 years and older, the incidence was 190 new RRT patients per million age-related inhabitants and varied in healthcare districts in the range of 0–366 and in regions in the range of 123–238. The incidence of RRT among inhabitants older than 75 years was considerably smaller in Finland than in the other Nordic countries, which ranged between 353 and 495 new RRT patients per million age-related inhabitants in 2014 (Annual Report 2014, http://www.era-edta-reg.org).

Table 5. Number of new RRT patients by age group and sex
Finnish Registry for Kidney Diseases 2005–2015

Age group		Number of new RRT patients					Incidence of RRT/million inhabitants				
		2005	2010	2013	2014	2015	2005	2010	2013	2014	2015
0–19 y	Males	8	5	12	9	9	13	8	19	15	15
	Females	5	7	2	5	8	8	12	3	8	14
	Total	13	12	14	14	17	11	10	12	12	14
20–44 y	Males	42	40	42	42	46	48	47	49	48	53
	Females	32	18	23	24	29	38	22	28	29	35
	Total	74	58	65	66	75	44	35	39	39	44
45–64 y	Males	151	120	125	141	124	204	157	168	191	170
	Females	54	49	59	50	68	72	63	78	67	92
	Total	205	169	184	191	192	138	110	123	129	131
65–74 y	Males	63	92	89	78	111	309	391	319	268	365
	Females	49	42	49	32	40	201	155	156	99	118
	Total	112	134	138	110	151	250	265	233	179	235
≥75 y	Males	68	57	62	54	53	513	364	359	302	291
	Females	38	28	27	32	31	146	100	93	108	104
	Total	106	85	89	86	84	270	195	192	181	175
Total	Males	332	314	330	324	343	129	119	123	120	127
	Females	178	144	160	143	176	66	53	58	51	63
	Total	510	458	490	467	519	97	85	90	85	95

Table 5 shows the number of new RRT patients and the incidence of RRT according to age group and sex in 2005–2015. The incidence of RRT was more than twice as high in men as in women, and the difference was even larger in the older age groups. In those 75 years and older, the incidence in 2015 was 35% lower than in 2005. In the other age groups, the incidence has remained virtually unchanged in the ten-year period.

Figure 2. Incidence of RRT according to diagnosis
Finnish Registry for Kidney Diseases 1965–2015



*Other systemic diseases, urinary tract obstruction, congenital diseases, and tubulointerstitial nephritis, among others

The incidence of RRT according to diagnosis appears as smoothed averages in Figure 2. Until the end of the 1990s, the incidence increased in almost all diagnostic groups, but thereafter the increase stopped or even declined.

Type 2 diabetes has been the leading cause of end-stage renal disease since 1999. Type 1 diabetes and glomerulonephritis rank as the second most common causes of end-stage renal disease. The incidence of RRT due to polycystic kidney degeneration has slightly increased in recent years. The number of amyloidosis patients entering RRT has decreased continuously since 2000.

The group “other defined diagnosis” was in 2015 larger than earlier. Within this group, the most frequent ICD-10 diagnosis was N18.8 (other defined renal insufficiency), and this diagnosis had also increased the most.

Table 6. Number of RRT patients at 90 days from start of RRT according to type of treatment in healthcare districts and regions
Finnish Registry for Kidney Diseases 2011–2015

Healthcare district		Number of patients (%) at 90 days from start of RRT in 2010–2014						
		CAPD	APD	Home HD	In-center HD	HDF	Tx	Total
1	Helsinki-Uusimaa	9 (2)	54 (9)	82 (14)	56 (10)	363 (62)	17 (3)	581 (100)
3	Varsinais-Suomi	2 (1)	53 (26)	33 (16)	1 (0)	107 (52)	8 (4)	204 (100)
4	Satakunta	(0)	29 (29)	8 (8)	1 (1)	59 (60)	2 (2)	99 (100)
5	Kanta-Häme	(0)	3 (3)	28 (27)	(0)	62 (60)	11 (11)	104 (100)
6	Pirkanmaa	1 (0)	30 (13)	32 (13)	2 (1)	173 (73)	(0)	238 (100)
7	Päijät-Häme	(0)	19 (22)	6 (7)	1 (1)	59 (69)	(0)	85 (100)
8	Kymenlaakso	(0)	2 (3)	18 (28)	3 (5)	42 (65)	(0)	65 (100)
9	Etelä-Karjala	1 (2)	2 (3)	10 (16)	3 (5)	39 (63)	7 (11)	62 (100)
10	Etelä-Savo	(0)	2 (5)	(0)	1 (3)	32 (80)	5 (13)	40 (100)
11	Itä-Savo	(0)	1 (4)	2 (7)	(0)	15 (54)	10 (36)	28 (100)
12	Pohjois-Karjala	(0)	7 (10)	12 (18)	(0)	43 (64)	5 (7)	67 (100)
13	Pohjois-Savo	1 (1)	7 (5)	31 (22)	18 (13)	84 (58)	3 (2)	144 (100)
14	Keski-Suomi	(0)	10 (11)	14 (15)	1 (1)	66 (72)	1 (1)	92 (100)
15	Etelä-Pohjanmaa	(0)	16 (19)	5 (6)	(0)	54 (64)	10 (12)	85 (100)
16	Vaasa	(0)	6 (8)	6 (8)	(0)	57 (79)	3 (4)	72 (100)
17	Keski-Pohjanmaa	(0)	3 (7)	1 (2)	(0)	28 (68)	9 (22)	41 (100)
18	Pohjois-Pohjanmaa	2 (1)	9 (7)	28 (20)	1 (1)	91 (66)	7 (5)	138 (100)
19	Kainuu	1 (3)	7 (18)	9 (23)	1 (3)	21 (53)	1 (3)	40 (100)
20	Länsi-Pohja	(0)	6 (23)	5 (19)	(0)	5 (19)	10 (38)	26 (100)
21	Lappi	(0)	13 (33)	3 (8)	(0)	23 (58)	1 (3)	40 (100)
22	Åland	(0)	(0)	(0)	(0)	14 (82)	3 (18)	17 (100)
Region	South	10 (1)	58 (8)	110 (16)	62 (9)	444 (63)	24 (3)	708 (100)
	Southwest	2 (1)	88 (22)	47 (12)	2 (1)	237 (60)	16 (4)	392 (100)
	West	1 (0)	68 (13)	71 (14)	3 (1)	348 (68)	21 (4)	512 (100)
	East	1 (0)	27 (7)	59 (16)	20 (5)	240 (65)	24 (6)	371 (100)
	North	3 (1)	38 (13)	46 (16)	2 (1)	168 (59)	28 (10)	285 (100)
Entire country		17 (1)	279 (12)	333 (15)	89 (4)	1437 (63)	113 (5)	2268 (100)

Table 6 presents the number of RRT patients at 90 days from start of RRT in 2011–2015 according to type of treatment in healthcare districts and regions. Of the 2268 patients, only 17 (0.7%) had received a kidney graft (Tx), 27% were on continuous ambulatory or automated peritoneal dialysis (CAPD or APD), 4% were on home hemodialysis (home HD), and 68% were on either in-center hemodialysis (in-center HD) or hemodiafiltration (HDF).

Figure 3. Distribution of treatment modalities at 90 days from start of RRT in patients older than 20 years
Finnish Registry for Kidney Diseases 2005–2015

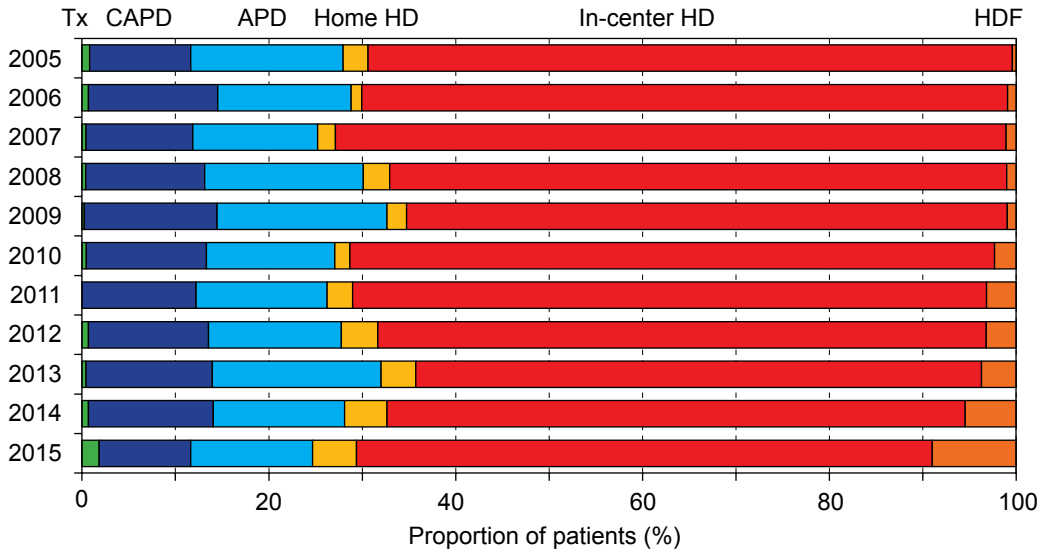


Figure 4. Proportion of home dialysis and kidney transplantation patients of all RRT patients older than 20 years at 90 days from start of RRT
Finnish Registry for Kidney Diseases 2011–2015

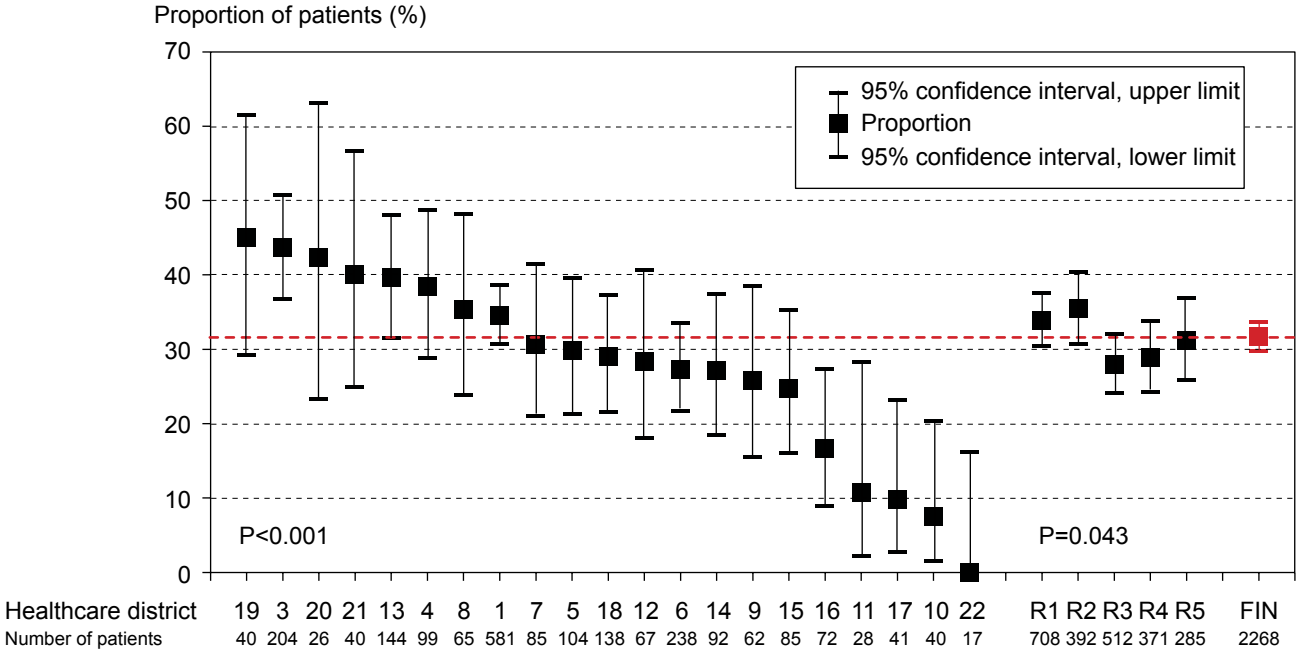


Figure 3 shows the distribution of RRT patients' treatment modalities at 90 days from start of RRT in 2005–2015 (n=5024). The combined proportion of home dialysis and kidney transplantation patients was similar in 2015 as in 2005, about 30%. The proportion of kidney transplantation patients was slightly larger in 2015 (2%) than earlier. The proportion of patients on continuous (CAPD) or automated peritoneal dialysis (APD) was smaller in 2015 than in earlier years. The proportion of patients on home hemodialysis (Home HD) has increased during the ten-year period. The proportion of hemodiafiltration (HDF) is small (underreporting suspected), but has increased in recent years.

The combined proportion of home dialysis (CAPD, APD, and home HD) and kidney transplantation at 90 days from start of RRT was 32% in the entire country in 2011–2015 (Figure 4). The proportion varied significantly according to healthcare district (0–45%) and region (28–35%). The P-values shown in the Figure were adjusted for age and sex using binary logistic regression. For comparison, a similar analysis was presented in Report 2012 on page 24.

Figure 5. International comparison of incidence of RRT in 2014
Finnish Registry for Kidney Diseases 2014

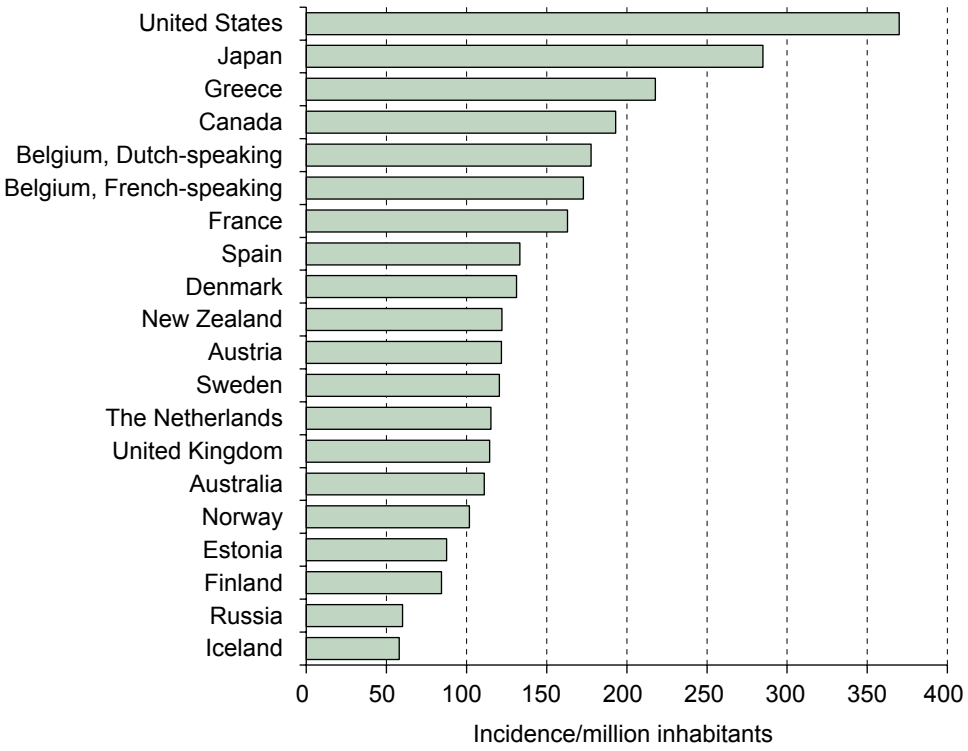


Figure 5 shows the incidence of RRT in 2014 in countries reporting to the ERA-EDTA Registry (Annual Report 2014, http://www.era-edta-reg.org) and in the United States, Canada, Australia, New Zealand, Japan, and Russia (The 2016 USRDS Annual Data Report Atlas, http://www.usrds.org). In 2014, the incidence of RRT in Finland was the second lowest among the Nordic countries. Relative to Finland, the incidence in Denmark was 55% higher, in Sweden 43% higher, in Norway 21% higher, and in Iceland 31% lower.

Table 7. Patients on RRT at end of year according to healthcare district and region
Finnish Registry for Kidney Diseases 2005–2015

Healthcare district		Number of RRT patients					Prevalence of RRT/million inhabitants				
		2005	2010	2013	2014	2015	2005	2010	2013	2014	2015
1	Helsinki-Uusimaa	1004	1141	1250	1270	1299	693	747	790	794	804
3	Varsinais-Suomi	343	396	424	427	429	747	845	894	897	899
4	Satakunta	199	239	214	214	219	870	1059	953	955	982
5	Kanta-Häme	118	135	148	162	158	701	773	843	924	904
6	Pirkanmaa	364	434	462	471	473	739	849	886	898	898
7	Päijät-Häme	160	178	172	183	183	761	836	806	859	861
8	Kymenlaakso	115	142	135	134	141	646	810	776	775	821
9	Etelä-Karjala	125	147	156	151	153	927	1106	1180	1146	1167
10	Etelä-Savo	72	89	89	88	100	659	840	852	847	968
11	Itä-Savo	41	49	55	49	51	859	1074	1238	1112	1174
12	Pohjois-Karjala	128	135	131	133	144	741	795	775	787	855
13	Pohjois-Savo	221	223	249	255	261	884	899	1002	1027	1052
14	Keski-Suomi	130	157	164	174	182	536	632	654	693	722
15	Etelä-Pohjanmaa	110	122	127	131	131	553	615	639	661	664
16	Vaasa	101	114	134	132	140	624	686	794	778	823
17	Keski-Pohjanmaa	52	61	62	60	69	671	782	792	765	878
18	Pohjois-Pohjanmaa	262	286	294	310	306	686	723	729	764	752
19	Kainuu	69	62	62	66	70	846	788	807	867	929
20	Länsi-Pohja	49	64	56	59	56	736	980	872	928	888
21	Lappi	78	74	84	78	77	654	626	710	660	654
22	Åland	14	24	28	25	27	523	857	977	865	932
Region	South	1244	1430	1541	1555	1593	707	779	816	817	830
	Southwest	657	773	800	798	815	750	870	893	888	906
	West	752	869	909	947	945	703	792	819	852	850
	East	592	653	688	699	738	720	799	842	856	905
	North	510	547	558	573	578	702	744	753	772	779
Entire country		3755	4272	4496	4572	4669	714	795	825	836	851

Table 7 presents the number of RRT patients and the prevalence of RRT on 31 December 2005–2015. In the entire country, the prevalence at the end of 2015 was 851 RRT patients per million inhabitants. On 31 December 2015, the prevalence was the highest in the southwestern and eastern regions and the lowest in the northern region. In the healthcare districts, the prevalence varied between 654 and 1174 patients per million inhabitants.

In the entire country, the prevalence has increased by 7% from 2010. The prevalence has increased in all regions, the most in the eastern region (13%) and the least in the southwestern region (4%). In the healthcare districts, the prevalence has increased the most during the past five years in Vaasa (20%). In two healthcare districts (Länsi-Pohja and Satakunta), the prevalence has decreased.

Table 8. Patients on RRT according to age group and sex
Finnish Registry for Kidney Diseases 2005–2015

Age group		Number of RRT patients					Prevalence of RRT/million inhabitants				
		2005	2010	2013	2014	2015	2005	2010	2013	2014	2015
0–19 y	Males	81	70	66	70	68	129	112	107	114	111
	Females	53	54	48	50	52	88	90	81	85	89
	Total	134	124	114	120	120	109	102	94	100	100
20–44 y	Males	446	427	418	429	442	514	497	483	493	506
	Females	304	266	240	239	242	365	325	292	289	292
	Total	750	693	658	668	684	441	413	390	394	402
45–64 y	Males	1100	1248	1225	1228	1243	1484	1631	1642	1665	1704
	Females	638	710	730	721	738	856	919	970	969	1004
	Total	1738	1958	1955	1949	1981	1169	1273	1305	1316	1353
65–74 y	Males	397	609	739	747	801	1944	2588	2650	2566	2632
	Females	285	356	393	411	432	1168	1318	1255	1267	1278
	Total	682	965	1132	1158	1233	1522	1909	1912	1881	1919
≥75 y	Males	265	333	408	443	430	1999	2129	2362	2476	2359
	Females	186	199	229	234	221	714	713	785	788	741
	Total	451	532	637	677	651	1148	1221	1372	1423	1354
Total	Males	2289	2687	2856	2917	2984	890	1018	1066	1084	1105
	Females	1466	1585	1640	1655	1685	546	579	592	595	605
	Total	3755	4272	4496	4572	4669	714	795	825	836	851

Figure 6. Standardized prevalence of RRT in regions
Finnish Registry for Kidney Diseases 2005–2015

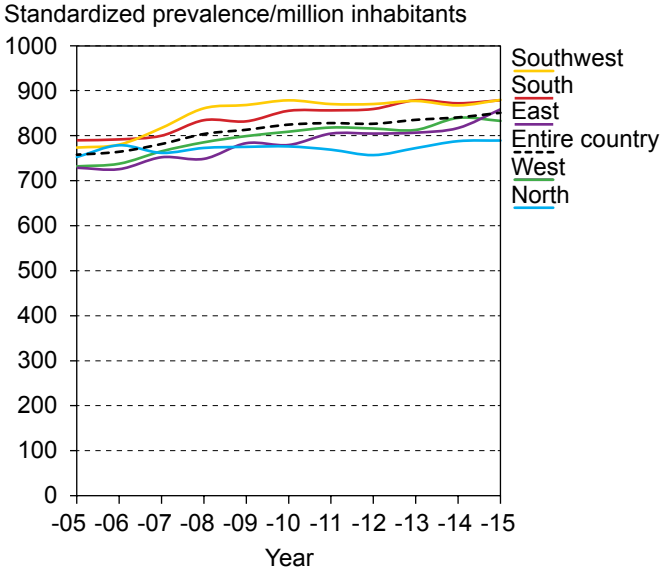
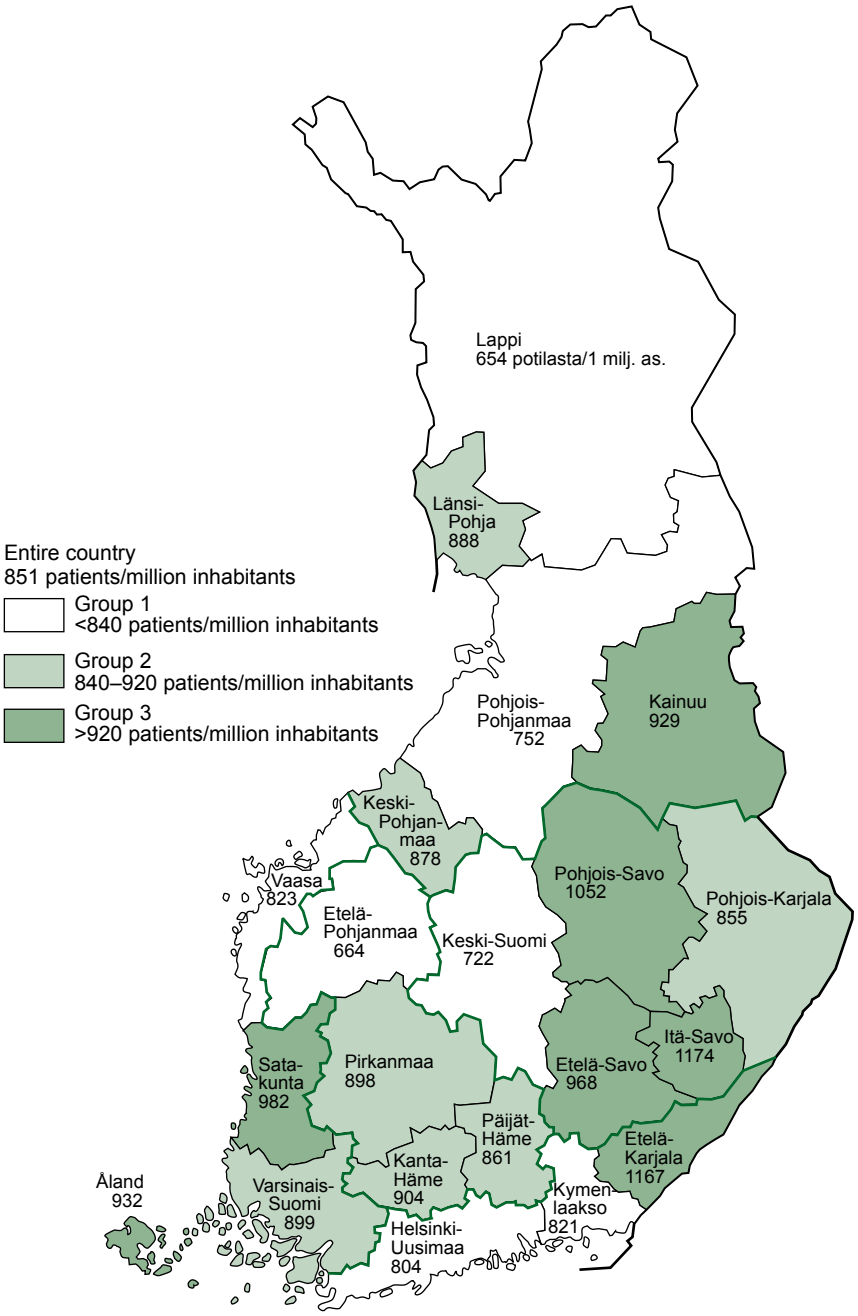


Table 8 shows the number of RRT patients and the prevalence of RRT on 31 December 2005–2015 according to age group and sex. The prevalence of RRT has increased by 19% since 2005. The prevalence has increased by 18% in the age group of 75 years and older, by 26% in the age group of 65–74-year-olds, and by 16% in the age group of 45–64-year-olds. In the younger age groups, the prevalence of RRT has decreased by 8–9% during the past ten years. The highest prevalence, observed among men aged 65–74 years at the end of 2015, was 2632 cases per million age-related inhabitants. At the end of 2015, the prevalence was 83% greater among men than women, and the sex difference was even more pronounced in the oldest age group, in which it was threefold as high in men.

Figure 6 shows the age- and sex-standardized prevalence rates for 2005–2015 using the Finnish general population on 31 December 2015 as the reference population. Population changes during this period have been taken into consideration. The standardized prevalence rates have increased slowly in recent years, and the differences between regions are small.

Figure 7. Prevalence of RRT on 31 December 2015
Finnish Registry for Kidney Diseases 2015



The healthcare districts shown on the map are grouped according to the prevalence of RRT at the end of 2015 (Figure 7). The prevalence per million inhabitants was <840 in seven districts, 840–920 in seven districts, and >920 in seven districts. The borders of the regions are indicated with thick lines.

Figure 8. Prevalence of RRT at end of year according to type of treatment
Finnish Registry for Kidney Diseases 1965–2015

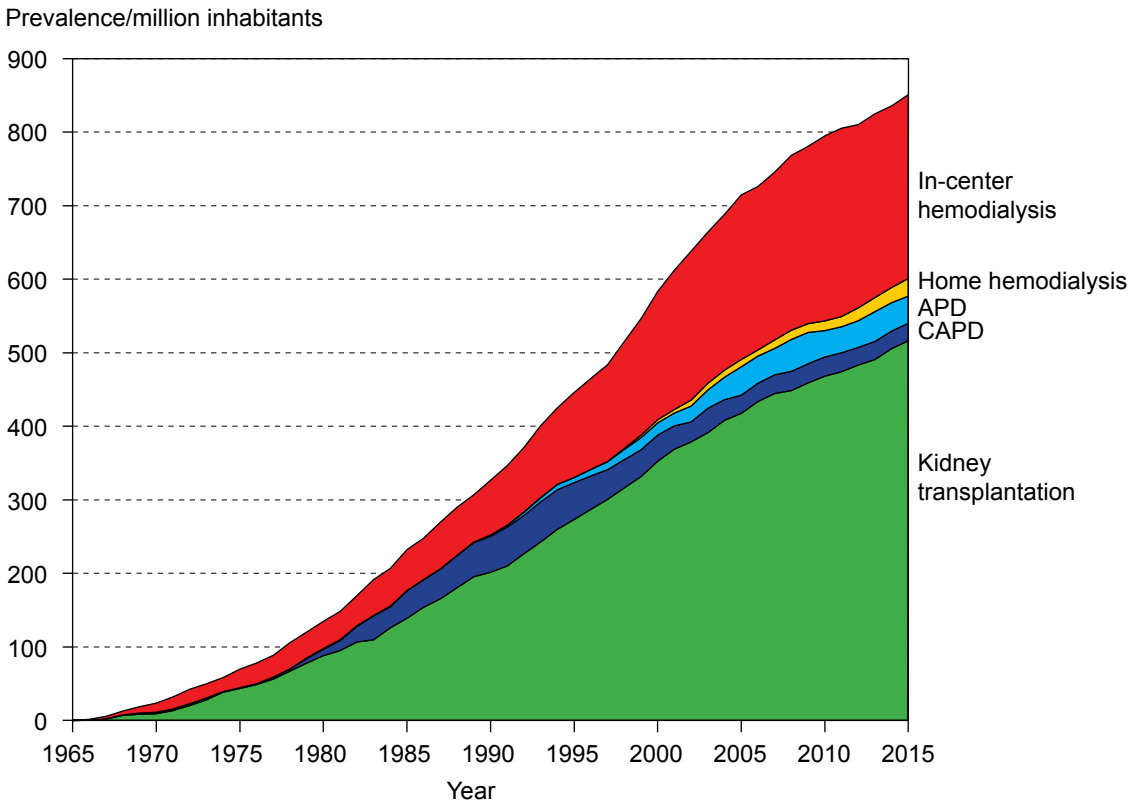


Figure 8 displays the prevalence of RRT according to treatment type. The prevalence of kidney transplantation has shown a continuous increase, 10% during the past five years. The number of in-center hemodialysis patients has not increased in the past five years. The number of patients on peritoneal dialysis has remained virtually unchanged for decades, but the proportion of automated peritoneal dialysis (APD) increased until 2005, while that of continuous ambulatory peritoneal dialysis (CAPD) decreased. Since 2005, the proportion of APD patients of all PD patients has been about 60%. The number of home hemodialysis patients has increased by 81% during the past five years.

Table 9. Prevalence of dialysis and kidney transplantation in healthcare districts and regions
Finnish Registry for Kidney Diseases 2005–2015

Healthcare district		Number of dialysis patients/ million inhabitants					Number of kidney transplantation patients/ million inhabitants				
		2005	2010	2013	2014	2015	2005	2010	2013	2014	2015
1	Helsinki-Uusimaa	268	284	300	288	299	425	463	491	506	505
3	Varsinais-Suomi	301	316	361	376	379	447	529	534	521	520
4	Satakunta	372	425	370	362	368	499	633	583	594	614
5	Kanta-Häme	422	424	365	422	406	279	349	479	502	498
6	Pirkanmaa	305	368	378	379	353	435	481	508	519	545
7	Päijät-Häme	352	343	300	347	348	409	493	506	512	513
8	Kymenlaakso	270	433	408	416	425	377	376	368	359	396
9	Etelä-Karjala	482	527	484	455	457	445	579	696	691	709
10	Etelä-Savo	210	340	316	289	387	448	500	536	558	581
11	Itä-Savo	377	482	563	409	460	482	592	675	704	713
12	Pohjois-Karjala	313	318	284	302	392	429	477	491	486	463
13	Pohjois-Savo	320	355	390	370	359	564	544	612	656	693
14	Keski-Suomi	219	250	263	263	278	318	382	391	430	445
15	Etelä-Pohjanmaa	226	262	317	318	319	327	353	322	343	345
16	Vaasa	278	253	332	295	306	346	433	462	483	517
17	Keski-Pohjanmaa	310	410	332	306	369	361	372	460	459	509
18	Pohjois-Pohjanmaa	312	283	297	301	280	375	440	431	463	472
19	Kainuu	417	318	274	250	266	429	470	534	617	664
20	Länsi-Pohja	301	521	498	550	476	436	460	374	377	412
21	Lappi	184	212	279	245	212	470	415	431	415	441
22	Åland	187	464	453	242	276	336	393	523	622	656
Region	South	285	316	323	311	321	422	463	494	505	509
	Southwest	312	337	360	353	359	438	533	532	535	547
	West	318	353	350	369	354	385	439	470	483	496
	East	277	320	329	315	350	443	478	513	541	556
	North	301	310	313	309	294	400	434	440	464	485
Entire country		297	327	334	330	335	417	468	491	506	516

Table 9 presents the prevalence of dialysis and kidney transplantation per million inhabitants in healthcare districts and regions in 2005–2015. The prevalence of dialysis has increased by 13% and that of kidney transplantation by 24% during the past ten years. During the past five years, the prevalence of dialysis has increased by 2%. At the end of 2015, the prevalence of dialysis varied between 212 and 476 per million inhabitants and that of kidney transplantation between 345 and 713 per million inhabitants. In regions, the prevalence of dialysis varied between 294 and 359 per million inhabitants and that of kidney transplantation between 485 and 556 per million inhabitants.

Table 10. Number of RRT patients at end of year according to type of treatment in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015

Healthcare district		Number of patients on 31 December 2015 (%)						
		CAPD	APD	Home HD	In-center HD	HDF	Tx	Total
1	Helsinki-Uusimaa	35 (3)	48 (4)	71 (5)	265 (20)	64 (5)	816 (63)	1299 (100)
3	Varsinais-Suomi	26 (6)	27 (6)	11 (3)	60 (14)	57 (13)	248 (58)	429 (100)
4	Satakunta	8 (4)	10 (5)	1 (0)	52 (24)	11 (5)	137 (63)	219 (100)
5	Kanta-Häme	3 (2)	7 (4)	1 (1)	30 (19)	30 (19)	87 (55)	158 (100)
6	Pirkanmaa	21 (4)	11 (2)	3 (1)	116 (25)	35 (7)	287 (61)	473 (100)
7	Päijät-Häme	9 (5)	10 (5)	4 (2)	45 (25)	6 (3)	109 (60)	183 (100)
8	Kymenlaakso	(0)	15 (11)	8 (6)	43 (30)	7 (5)	68 (48)	141 (100)
9	Etelä-Karjala	1 (1)	4 (3)	5 (3)	8 (5)	42 (27)	93 (61)	153 (100)
10	Etelä-Savo	2 (2)	1 (1)	3 (3)	23 (23)	11 (11)	60 (60)	100 (100)
11	Itä-Savo	(0)	1 (2)	(0)	1 (2)	18 (35)	31 (61)	51 (100)
12	Pohjois-Karjala	4 (3)	10 (7)	3 (2)	19 (13)	30 (21)	78 (54)	144 (100)
13	Pohjois-Savo	1 (0)	12 (5)	13 (5)	45 (17)	18 (7)	172 (66)	261 (100)
14	Keski-Suomi	2 (1)	10 (5)	2 (1)	31 (17)	25 (14)	112 (62)	182 (100)
15	Etelä-Pohjanmaa	3 (2)	8 (6)	(0)	8 (6)	44 (34)	68 (52)	131 (100)
16	Vaasa	4 (3)	3 (2)	4 (3)	23 (16)	18 (13)	88 (63)	140 (100)
17	Keski-Pohjanmaa	1 (1)	(0)	(0)	9 (13)	19 (28)	40 (58)	69 (100)
18	Pohjois-Pohjanmaa	2 (1)	17 (6)	1 (0)	61 (20)	33 (11)	192 (63)	306 (100)
19	Kainuu	2 (3)	2 (3)	(0)	13 (19)	3 (4)	50 (71)	70 (100)
20	Länsi-Pohja	3 (5)	2 (4)	(0)	3 (5)	22 (39)	26 (46)	56 (100)
21	Lappi	3 (4)	5 (6)	1 (1)	10 (13)	6 (8)	52 (68)	77 (100)
22	Åland	(0)	(0)	(0)	4 (15)	4 (15)	19 (70)	27 (100)
Region	South	36 (2)	67 (4)	84 (5)	316 (20)	113 (7)	977 (61)	1593 (100)
	Southwest	38 (5)	40 (5)	16 (2)	139 (17)	90 (11)	492 (60)	815 (100)
	West	36 (4)	36 (4)	8 (1)	199 (21)	115 (12)	551 (58)	945 (100)
	East	9 (1)	34 (5)	21 (3)	119 (16)	102 (14)	453 (61)	738 (100)
	North	11 (2)	26 (4)	2 (0)	96 (17)	83 (14)	360 (62)	578 (100)
Entire country		130 (3)	203 (4)	131 (3)	869 (19)	503 (11)	2833 (61)	4669 (100)

Table 10 presents the number of RRT patients according to type of treatment in healthcare districts and regions at the end of 2015. The proportion of peritoneal dialysis patients was the greatest in the healthcare district of Varsinais-Suomi, where 12% of all RRT patients were receiving either continuous ambulatory peritoneal dialysis (CAPD) or automated peritoneal dialysis (APD). The proportion of patients on home hemodialysis (home HD) was largest, 6%, in the healthcare district of Kymenlaakso. In six healthcare districts, there were no home HD patients. The proportion of kidney transplantation patients varied between 46% and 71% in the healthcare districts (P=0.029 in age- and gender-adjusted analysis using binary logistic regression). The difference between regions was not significant (P=0.687).

Of all RRT patients, 25% were on home dialysis (CAPD, APD, or home HD) at the end of 2015. The proportion of home dialysis was higher than 30% in five healthcare districts (Lappi, Varsinais-Suomi, Helsinki-Uusimaa, Kymenlaakso, and Päijät-Häme) and lower than 15% in three healthcare districts.

Figure 9. International comparison of prevalence of RRT on 31 December 2014
Finnish Registry for Kidney Diseases 2014

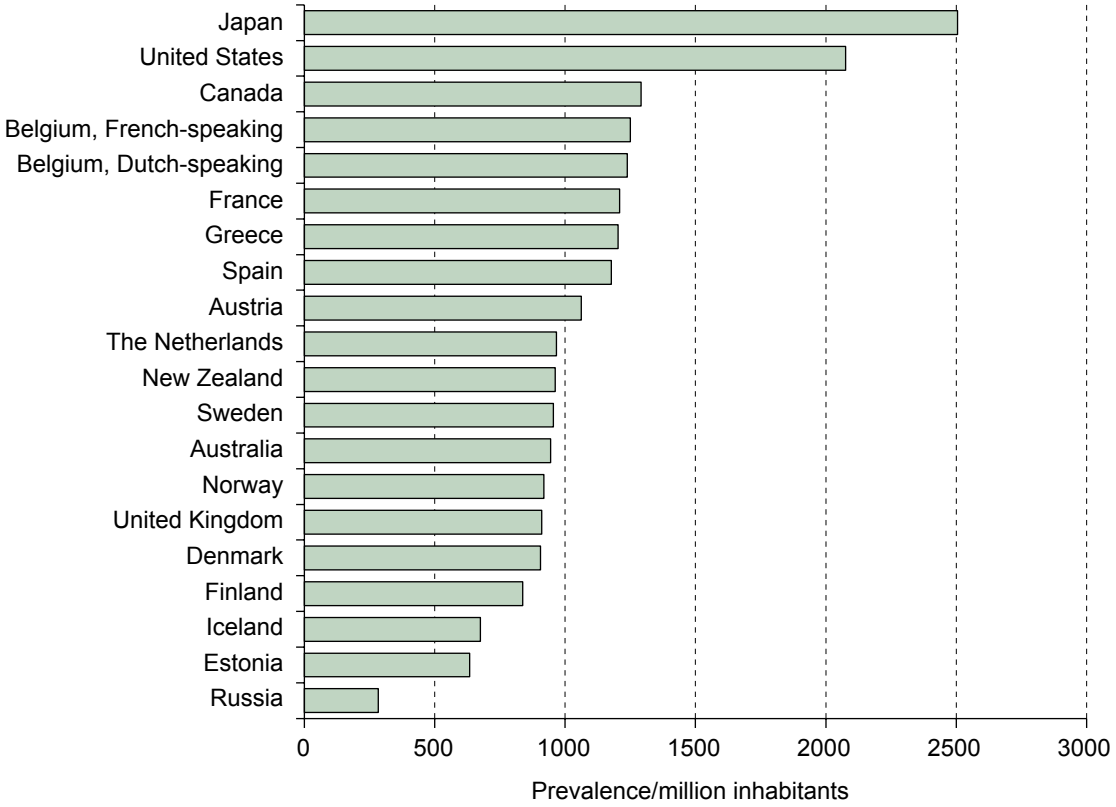


Figure 9 displays the prevalence of RRT on 31 December 2014 in countries reporting to the ERA-EDTA Registry (Annual Report 2014, http://www.era-edta-reg.org) and in the United States, Canada, Australia, New Zealand, Japan, and Russia (The 2016 USRDS Annual Data Report Atlas, http://www.usrds.org). The prevalence rate in Finland was the fourth lowest internationally and the second lowest of the Nordic countries. Relative to Finland, the prevalence in Sweden was 14% higher, in Norway 10% higher, and in Denmark 8% higher. Figure 5 shows the international incidence rates.

Table 11. Number of patient-years of all RRT patients according to diagnosis and type of treatment Finnish Registry for Kidney Diseases 2005–2015

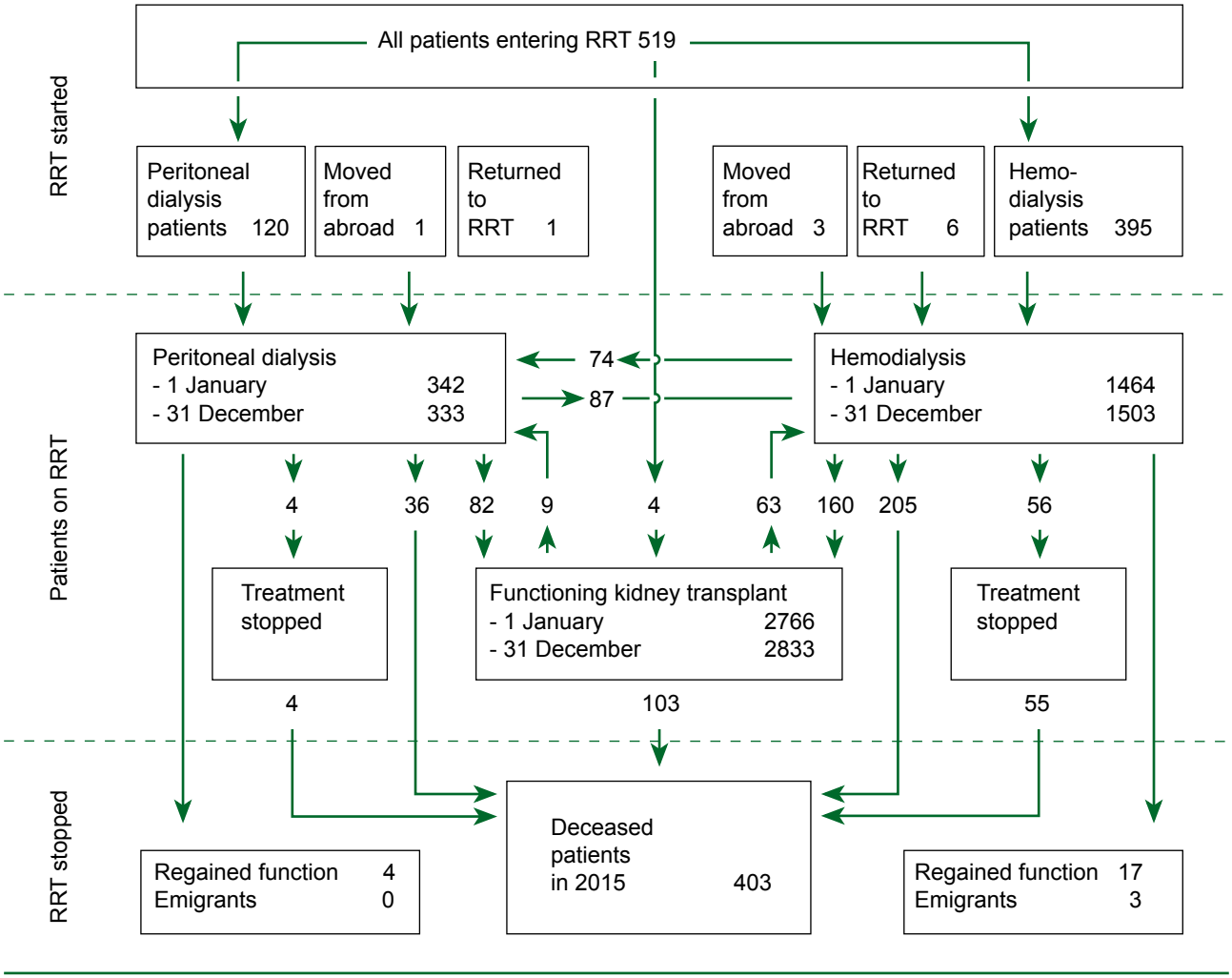
Diagnosis	Number of patient-years in 2005 (%)				Number of patient-years in 2015 (%)			
	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total
Glomerulonephritis	52 (16.0)	184 (15.4)	613 (28.2)	849 (23.0)	51 (15.1)	223 (14.9)	741 (26.4)	1015 (21.9)
Type 1 diabetes	96 (29.5)	114 (9.6)	423 (19.4)	633 (17.1)	71 (21.1)	175 (11.7)	491 (17.5)	737 (15.9)
Polycystic degeneration	18 (5.4)	116 (9.7)	334 (15.4)	468 (12.7)	34 (10.0)	149 (10.0)	496 (17.7)	680 (14.6)
Type 2 diabetes	44 (13.4)	234 (19.6)	48 (2.2)	326 (8.8)	38 (11.1)	296 (19.8)	114 (4.0)	447 (9.6)
Undefined kidney disease	28 (8.6)	175 (14.7)	78 (3.6)	281 (7.6)	46 (13.6)	238 (15.9)	153 (5.5)	437 (9.4)
Pyelonephritis	19 (5.7)	68 (5.7)	201 (9.2)	288 (7.8)	12 (3.5)	56 (3.7)	175 (6.2)	243 (5.2)
Nephrosclerosis	25 (7.7)	73 (6.1)	54 (2.5)	152 (4.1)	24 (7.2)	104 (7.0)	89 (3.2)	217 (4.7)
Other systemic diseases	13 (3.8)	52 (4.3)	66 (3.0)	130 (3.5)	15 (4.4)	67 (4.5)	106 (3.8)	188 (4.1)
Urinary tract obstruction	8 (2.6)	33 (2.8)	82 (3.8)	124 (3.4)	16 (4.6)	43 (2.9)	110 (3.9)	168 (3.6)
Congenital diseases	3 (1.1)	14 (1.2)	97 (4.4)	114 (3.1)	7 (2.0)	22 (1.5)	114 (4.0)	143 (3.1)
Other kidney diseases	3 (1.0)	17 (1.4)	31 (1.4)	51 (1.4)	11 (3.3)	48 (3.2)	44 (1.6)	103 (2.2)
Congenital nephrosis, Finnish type	4 (1.2)	3 (0.3)	54 (2.5)	61 (1.7)	5 (1.4)	4 (0.3)	86 (3.0)	95 (2.0)
Amyloidosis	5 (1.5)	63 (5.3)	44 (2.0)	113 (3.1)	5 (1.5)	19 (1.3)	34 (1.2)	58 (1.3)
Tubulointerstitial nephritis	2 (0.6)	19 (1.6)	35 (1.6)	56 (1.5)	1 (0.3)	14 (0.9)	35 (1.2)	50 (1.1)
Malignancies	4 (1.3)	24 (2.0)	6 (0.3)	34 (0.9)	2 (0.6)	30 (2.0)	12 (0.4)	43 (0.9)
Metabolic diseases	2 (0.7)	4 (0.4)	10 (0.4)	16 (0.4)	1 (0.4)	5 (0.3)	12 (0.4)	18 (0.4)
All	327 (100)	1193 (100)	2176 (100)	3696 (100)	338 (100)	1492 (100)	2812 (100)	4642 (100)

Table 11 presents the number of patient-years according to diagnosis of kidney disease and type of treatment in 2005 and 2015. The number of patient-years indicates time spent by patients in RRT during the year. Overall, the number of patient-years has increased by 26% since 2005. The number of patient-years has increased by 25% in hemodialysis and by 29% in kidney transplantation. The number of patient-years in peritoneal dialysis has remained virtually unchanged.

Glomerulonephritis is the most common diagnosis among all RRT patients and among kidney transplantation patients; the proportion of patient-years due to glomerulonephritis was 22% in 2015. Type 1 diabetes is the second most common diagnosis among all RRT patients and the most common diagnosis among peritoneal dialysis patients. The number of patient-years in patients with polycystic degeneration has increased by 45% during the last ten years. Polycystic degeneration is the second most common diagnosis of kidney transplantation patients. Type 2 diabetes is the fourth most common kidney disease diagnosis of all RRT patients and the most common among hemodialysis patients.

The proportion of patient-years due to amyloidosis has decreased by 48% since 2005. The proportion of undefined kidney disease has increased during the past decade, reaching 9.4% in 2015.

Figure 10. Net changes in type of treatment
Finnish Registry for Kidney Diseases 2015



During 2015 altogether 519 new patients entered RRT (Figure 10), and seven patients returned to RRT. In all, 4572 patients were receiving RRT at the beginning of the year. Altogether 403 patients died and dialysis was discontinued for 21 patients because the patient's own kidney function resumed. Of those who died, 103 had a functioning kidney transplant, 36 were receiving peritoneal dialysis, and 205 were on hemodialysis. During 2015 RRT was discontinued for 60 uremic patients. At the end of 2015, the number of peritoneal dialysis patients was 3% smaller, the number of hemodialysis patients 3% larger, and the number of kidney transplantation patients 2% larger than at the beginning of the year.

A total of 244 patients received a kidney transplant. Of these patients, 18 received a combined pancreas and kidney transplantation, and one a combined heart and kidney transplantation (source: Kidney Transplantation Unit, Helsinki University Central Hospital). Fifteen kidney transplants were received from living donors. Four kidney transplantation patients moved abroad (not shown in Figure 10).

Table 12. Mortality of RRT patients by region
Finnish Registry for Kidney Diseases 2005–2015

Region	Deaths/1000 patient-years						Deaths/1000 patient-years[1)]					
	2005	2010	2013	2014	2015	2011–2015	2005	2010	2013	2014	2015	2011–2015
South	82	69	66	80	76	75	79	67	66	79	75	73
Southwest	104	73	77	101	90	89	103	70	76	99	87	88
West	93	99	101	90	102	99	90	94	100	86	99	96
East	103	97	90	76	74	87	101	94	85	72	73	84
North	101	88	104	76	103	95	99	88	99	72	97	91
Entire country	94	83	84	85	87	87	92	80	82	82	84	85

[1)]Patients who died within 90 days of start of RRT excluded

Figure 11. Standardized mortality of RRT patients by region
Finnish Registry for Kidney Diseases 2005–2015

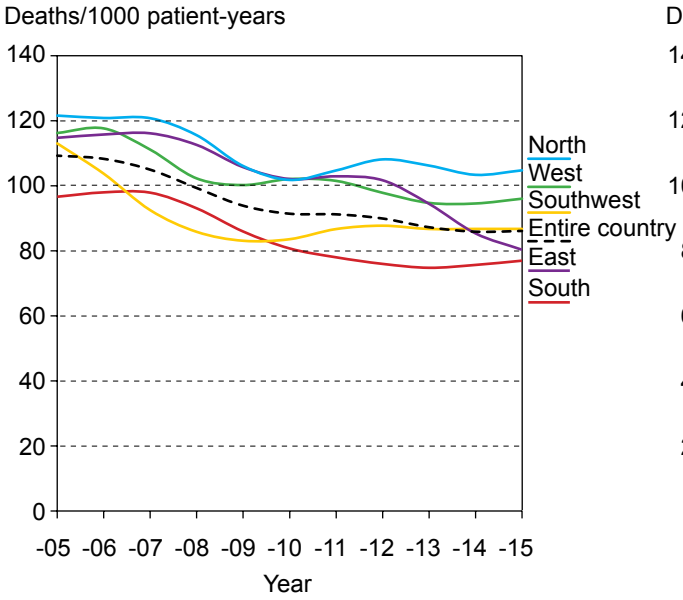


Figure 12. Standardized mortality of RRT patients by region (patients who died within 90 days of start of RRT excluded)
Finnish Registry for Kidney Diseases 2005–2015

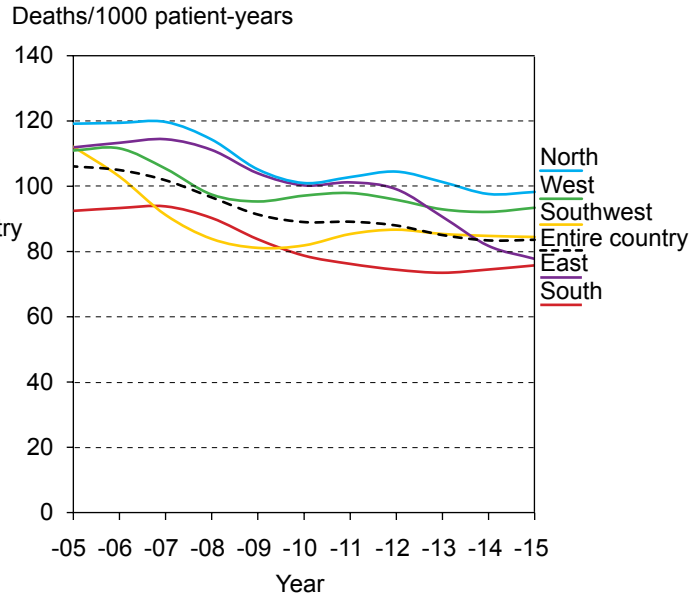


Table 12 shows RRT patients' mortality in 2005–2015 according to region. The mortality of patients who had been on RRT for at least 90 days is presented separately. The average mortality in 2011–2015 was lower in the southern region than elsewhere.

Figures 11 and 12 show regional mortality as smoothed averages. The regional mortality rates for 2005–2015 have been age- and sex-standardized using all patient-years in 2015 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 RRT were excluded from Figure 12. During the period 2005–2015 the standardized mortality rate has declined in all regions.

Table 13. Number of RRT patients older than 20 years in hospitals
Finnish Registry for Kidney Diseases 2015

Region	Healthcare district	Hospital	No. of RRT patients (≥20 y) on 31 Dec 2015			
			PD	HD	Tx	Total
South (R1)			99	509	946	1554
	Helsinki-Uusimaa (1)		80	398	793	1271
		Helsinki University Central Hospital	80	295	693	1068
		Nephrology Polyclinic			692	692
		Dialysis unit DHK		67		67
		Dialysis unit DOK	80	105		185
		B. Braun Malmi		63		63
		B. Braun Pitäjänmäki		60		60
		Unit of Transplant. and Liver Surgery			1	1
		Hyvinkää Hospital		30	27	57
		Lohja Hospital		27	29	56
		Länsi-Uusimaa Hospital		20	20	40
		Porvoo Hospital		26	24	50
	Kymenlaakso (8)		14	58	63	135
		Kymenlaakso Central Hospital	14	58	63	135
	Etelä-Karjala (9)		5	53	90	148
		South Karelia Central Hospital	5	38	90	133
		Honkaharju Hospital		15		15
Southwest (R2)			75	244	469	788
	Varsinais-Suomi (3)		51	126	241	418
		Turku University Central Hospital	51	126	241	418
	Satakunta (4)		19	64	132	215
		Satakunta Central Hospital	19	64	132	215
	Vaasa (16)		5	46	77	128
		Vaasa Central Hospital	5	39	75	119
		Pietarsaari Hospital		7	2	9
	Åland (22)			8	19	27
		Åland Central Hospital		8	19	27
West (R3)			67	321	518	906
	Kanta-Häme (5)		10	62	84	156
		Central Hospital of Tavastia	10	62	84	156
	Pirkanmaa (6)		27	152	265	444
		Tampere University Hospital	27	128	264	419
		Valkeakoski Regional Hospital		24	1	25
	Päijät-Häme (7)		19	55	109	183
		Päijänne Tavastia Central Hospital	19	55	109	183
	Etelä-Pohjanmaa (15)		11	52	60	123
		Southern Ostrobothnia Central Hospital	11	52	60	123
East (R4)			44	243	447	734
	Etelä-Savo (10)		3	31	53	87
		Mikkeli Central Hospital	3	31	53	87
	Itä-Savo (11)		1	20	35	56
		Central Hospital of Savonlinna	1	20	35	56
	Pohjois-Karjala (12)		13	50	73	136
		North Karelia Central Hospital	13	50	73	136
	Pohjois-Savo (13)		13	84	169	266
		Kuopio University Hospital	13	50	148	211
		Regional Hospital of Iisalmi		18	12	30
		Regional Hospital of Varkaus		16	9	25
	Keski-Suomi (14)		14	58	117	189
		Central Finland Central Hospital	14	58	117	189
North (R5)			37	181	349	567
	Keski-Pohjanmaa (17)		3	26	40	69
		Central Hospital of Keski-Pohjanmaa	3	26	40	69
	Pohjois-Pohjanmaa (18)		17	97	181	295
		Oulu University Hospital	17	97	181	295
	Kainuu (19)		4	16	50	70
		Kainuu Central Hospital	4	16	50	70
	Länsi-Pohja (20)		5	24	26	55
		Central Hospital of Länsi-Pohja	5	24	26	55
	Lappi (21)		8	18	52	78
		Lapland Central Hospital	8	18	52	78
Entire country			322	1498	2729	4549

At the end of 2015, dialysis and kidney transplantation patients were treated and followed up in 30 hospitals of 21 healthcare districts in five regions (Table 13). In the first part of this report, the healthcare district of the patient is determined according to place of residence. However, in the analysis of treatment quality on pages 26–42, healthcare district of the patient is determined according to treating hospital. In the entire country, 98% of patients lived in the same healthcare district where they were treated.

Figure 13. Nephrological follow-up before start of RRT in patients older than 20 years according to year of start of RRT
Finnish Registry for Kidney Diseases 2011–2015

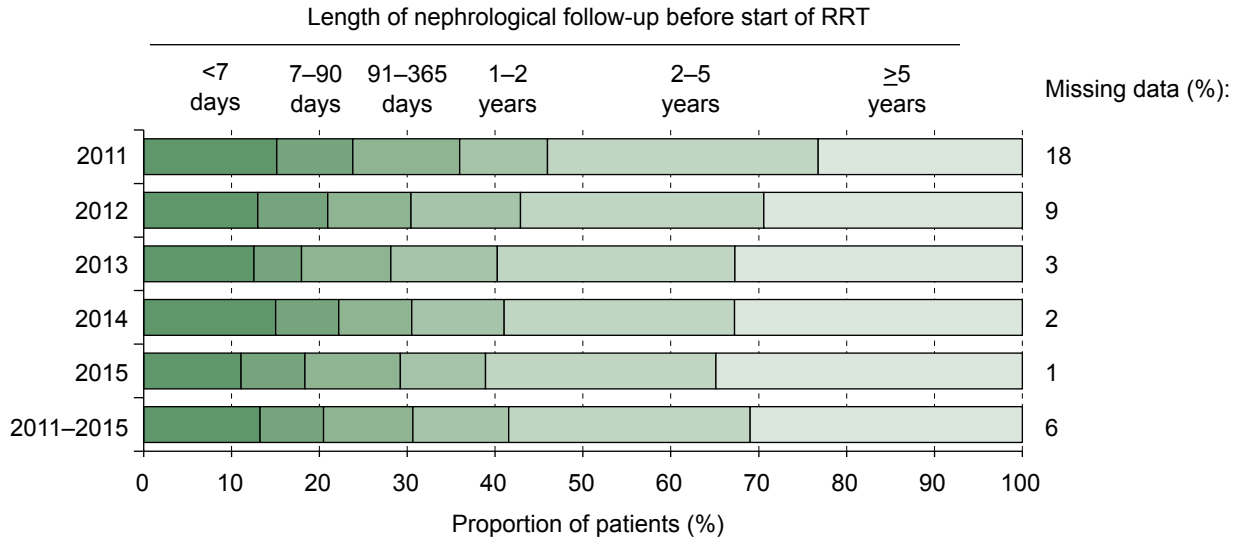
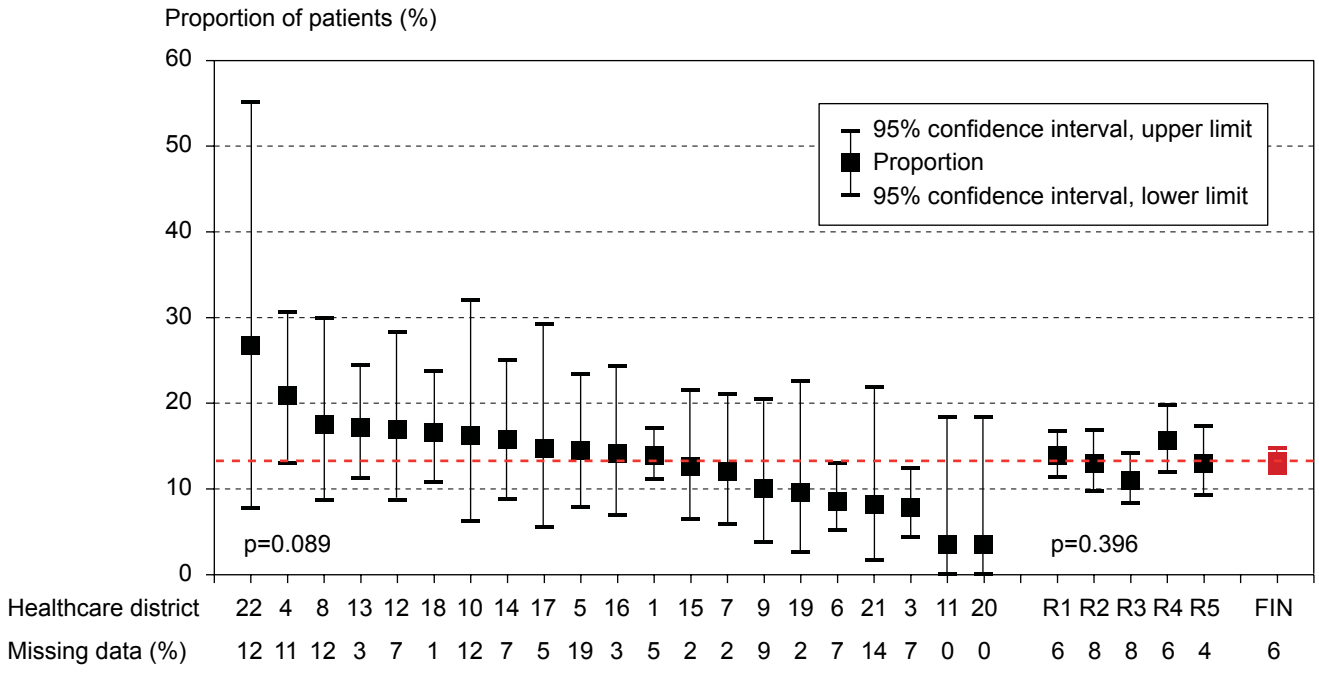


Figure 14. Proportion of patients older than 20 years with nephrological follow-up shorter than 7 days before start of RRT
Finnish Registry for Kidney Diseases 2011–2015



The Finnish Registry for Kidney Diseases has since 2011 collected information on when a patient first was followed up by a nephrologist. During 2011–2015 altogether 2323 patients aged 20 years or older entered RRT. More than half had been under nephrological follow-up for more than two years, but 13 has been followed up for less than seven days before start of RRT (Figure 13).

The proportion of patients followed up by a nephrologist for less than seven days before start of RRT varied from 4% to 21% in healthcare districts (P=0.089) and from 11% to 16% in regions (P=0.396) (Figure 14). The proportion did not differ between sexes (P=0.267).

All P-values on pages 27–42 were adjusted for age and sex by using binary logistic regression in which treatment target was the binary outcome and healthcare district (or region), age, and sex were explanatory variables.

Figure 15. Nephrological follow-up before start of RRT of patients older than 20 years according to age group and sex
Finnish Registry for Kidney Diseases 2011–2015

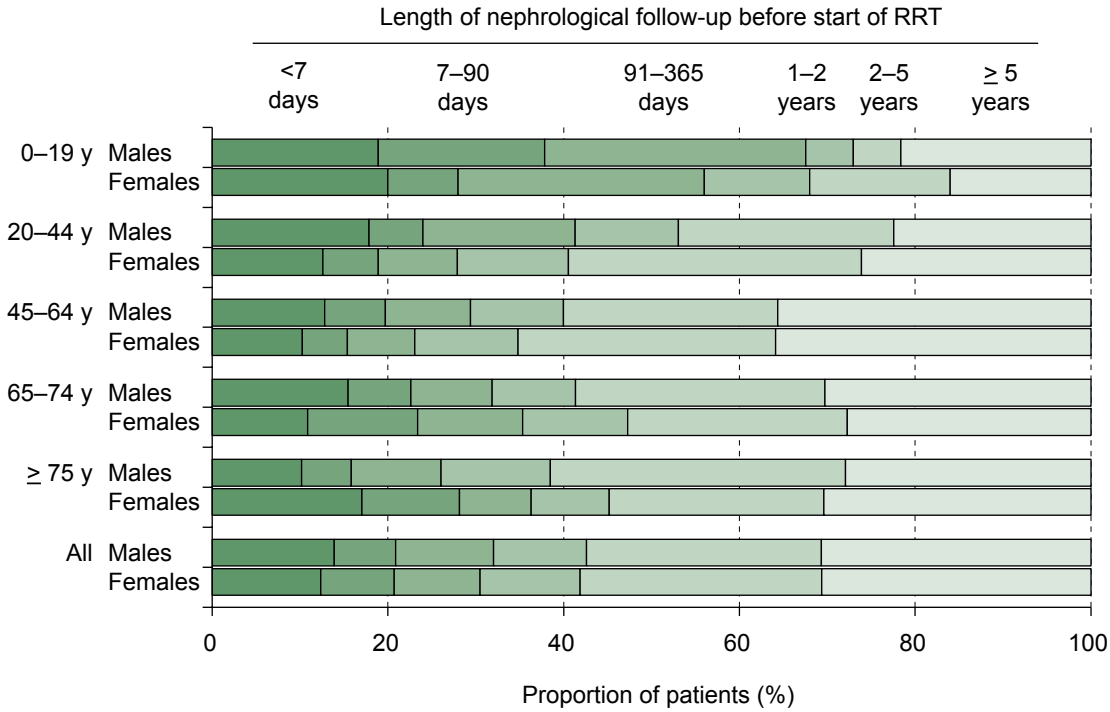


Figure 15 displays according to age group and sex the length of nephrological follow-up before start of RRT in patients who entered RRT in 2011–2015. The median follow-up was 2.8 years, and significant differences were observed between age groups (P=0.001), but not between sexes (P=0.966).

Figure 16. Hemoglobin distribution of dialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2005–2015

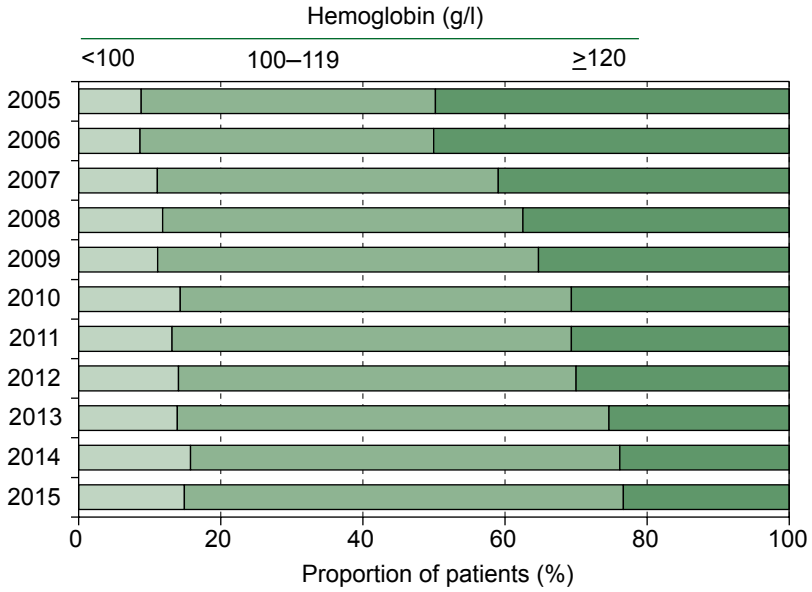
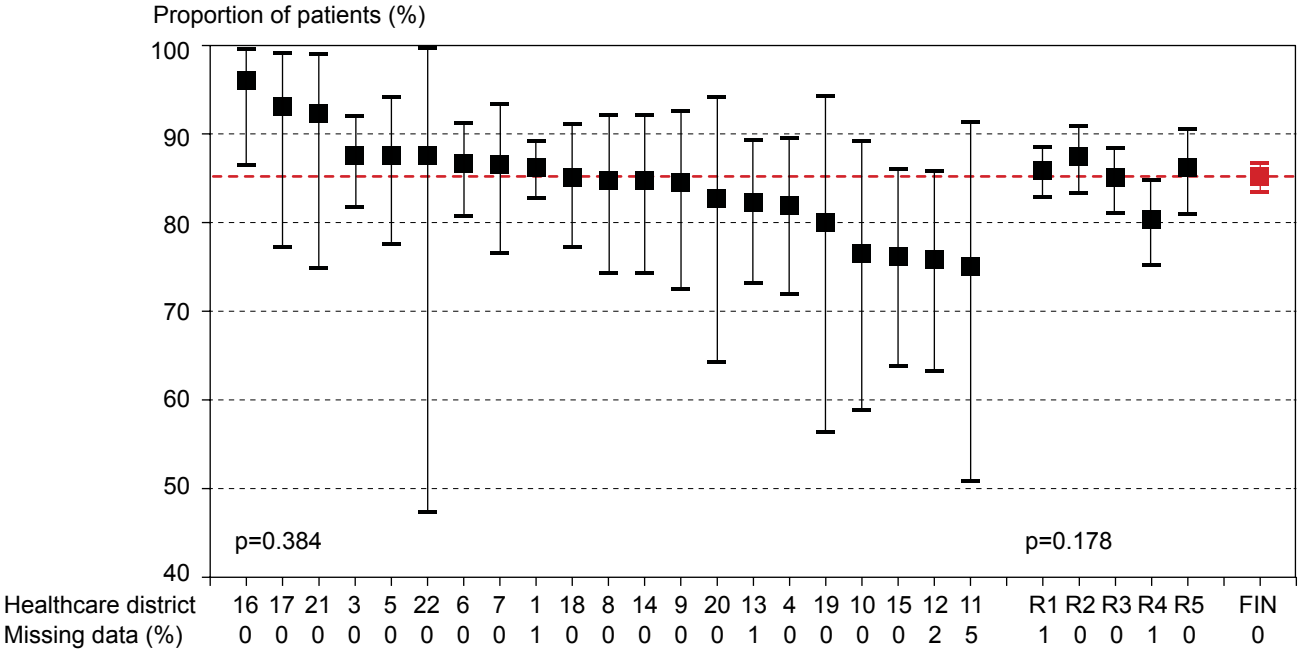


Figure 17. Proportion of dialysis patients older than 20 years with hemoglobin concentration ≥100 g/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015



Several guidelines exist regarding the target for blood hemoglobin concentration in dialysis patients: European Best Practice Guidelines (EPBG) 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 erythropoietin-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 the same cut-offs.

The distribution of dialysis patients' hemoglobin concentration has changed considerably during 2004–2014 (Figure 16). The proportion of patients with a hemoglobin concentration lower than 100 g/l has increased and was 15% at the end of 2015. The proportion of patients with a hemoglobin concentration of 120 g/l or higher has decreased to less than half and was 23% in 2015. Figures 16 and 17 include all hemodialysis patients, also those who did not use ESAs.

In Figure 17, the hemoglobin target is 100 g/l or higher. At the end of 2015, the proportion of dialysis patients reaching this target was 85% and varied from 75% to 96% in the healthcare districts (P=0.384) and from 80% to 87% in the regions (P=0.178). No significant difference was present in the proportions of men and women with a hemoglobin concentration of 100 g/l or higher.

Figure 18. Distribution of serum phosphorus among dialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2005–2015

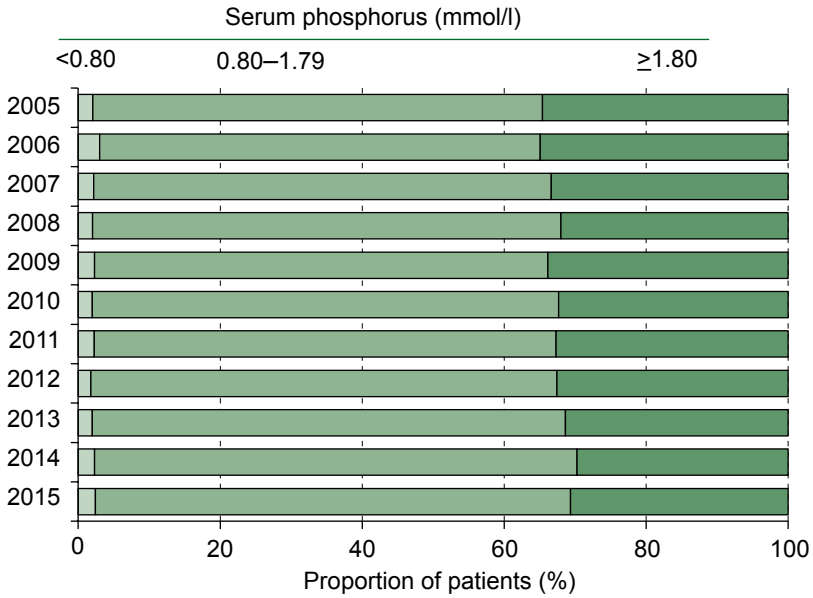
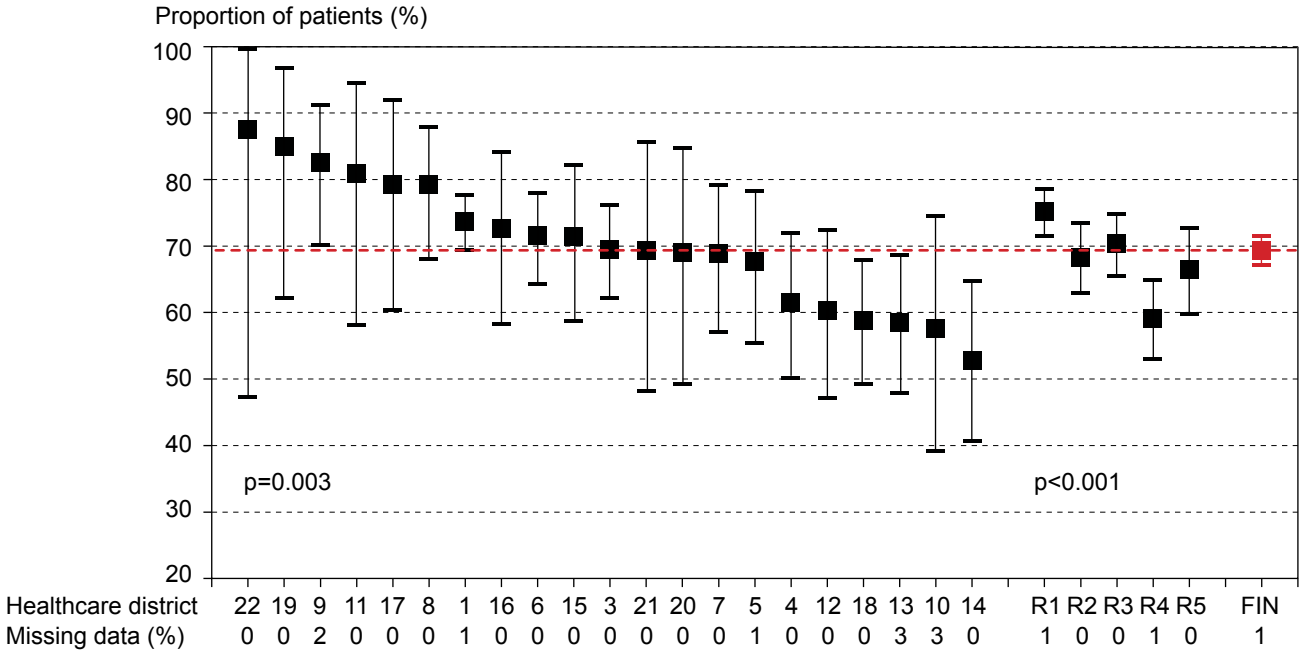


Figure 19. Proportion of dialysis patients older than 20 years with serum phosphorus <1.8 mmol/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015

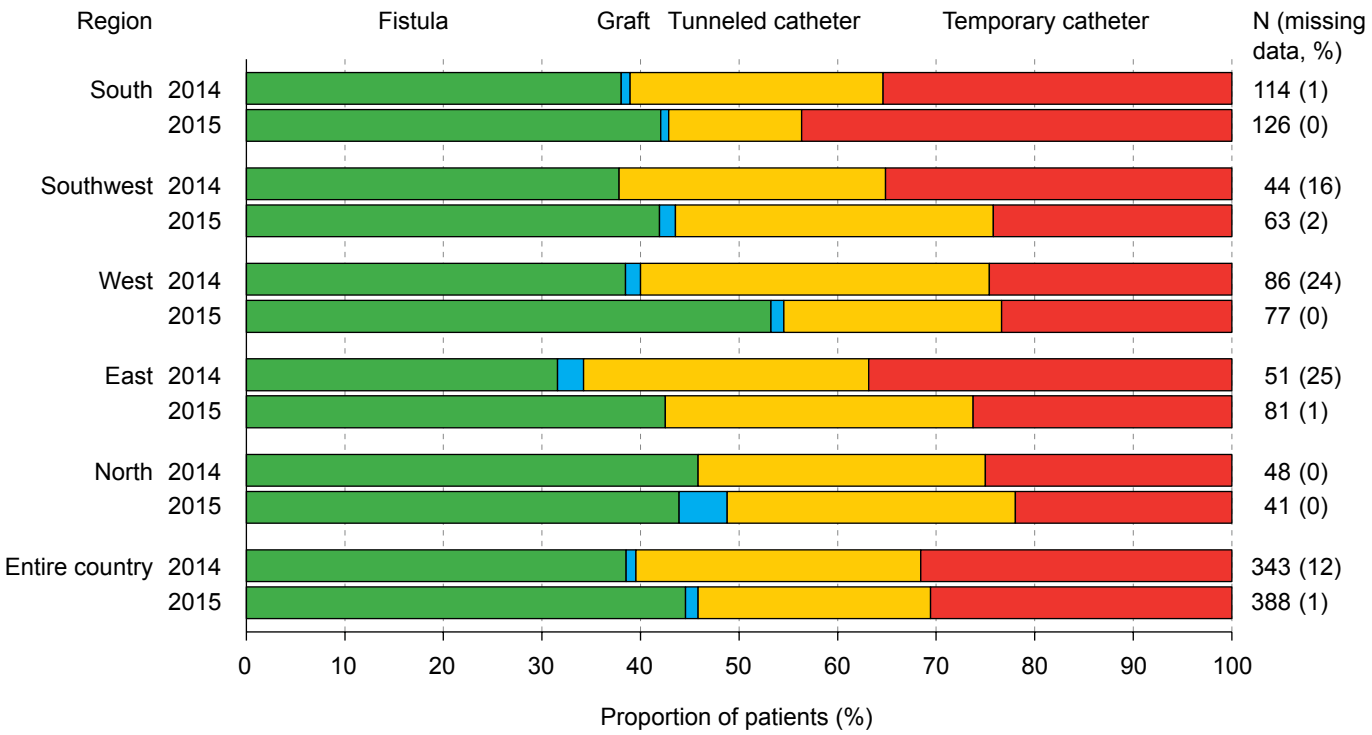


Hyperphosphatemia among patients with kidney disease is associated with vascular calcification and increased mortality. The guideline of the Kidney Disease Global Outcomes (KDIGO) suggests that elevated serum phosphorus of dialysis patients should be lowered towards the normal range with diet, intensified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

At the end of 201, 69% of hemodialysis and peritoneal dialysis patients had concentrations of serum phosphorus lower than 1.8 mmol/l; this proportion has remained virtually unchanged during the past ten years (Figure 18). Only 2% of dialysis patients had an excessively low concentration of serum phosphorus (<0.8 mmol/l).

The proportion of patients reaching the treatment target (serum phosphorus <1.8 mmol/l) varied between 53% and 88% in the healthcare districts (P=0.003) and between 59% and 75% in the regions (P<0.001) (Figure 19). No significant difference was present in the proportions of men and women reaching the treatment target.

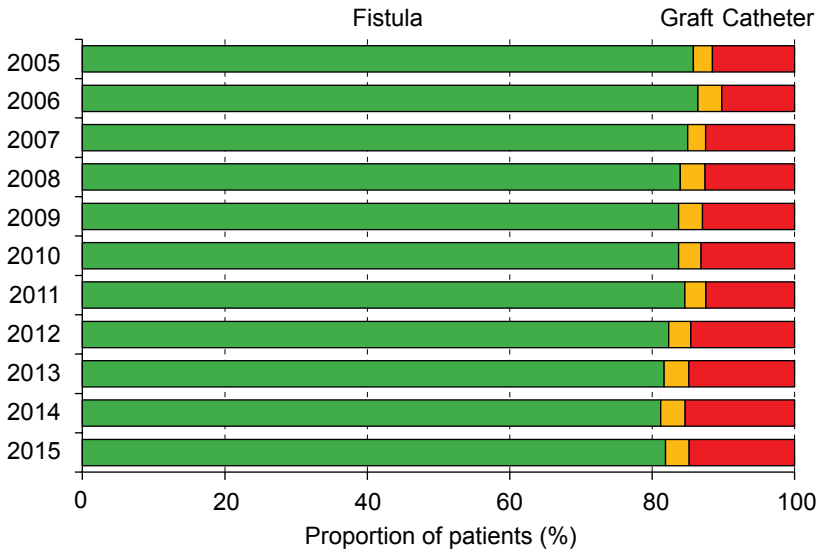
Figure 20. Vascular access of new hemodialysis patients older than 20 years by region
Finnish Registry for Kidney Diseases 2014–2015



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

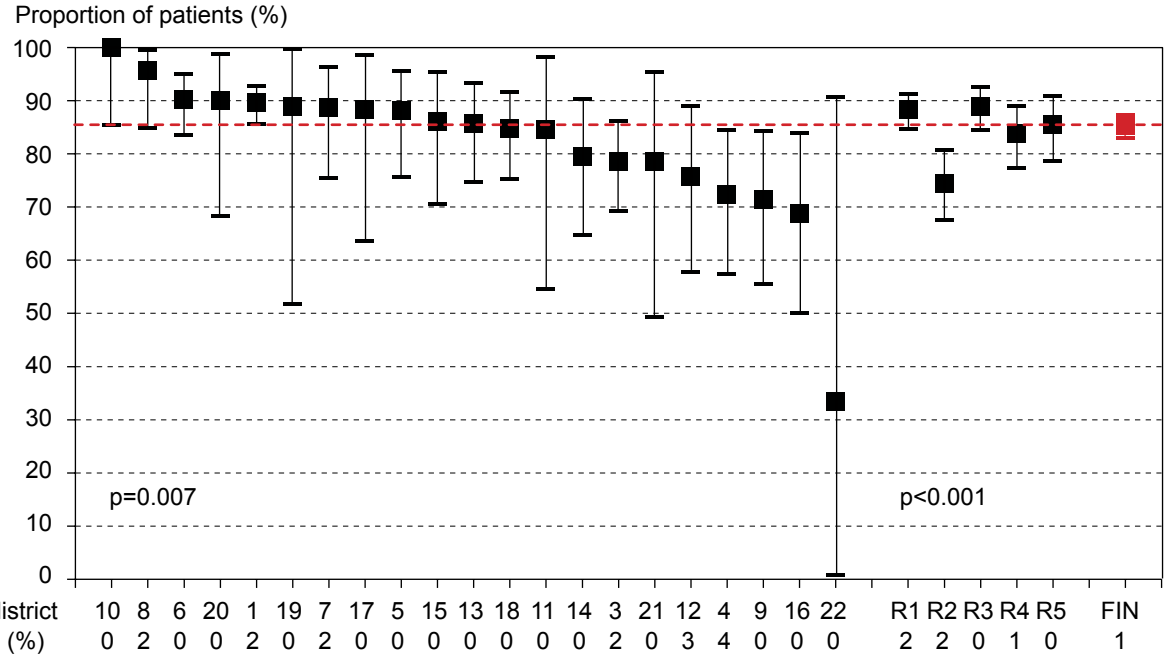
In 2015, 46% of patients older than 20 years who entered hemodialysis had an arteriovenous fistula or graft and the proportion varied 45–55% in regions (P=0.489) (Figure 20). Of the patients entering hemodialysis in the entire country, 31% had a temporary catheter and this proportion varied from 22% to 44% in regions (P=0.002).

Figure 21. Vascular access of hemodialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2005–2015



Patients who had been on RRT less than one year were excluded.

Figure 22. Proportion of hemodialysis patients older than 20 years with a fistula or graft in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015



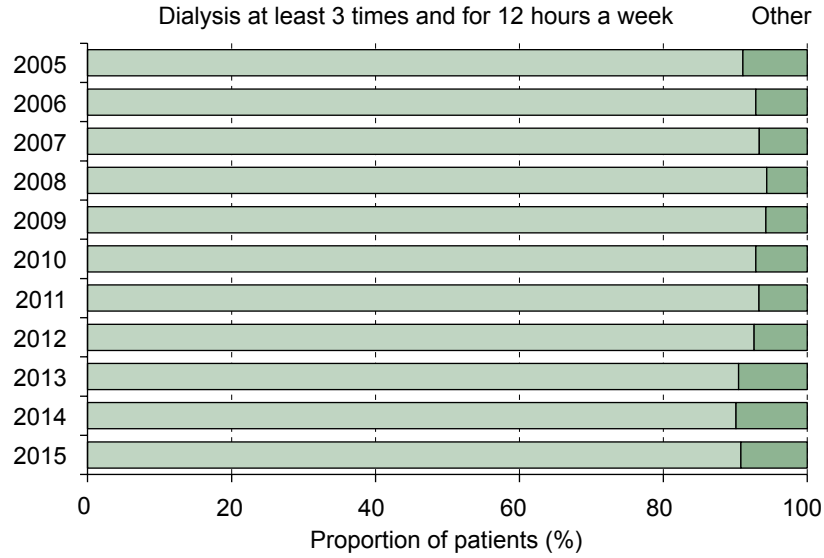
Healthcare district	10	8	6	20	1	19	7	17	5	15	13	18	11	14	3	21	12	4	9	16	22	R1	R2	R3	R4	R5	FIN
Missing data (%)	0	2	0	0	2	0	2	0	0	0	0	0	0	0	2	0	3	4	0	0	0	2	2	0	1	0	1

Patients who had been on RRT less than one year were excluded.

Vascular access is one of the most important quality measures in hemodialysis. Use of a central venous catheter is associated with complications, and the goal is that hemodialysis patients have an arteriovenous fistula or graft. Of hemodialysis patients aged 20 years or older who had been on RRT for at least one year, the proportion with a fistula or graft was the largest, 90%, in 2006, after which it decreased and has been 85% since 2014 (Figure 21).

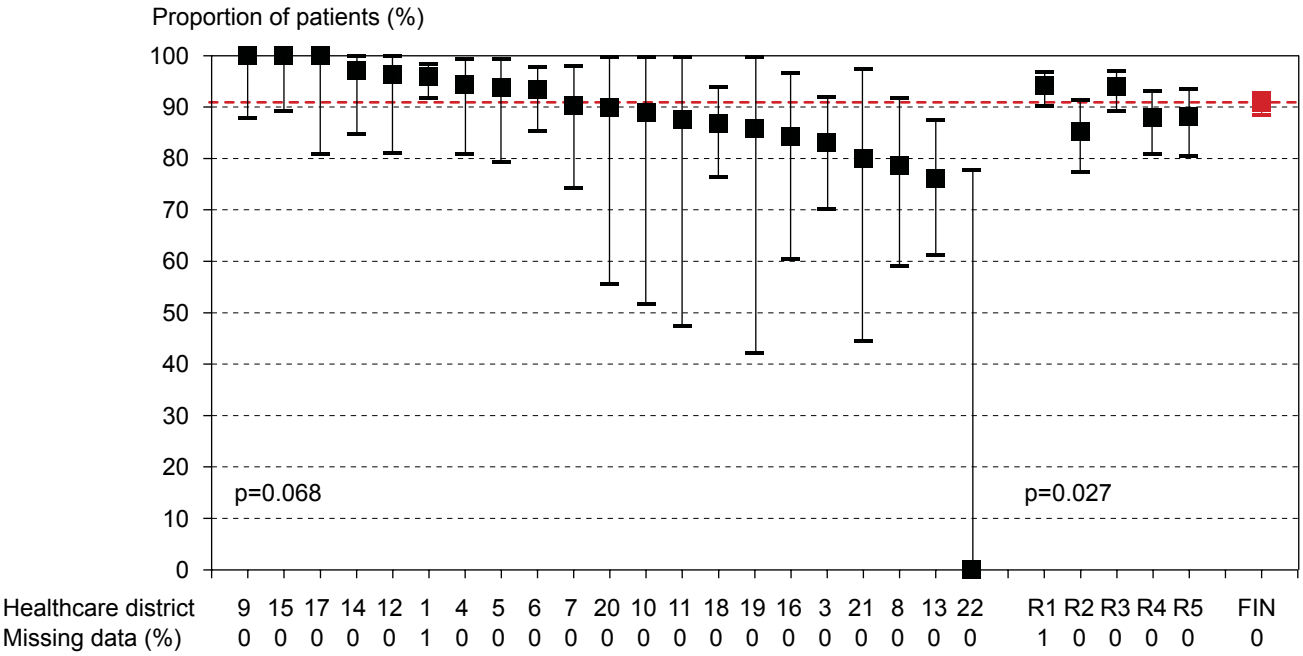
At the end of 2015, the proportion of patients with a fistula or graft varied between 69% and 100% in healthcare districts (excluding healthcare district 22, in which only 3 patients fulfilled inclusion criteria) (P=0.007) and between 80% and 87% in regions (P<0.001) (Figure 22). At the end of 2015, female hemodialysis patients less frequently than male patients had a fistula or graft (80% vs. 88%, P=0.001).

Figure 23. Sufficiency of dialysis time among hemodialysis patients aged 20–74 years
Finnish Registry for Kidney Diseases 2005–2015



Patients who had been on RRT less than one year and home hemodialysis patients were excluded.

Figure 24. Proportion of hemodialysis patients aged 20–74 years with sufficient dialysis time in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015

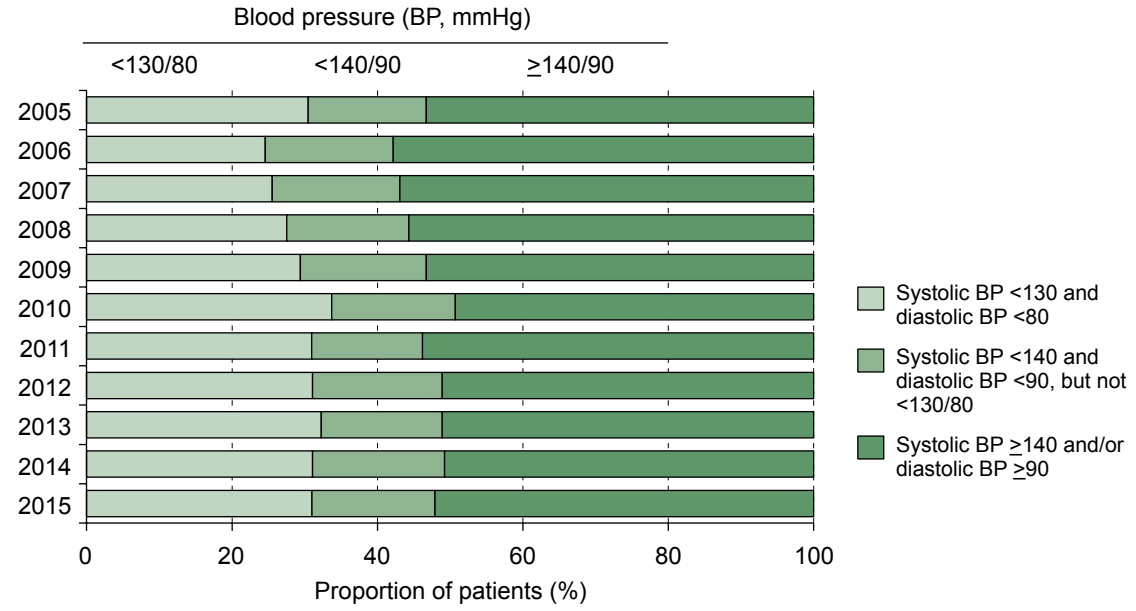


Patients who had been on RRT less than one year and home hemodialysis patients were excluded (n=743).

According to the European Best Practice Guidelines (EBPG), hemodialysis should be performed at least three times and for at least 12 hours a week if there is no significant residual kidney function. According to this definition, 91% of 20–74-year-old in-center hemodialysis patients received sufficient hemodialysis time at the end of 2015 (Figure 23). The proportion has remained virtually unchanged during recent years.

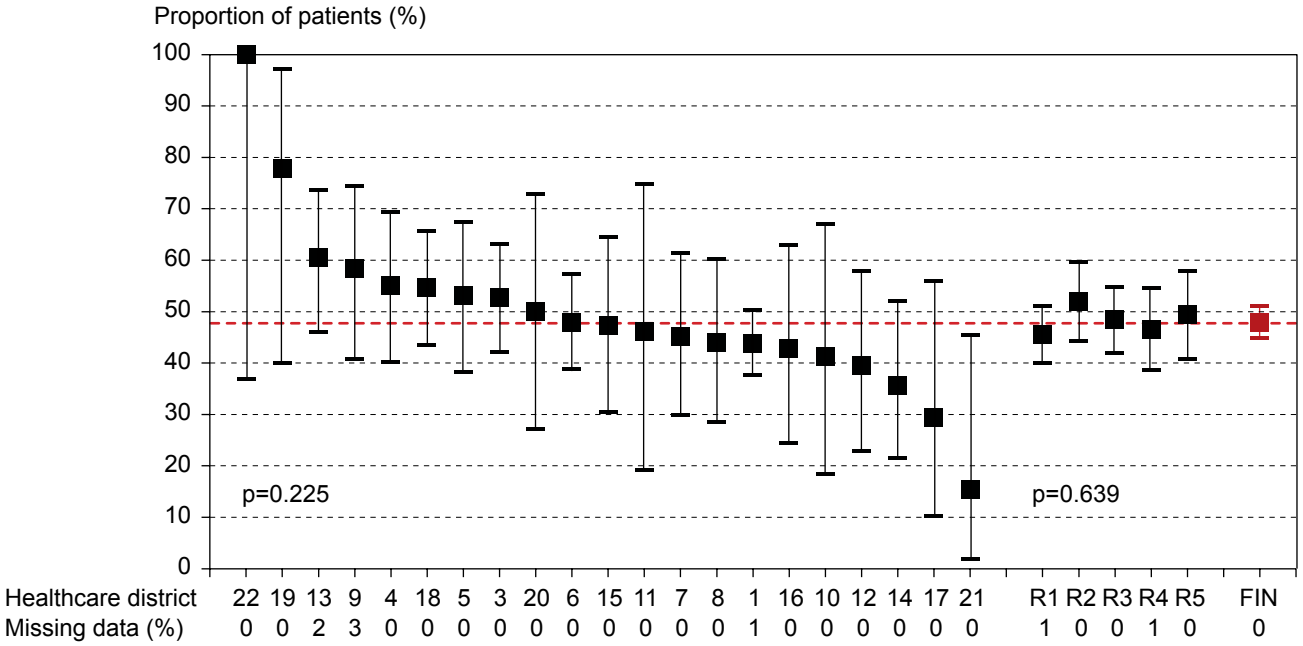
At the end of 2015, the proportion varied between 76% and 100% in healthcare districts (excluding healthcare district 22, in which only 2 patients fulfilled inclusion criteria) (P=0.068) and between 85% and 94% in regions (P=0.027) (Figure 24). After adjustment for age and sex, the difference between healthcare districts was not significant (P=0.051). At the end of 2014, female hemodialysis patients less frequently than males had sufficient dialysis time (87% vs. 93%, P=0.014).

Figure 25. Distribution of predialytic blood pressure among hemodialysis patients older than 20 years
Finnish Registry for Kidney Diseases 2005–2015



Patients who had been on RRT less than one year and home hemodialysis patients were excluded.

Figure 26. Proportion of hemodialysis patients older than 20 years with predialytic blood pressure <140/90 mmHg in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015



Patients who had been on RRT less than one year and home hemodialysis patients were excluded (n=1084).

According to the guidelines of the Kidney Disease Outcome Quality Initiative (KDOQI), hemodialysis patients' target for predialytic blood pressure is lower than 140/90 mmHg. At the end of 2015, 48% of hemodialysis patients reached this target (Figure 25). The proportion of patients reaching the target varied between 15% and 100% in healthcare districts (P=0.225) and between 45% and 52% in regions (P=0.639) (Figure 26). There was no significant difference in proportions of males and females reaching the target blood pressure.

Figure 27. Number of PD peritonitis patients older than 20 years according to annual number of episodes of peritonitis
Finnish Registry for Kidney Diseases 2005–2015

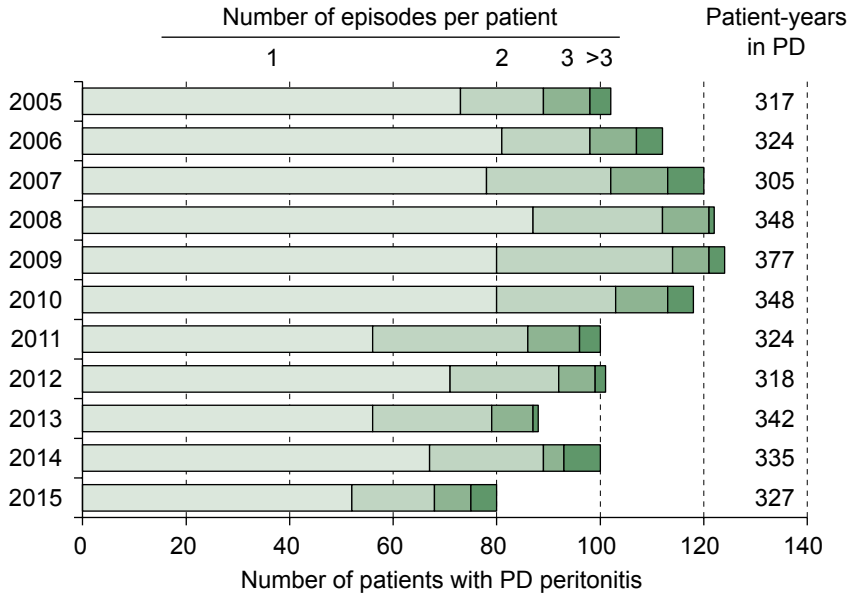


Figure 28. Incidence density of peritonitis among PD patients older than 20 years in regions.
Finnish Registry for Kidney Diseases 2005–2015

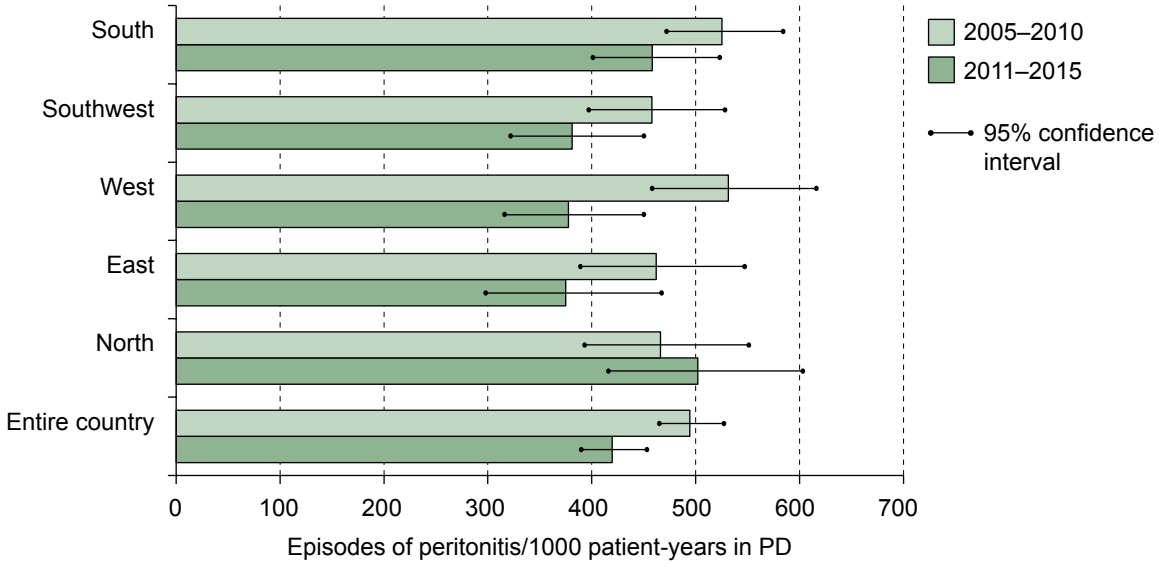


Figure 27 presents the number of peritoneal dialysis (PD) patients who had had at least one episode of peritonitis per calendar year during 2005–2015. Of PD patients with peritonitis in 2015, 35% had had more than one episode.

Figure 28 shows PD patients' incidence density of peritonitis, i.e. number of peritonitis episodes per 1000 patient-years 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 420 per 1000 patient-years in 2011–2015, and this was 15% less than in 2005–2010 (P<0.001). The incidence density of PD peritonitis has declined in most regions.

Figure 29. Incidence density of peritonitis among PD patients according to age group and sex
Finnish Registry for Kidney Diseases 2011–2015

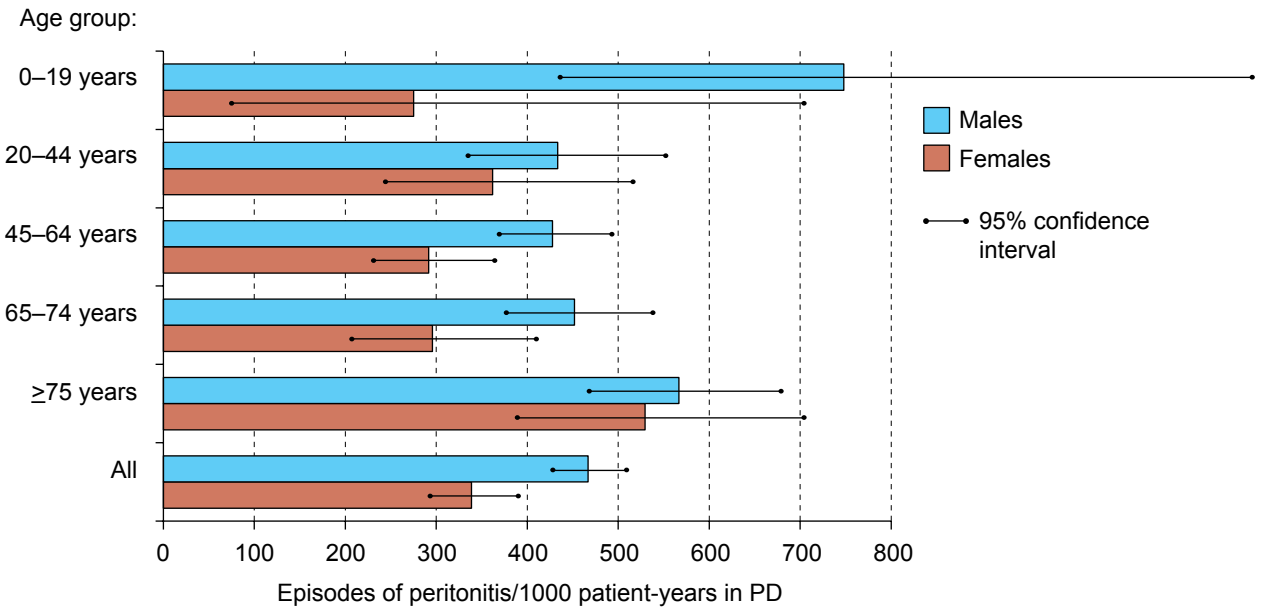


Figure 30. Incidence density of peritonitis among PD patients older than 20 years according to age group and diabetes status
Finnish Registry for Kidney Diseases 2011–2015

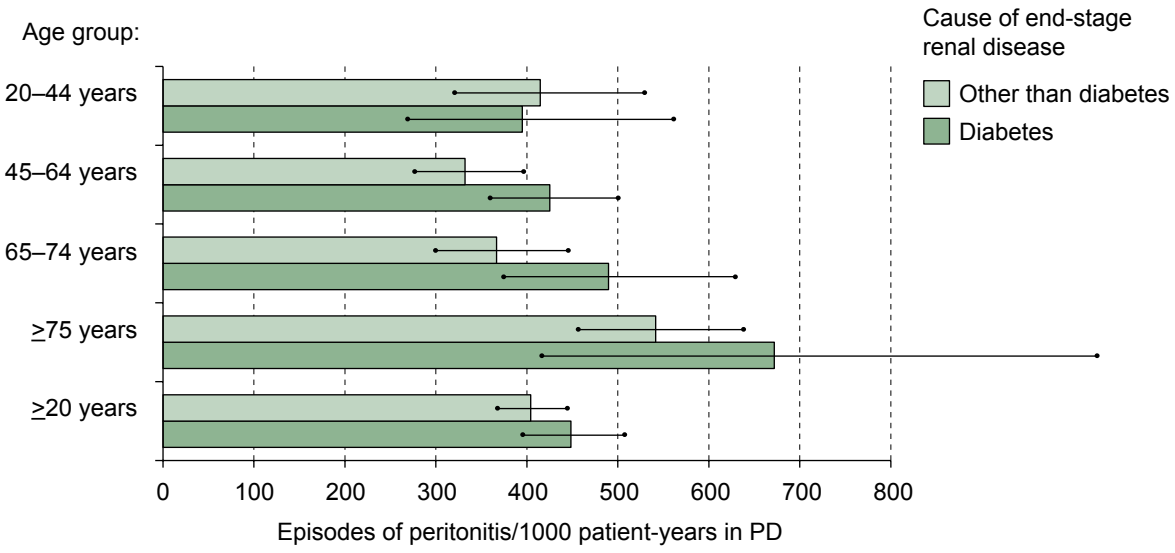


Figure 29 shows peritoneal dialysis (PD) patients' incidence density of peritonitis according to age group and sex in 2011–2015. During this time there were 1684 patient-years in PD and 712 episodes of peritonitis. If the patient had more than three episodes of peritonitis during one calendar year, only the first three episodes were considered when calculating the incidence density. Among patients younger than 20 years, 21 episodes of peritonitis were observed in 37 patient-years, and due to the small number the confidence intervals of the incidence density are wide. Patients older than 75 years had 41% higher risk of peritonitis than younger patients (P<0.001), and males had 38% higher risk than females (P<0.001).

PD patients aged 20 years or older with diabetes as the cause of end-stage renal disease had higher incidence density of peritonitis than those with other causes of end-stage renal disease (P<0.001), and the difference is emphasized among patients older than 45 years (Figure 30). The data of patients younger than 20 years are not shown, as no one in this age group had diabetes as the cause of end-stage renal disease.

Figure 31. Time to waitlisting for kidney transplantation of new RRT patients older than 20 years
Finnish Registry for Kidney Diseases 2005–2015

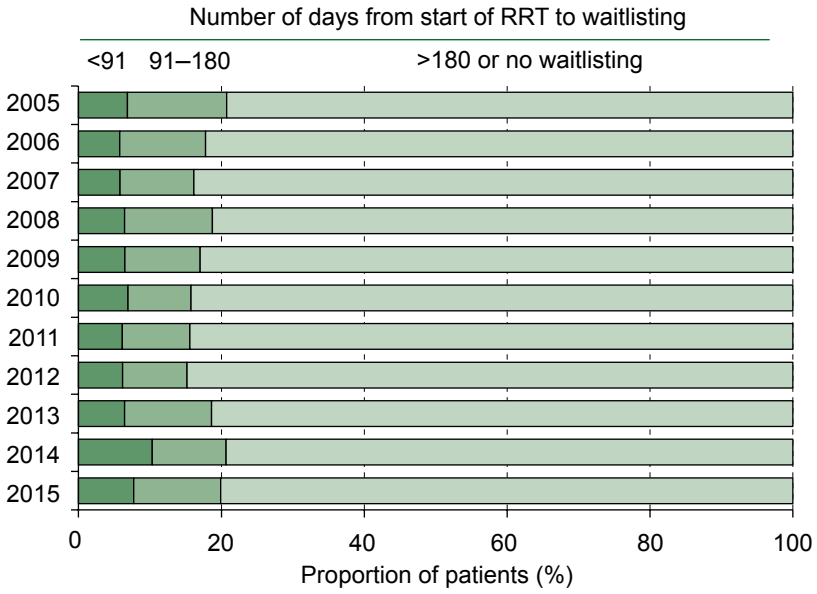
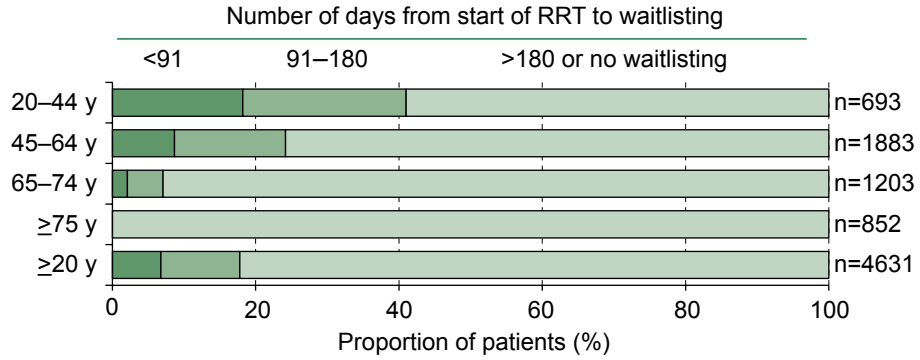


Figure 32. Time to waitlisting for kidney transplantation by age group of new RRT patients older than 20 years
Finnish Registry for Kidney Diseases 2005–2015



In 2005–2015, altogether 5143 patients older than 20 years entered RRT. Of these, four received a kidney transplant without preceding dialysis treatment. Patients who had died within 180 days from start of RRT (N=280) were excluded from the analyses in Figures 31 and 32. Because data on waitlisting for transplantation were not available after 31 December 2015, patients who entered RRT after 1 July 2015 were excluded to keep the follow-up data complete. The analysis included a total of 4631 patients.

Figure 31 shows the time from start of RRT until waitlisting for kidney transplantation. In 2015, 8% of patients who entered RRT were waitlisted within 90 days and 20% within 180 days from start of RRT. In 2014 and 2015, a somewhat larger proportion, 20%, than in earlier years was waitlisted within 180 days from start of RRT. Information on waitlisting was provided by the Registry for the Follow-up of Kidney Transplantation Patients at Helsinki University Central Hospital.

Figure 32 displays according to age group the time from start of RRT to waitlisting for kidney transplantation of patients who entered RRT in 2005–2015.

Figure 33. Proportion of new RRT patients waitlisted for kidney transplantation within 91 days from start of RRT in healthcare districts
Finnish Registry for Kidney Diseases 2011–2015

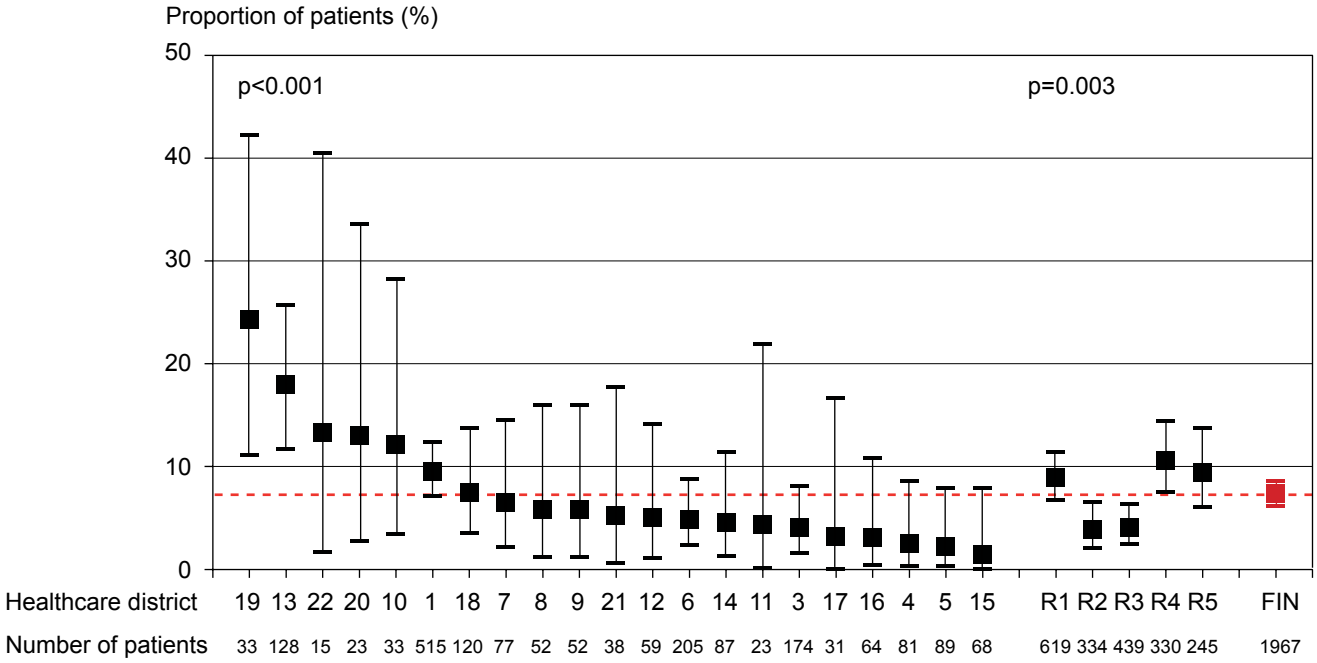
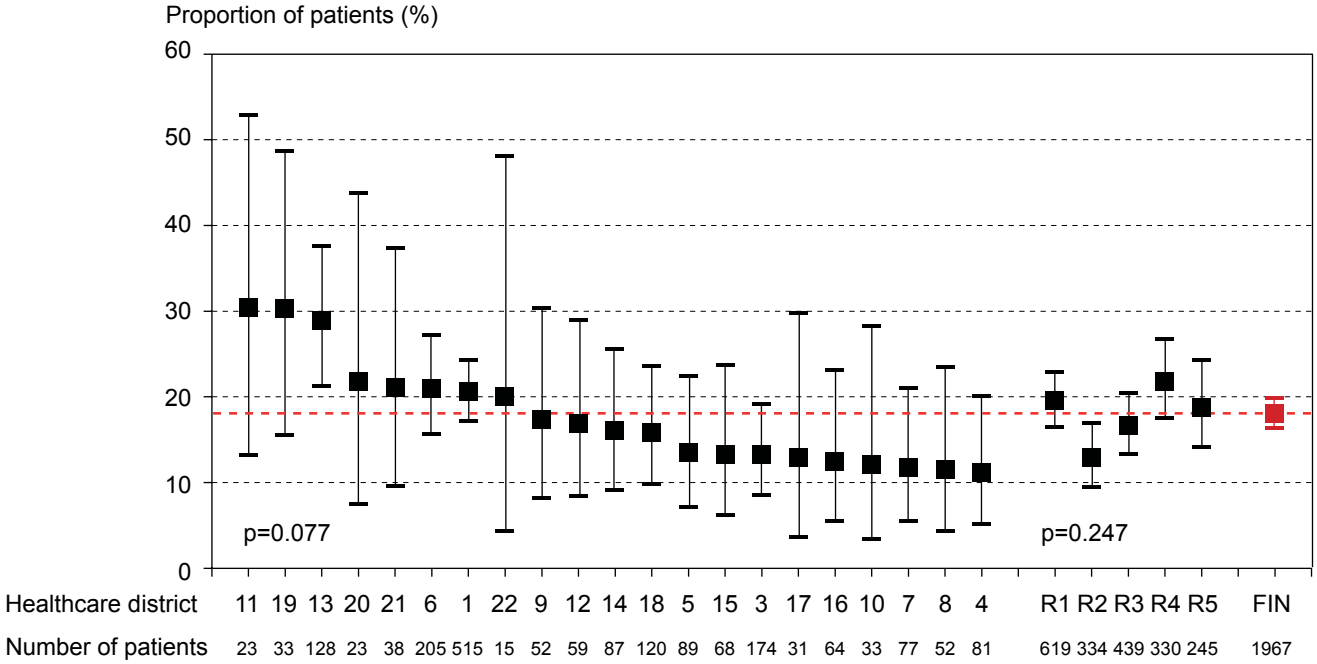


Figure 34. Proportion of new RRT patients waitlisted for kidney transplantation within 181 days from start of RRT in healthcare districts
Finnish Registry for Kidney Diseases 2011–2015



Figures 33 and 34 show the proportions of patients entering RRT in 2011–2015 who had been waitlisted for kidney transplantation within 90 and 180 days from start of RRT. Patients who had died within 180 days from start of RRT and those who entered RRT after 1 July 2015 were excluded from the analyses.

In the entire country, 7% of patients had been waitlisted within 90 days from start of RRT (Figure 33), and this proportion showed a range of 1–24% in healthcare districts (P<0.001) and 4–11% in regions (P=0.003). From start of RRT, 10% of female and 6% of male patients were waitlisted within 90 days (P=0.015).

Of the patients, 18% had been waitlisted within 180 days from start of RRT (Figure 34). This proportion ranged from 11% to 30% in healthcare districts (P=0.077) and from 13% to 22% in regions (P=0.247). Within 180 days from start of RRT, 22% of women and 16% of men were waitlisted for kidney transplantation (P=0.002).

Number of kidney transplantations and incidence density of kidney transplantation among dialysis patients
Finnish Registry for Kidney Diseases 2005–2015

Region	Number of kidney transplantations						Kidney transplantations/1000 dialysis-years					
	2005	2010	2013	2014	2015	2011–2015	2005	2010	2013	2014	2015	2011–2015
South	59	65	66	79	68	350	125	115	112	131	112	119
Southwest	24	29	30	32	40	156	84	100	95	101	127	102
West	36	37	33	38	54	194	112	95	83	96	137	99
East	24	22	35	46	34	162	111	85	126	177	123	118
North	15	17	14	27	34	118	73	75	62	119	154	107
Entire country	158	170	178	222	230	980	105	98	99	123	127	110

Figure 35. Standardized incidence density of kidney transplantation among dialysis patients
Finnish Registry for Kidney Diseases 2005–2015

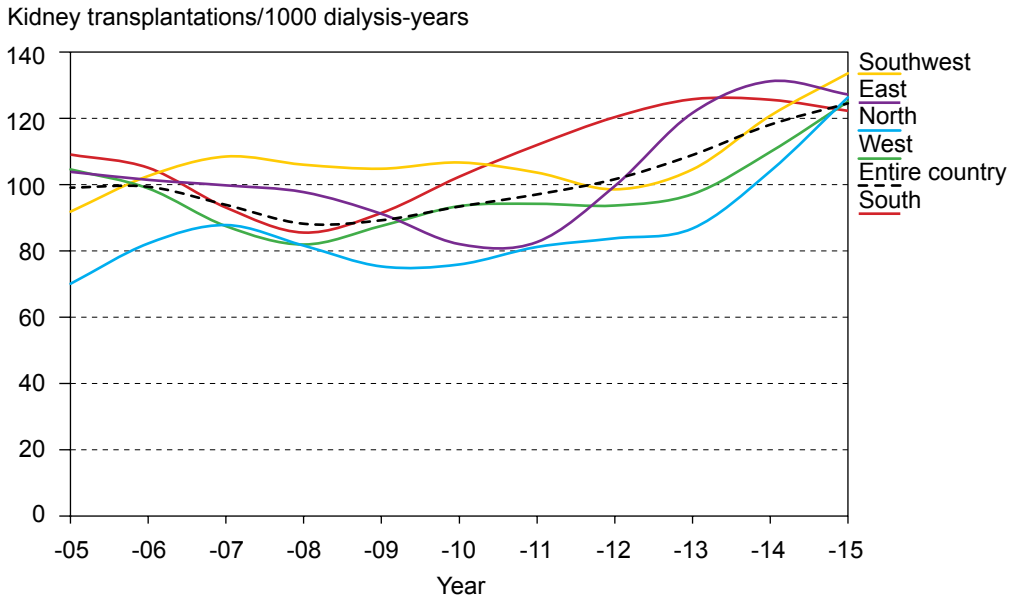


Table 14 presents the number of kidney transplantations performed on patients aged 20 years or older and dialysis patients' incidence density of kidney transplantation in regions in 2005–2015. In 2011–2015, dialysis patients' incidence density of kidney transplantation varied regionally in the range of 99–119 kidney transplantations per 1000 patient-years in dialysis.

Figure 35 shows regional incidence density of kidney transplantation as smoothed averages. The regional incidence densities for 2005–2015 have been age- and sex-standardized using all dialysis patients' patient-years in 2015 as the reference. Changes in age and sex distribution during this ten-year period have been taken into account. The annual numbers of kidney transplantation were considerably larger in 2014 and 2015 than in earlier years. In recent years, the standardized incidence density of kidney transplantation has been similar among dialysis patients in all regions.

Figure 36. Incidence density of kidney transplantation among dialysis patients according to age group and sex
Finnish Registry for Kidney Diseases 2005–2015

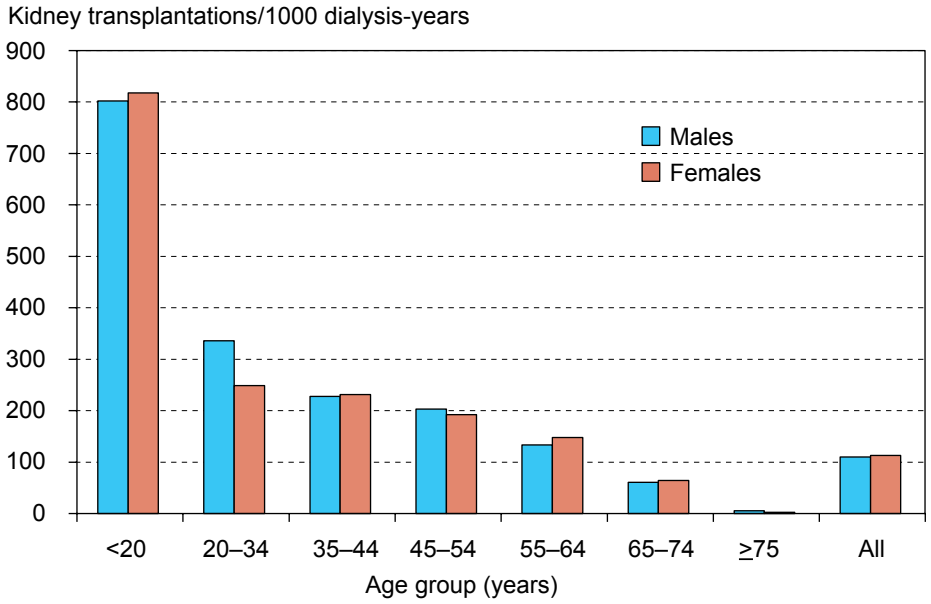
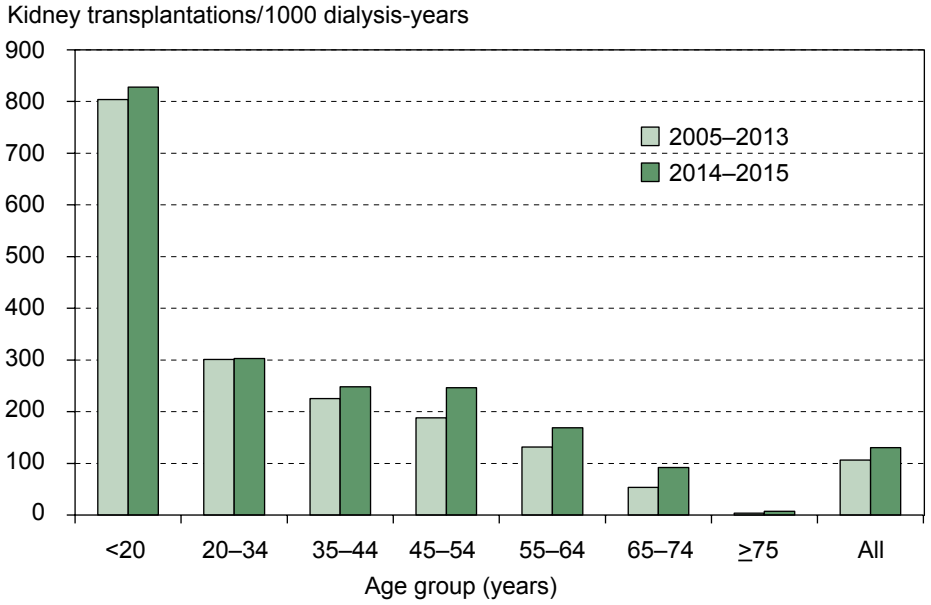


Figure 37. Incidence density of kidney transplantation among dialysis patients according to age group and time period
Finnish Registry for Kidney Diseases 2005–2015



In 2005–2015, altogether 2081 kidney transplantations were performed and there were 18 731 patient-years on dialysis in the entire country. Only 13 kidney transplantations were performed without preceding dialysis treatment. Figures 36 and 37 present dialysis patients' incidence density of kidney transplantation, i.e. the number of kidney transplantations per 1000 patient-years in dialysis.

The incidence density of kidney transplantation is smaller in the older age groups, but there is no difference between the sexes (Figure 36). On average 178 kidney transplantations were performed annually in 2005–2013, and in 2014–2015 the average was 238 kidney transplantations per year, which is 34% more than earlier. Dialysis patients' incidence density of kidney transplantation was 23% larger in 2014–2015 than in 2005–2013 (Figure 37). Incidence density increased by 30% among 45–64-year-olds and by 73% among those older than 65 years. Among dialysis patients younger than 45 years, incidence density of kidney transplantation did not increase significantly.

Figure 38. Distribution of blood pressure of kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2005–2015

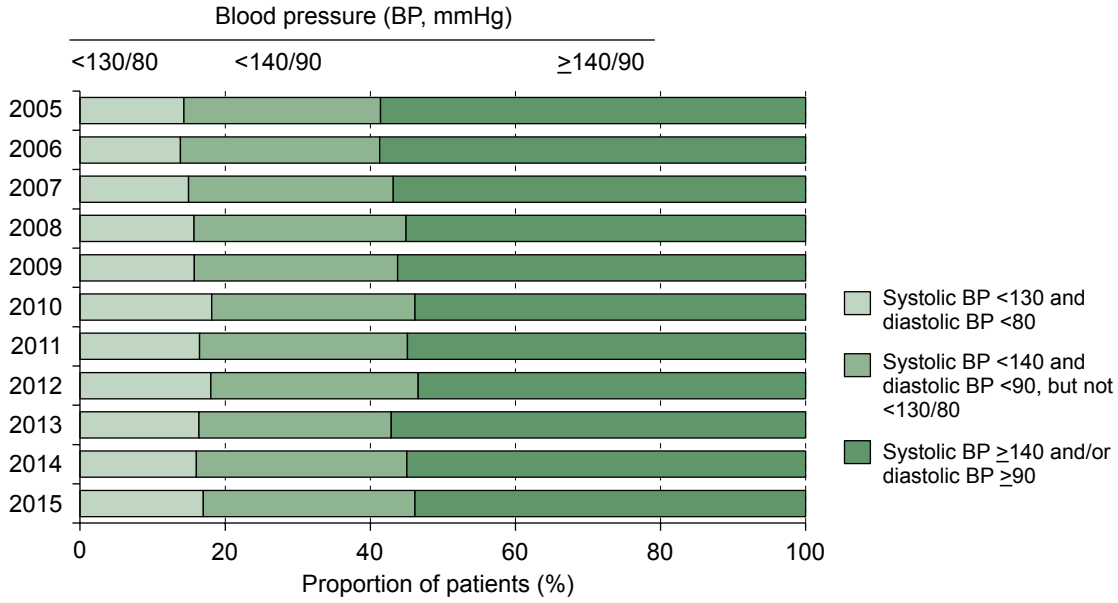
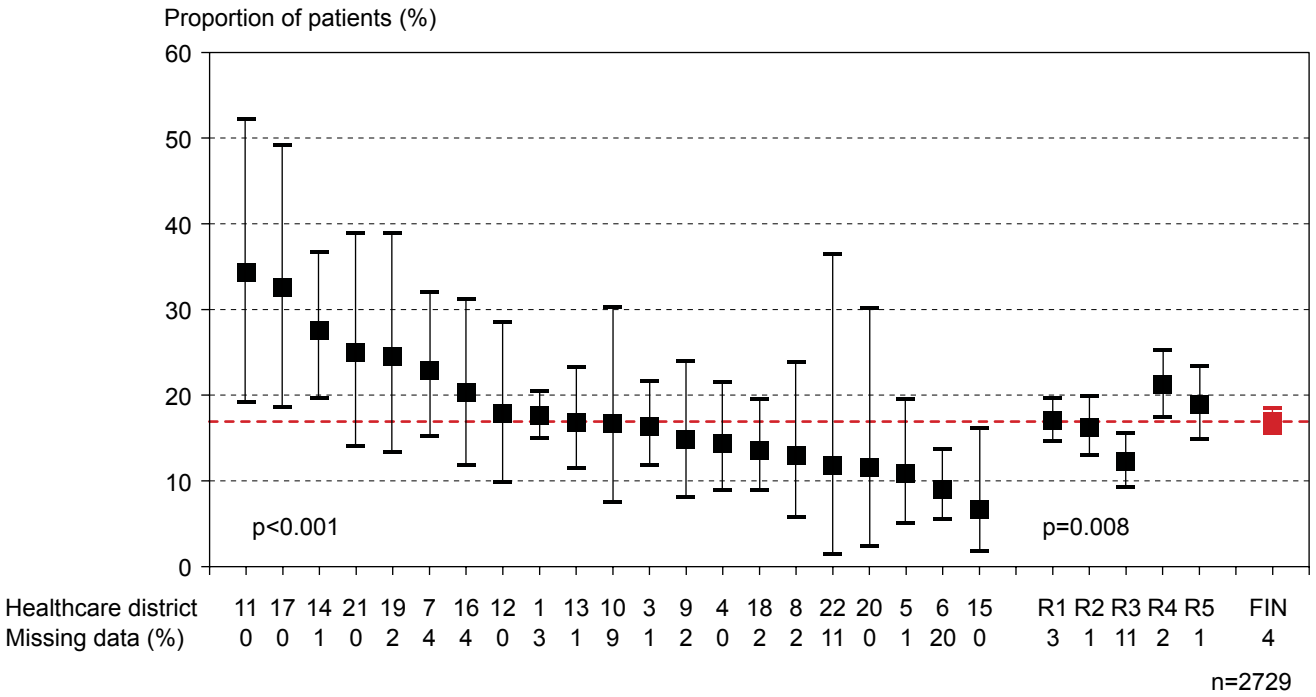


Figure 39. Proportion of kidney transplantation patients older than 20 years with blood pressure <130/80 mmHg in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015

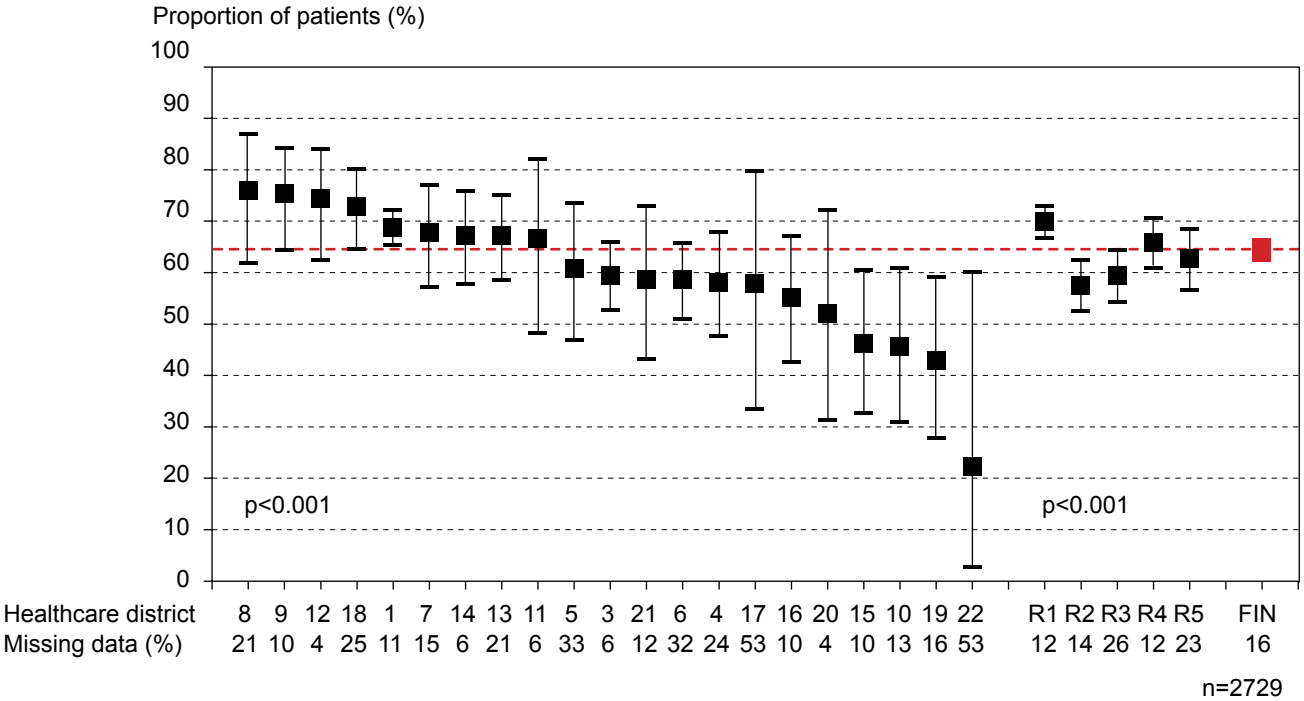


The KDIGO guidelines suggest that the blood pressure target of kidney transplantation patients be lower than 130 mmHg for systolic blood pressure and lower than 80 mmHg for diastolic blood pressure. Figure 388 shows the blood pressure distribution of kidney transplantation patients at the end of the years 2005–2015. The proportion of patients reaching the target (<130/80 mmHg) was 14% in 2005 and 17% in 2015.

At the end of 2015, the proportion of kidney transplantation patients reaching the blood pressure target varied between 7% and 34% in healthcare districts (P<0.001) and between 12% and 21% in regions (P=0.008) (Figure 39). No significant difference was observed between the sexes.

Figure 40. Distribution of serum LDL cholesterol among kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2005–2015

Figure 41. Proportion of kidney transplantation patients older than 20 years with serum LDL cholesterol <2.6 mmol/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2015



According to the KDIGO and KDOQI guidelines, kidney transplantation patients' concentration of serum low-density lipoprotein (LDL) cholesterol should be less than 2.6 mmol/l. In 2015, 64% of kidney transplantation patients reached this target (Figure 40).

The proportion of kidney transplantation patients reaching the treatment target for LDL cholesterol varied between 22% and 76% in healthcare districts (P<0.001) and between 58% and 70% in regions (P<0.001) (Figure 41). Males reached the target more frequently than females (66% vs. 60%, P=0.008).

The concentration of LDL cholesterol was calculated using the Friedewald formula based on serum concentrations of total cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides. Because of the restrictions of the Friedewald formula, patients with a concentration of triglycerides higher than 4.5 mmol/l were excluded (1% of patients).

Finnish Registry for Kidney Diseases

Report 2015

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