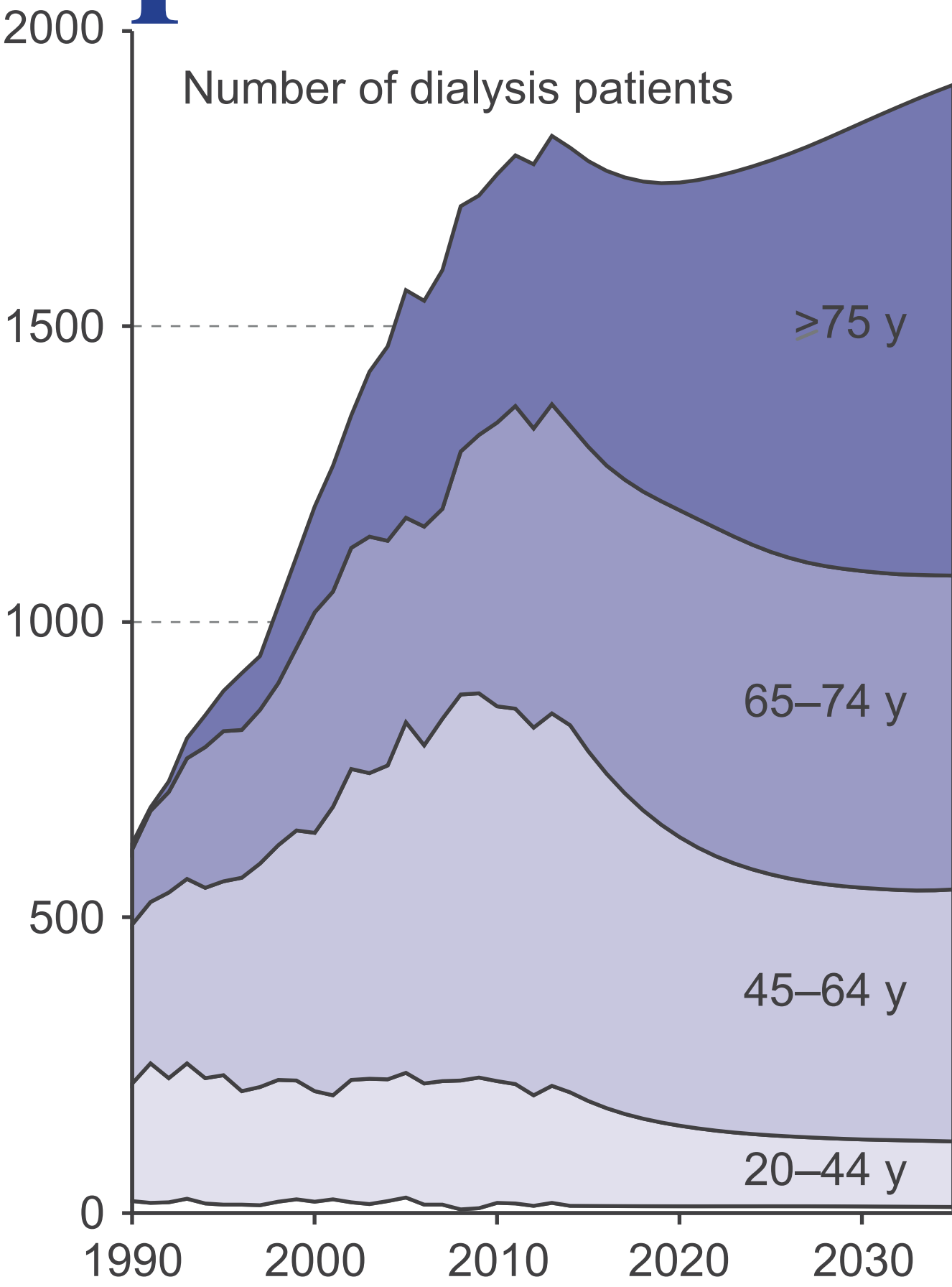
Report 2014

Finnish Registry for Kidney Diseases



Finnish Registry for Kidney Diseases – Report 2014

Content

Finnish Registry for Kidney Diseases 2014

The Finnish Registry for Kidney Diseases has in recent years become a quality registry that monitors parameters related to the quality of care of renal replacement therapy (RRT, dialysis and kidney transplantation) patients. The development into a quality registry has been achieved in collaboration with nephrologists from the healthcare districts around the country in a project funded by the Ministry of Social Affairs and Health. Report 2014 presents for the third time the results of quality of care of RRT patients. The report also contains the familiar section on trends of incidence and prevalence of RRT and RRT patients' mortality.

Incidence of RRT is among the lowest in Europe, with 84 patients entering RRT per million inhabitants in 2014. As in many industrialized countries, the incidence has not grown in recent years. Compared with other countries, the incidence is especially small in the age group 75 years and older. In the other Nordic countries, incidence of RRT in this age group varied in the range of 357–430 new patients per million age-related inhabitants in 2013, whereas the corresponding figure in Finland was only 192. The reason for this difference is unknown.

Dialysis and kidney transplantation patients' age-standardized mortality has continued to decrease over the years, reflecting improved treatment. In 2014, the number of kidney transplantations was 240, which is more than ever before, and in 2015 the number was similar. As a consequence of the high number of transplantations, the number of dialysis patients has stopped increasing. Report 2014 presents a projection of the number of dialysis and kidney transplantation patients until 2035. The projection is based on Statistic Finland's estimate of the future population in Finland, according to which the number of inhabitants older than 75 years will grow markedly. In addition, the prediction is based on the assumption that 250 kidney transplantations will be performed every year. According to the projection, the number of dialysis patients in 2035 will not be very different from today, but the patients will be considerably older. The number of kidney transplantation patients will continue to rise.

We have published analyses on the quality of care of dialysis and kidney transplantation patients since Report 2012. Report 2014 focuses on analyses that in earlier years have shown differences between healthcare districts or regions or changes over time. We will continue presenting results on quality every year. This will hopefully lead to smaller regional differences in quality and to larger proportions of patients reaching treatment targets.

The Finnish Registry for Kidney Diseases is a national healthcare registry maintained by the Finnish Kidney and Liver Association. The registry is mainly financed by the Finnish government through the National Institute of Health and Welfare. Support has also been received from the Liv och Hälsa Association. All patients have provided written consent for data collection. We estimate that the Finnish Registry for Kidney Diseases covers 97–99% of all RRT patients in Finland. This estimate is based on a comparison with the Registry for the Follow-up of Kidney Transplantation Patients at the Kidney Transplantation Unit of Helsinki University Central Hospital, which has complete coverage of all kidney transplantations performed in Finland.

The law on national person registries in healthcare dates back to 1989, and only a few healthcare registries in Finland have legal status (e.g. Finnish Cancer Registry and Finnish Register of Visual Impairment). The Ministry of Social Affairs and Health has in April 2015 appointed a working group to plan amendments to the legislation. The aim of the Board of the Finnish Registry for Kidney Diseases is that the registry will gain legal status. Finnish healthcare is undergoing comprehensive changes. In the future, Finnish healthcare will be organized by 18 autonomous regions and will no longer be the responsibility of joint municipal authorities. During the transfer period it is especially important that our national registry, which has operated for decades, monitors the effects of the changes on the treatment of dialysis and kidney transplantation patients.

The Board of the Finnish Registry for Kidney Diseases thanks all of its supporters and participating hospitals for excellent cooperation.

Patrik Finne
Administrative Director

Carola Grönhagen-Riska
Chairman of the Board

Board of the Finnish Registry for Kidney Diseases

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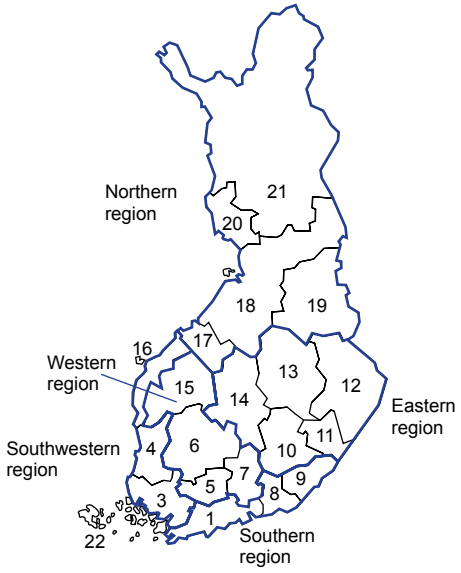
Table 1. The Finnish population (as thousands of inhabitants) and its distribution in healthcare districts
Finnish Registry for Kidney Diseases 2004–2014

Healthcare district		Year					Change (%) 2004–2014
		2004	2009	2012	2013	2014	
1	Helsinki-Uusimaa	1435	1514	1563	1581	1599	11.4
3	Varsinais-Suomi	457	466	472	474	476	4.1
4	Satakunta	229	226	225	225	224	–2.4
5	Kanta-Häme	168	174	175	175	175	4.6
6	Pirkanmaa	488	508	518	522	524	7.4
7	Päijät-Häme	210	212	214	213	213	1.4
8	Kymenlaakso	178	176	174	174	173	–3.0
9	Etelä-Karjala	135	133	132	132	132	–2.4
10	Etelä-Savo	110	107	105	104	104	–5.3
11	Itä-Savo	48	46	45	44	44	–8.4
12	Pohjois-Karjala	173	170	169	169	169	–2.4
13	Pohjois-Savo	251	248	248	248	248	–1.1
14	Keski-Suomi	242	247	250	251	251	4.0
15	Etelä-Pohjanmaa	199	198	199	199	198	–0.5
16	Vaasa	162	165	168	169	170	5.0
17	Keski-Pohjanmaa	77	78	78	78	78	1.4
18	Pohjois-Pohjanmaa	379	392	401	404	406	7.1
19	Kainuu	82	79	77	77	76	–7.4
20	Länsi-Pohja	67	65	65	64	64	–4.5
21	Lappi	120	118	118	118	118	–1.4
22	Åland	27	28	29	29	29	9.0
Region	South	1749	1822	1870	1888	1904	8.9
	Southwest	875	885	894	896	898	2.7
	West	1065	1093	1106	1109	1111	4.3
	East	823	818	818	817	816	–0.9
	North	725	733	739	741	742	2.4
Entire country		5237	5351	5427	5451	5472	4.5

Figure 1. Healthcare districts and regions in Finland
Finnish Registry for Kidney Diseases 2014



On 31 December 2014, the population of Finland was 5.472 million (Table 1, Source: Statistics Finland). During the past ten years the population of the country has increased by 4.5%, 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 in Helsinki-Uusimaa, Åland, Pirkanmaa, and Pohjois-Pohjanmaa. In the healthcare districts of Itä-Savo, Kainuu, and Etelä-Savo, 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. Vaasa healthcare district was earlier part of the western region, but has since 1 January 2013 belonged to the southwestern region (Turku University Central Hospital).

Table 2. The Finnish population (as thousands of inhabitants) according to region, age group, and sex
Finnish Registry for Kidney Diseases 2004–2014

Region	2004					2014				
	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 (25)	546 (65)	58 (7)	33 (4)	845 (100)	213 (23)	575 (62)	89 (10)	50 (5)	927 (100)
Women	201 (22)	559 (62)	73 (8)	71 (8)	903 (100)	204 (21)	580 (59)	107 (11)	86 (9)	977 (100)
Total	408 (23)	1106 (63)	130 (7)	104 (6)	1749 (100)	417 (22)	1156 (61)	196 (10)	136 (7)	1904 (100)
Southwest										
Men	102 (24)	263 (62)	37 (9)	25 (6)	427 (100)	98 (22)	258 (58)	52 (12)	34 (8)	442 (100)
Women	97 (22)	258 (58)	44 (10)	49 (11)	448 (100)	93 (20)	252 (55)	56 (12)	55 (12)	456 (100)
Total	199 (23)	522 (60)	80 (9)	74 (8)	875 (100)	192 (21)	510 (57)	108 (12)	88 (10)	898 (100)
West										
Men	126 (24)	323 (62)	44 (8)	28 (5)	521 (100)	124 (23)	320 (59)	63 (11)	39 (7)	546 (100)
Women	121 (22)	312 (57)	54 (10)	58 (11)	545 (100)	119 (21)	311 (55)	70 (12)	66 (12)	565 (100)
Total	246 (23)	635 (60)	98 (9)	86 (8)	1065 (100)	242 (22)	631 (57)	132 (12)	105 (9)	1111 (100)
East										
Men	97 (24)	249 (62)	37 (9)	23 (6)	406 (100)	87 (21)	237 (59)	49 (12)	32 (8)	404 (100)
Women	93 (22)	237 (57)	43 (10)	45 (11)	418 (100)	83 (20)	226 (55)	52 (13)	52 (13)	413 (100)
Total	189 (23)	486 (59)	80 (10)	68 (8)	823 (100)	170 (21)	463 (57)	100 (12)	83 (10)	816 (100)
North										
Men	97 (27)	220 (61)	29 (8)	17 (5)	364 (100)	93 (25)	216 (58)	39 (10)	25 (7)	373 (100)
Women	93 (26)	204 (57)	33 (9)	31 (9)	361 (100)	89 (24)	201 (55)	40 (11)	39 (10)	369 (100)
Total	189 (26)	425 (59)	62 (9)	49 (7)	725 (100)	182 (25)	417 (56)	79 (11)	64 (9)	742 (100)
Entire country										
Men	629 (25)	1602 (63)	204 (8)	127 (5)	2562 (100)	615 (23)	1607 (60)	291 (11)	179 (7)	2692 (100)
Women	603 (23)	1571 (59)	247 (9)	254 (9)	2675 (100)	588 (21)	1570 (56)	324 (12)	297 (11)	2780 (100)
Total	1233 (24)	3173 (61)	451 (9)	380 (7)	5237 (100)	1203 (22)	3177 (58)	615 (11)	476 (9)	5472 (100)

Table 2 shows the age and sex distribution of the Finnish population at the end of 2004 and 2014. At the end of 2014, 20% of the Finnish inhabitants were older than 65 years. In 2004, this proportion was 16%. In the southern region, the proportion of inhabitants older than 65 years was the smallest, 17%, whereas in the other regions it was 19–22%. The proportion of inhabitants aged 20–64 years was largest in the southern region, 61%, while it was 57% in the other regions. In the northern region, the proportion of inhabitants younger than 20 years was the largest, 25%.

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 11%.

Table 3. Number of new RRT patients and incidence of RRT by healthcare district and region
Finnish Registry for Kidney Diseases 2004–2014

Healthcare district		Number of new RRT patients						Incidence of RRT/million inhabitants					
		2004	2009	2012	2013	2014	2010–2014 on average	2004	2009	2012	2013	2014	2010–2014 on average
1	Helsinki-Uusimaa	109	108	114	135	120	120	76	71	73	85	75	77
3	Varsinais-Suomi	46	32	45	37	49	40	101	69	95	78	103	86
4	Satakunta	26	25	23	18	20	20	113	111	102	80	89	90
5	Kanta-Häme	21	17	15	22	26	22	125	98	85	125	148	128
6	Pirkanmaa	46	55	45	58	50	49	94	108	87	111	95	95
7	Päijät-Häme	29	14	13	15	23	18	138	66	61	70	108	86
8	Kymenlaakso	15	13	16	7	16	13	84	74	92	40	93	73
9	Etelä-Karjala	20	13	12	16	7	14	148	98	91	121	53	106
10	Etelä-Savo	5	14	5	5	8	7	46	131	48	48	77	65
11	Itä-Savo	3	9	7	7	2	5	62	196	156	158	45	116
12	Pohjois-Karjala	24	15	7	18	11	13	139	88	41	106	65	74
13	Pohjois-Savo	23	25	34	26	21	27	92	101	137	105	85	109
14	Keski-Suomi	26	17	23	16	19	20	108	69	92	64	76	81
15	Etelä-Pohjanmaa	12	16	21	12	19	19	60	81	106	60	96	95
16	Vaasa	20	15	12	22	7	14	124	91	71	130	41	86
17	Keski-Pohjanmaa	12	15	9	9	11	8	155	193	115	115	140	105
18	Pohjois-Pohjanmaa	38	26	30	39	30	31	100	66	75	97	74	77
19	Kainuu	18	5	6	11	9	7	219	63	77	143	118	96
20	Länsi-Pohja	4	6	2	7	8	5	60	92	31	109	126	78
21	Lappi	11	7	8	8	5	8	92	59	68	68	42	71
22	Åland	0	3	5	3	0	3	0	108	175	105	0	99
Region	South	144	134	142	158	143	147	82	74	76	84	75	78
	Southwest	92	75	85	80	76	78	105	85	95	89	85	87
	West	108	102	94	107	118	109	101	93	85	96	106	98
	East	81	80	76	72	61	72	98	98	93	88	75	88
	North	83	59	55	74	63	60	115	80	74	100	85	81
Entire country		508	450	452	491	461	465	97	84	83	90	84	86
	Children <15 y	7	6	8	8	11	8	8	7	9	9	12	9

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 2014 was somewhat smaller than in 2013 and 2012, but at the same level as in 2012 and 2009. In 2014, the incidence was 13% lower than in 2004.

In 2010–2014, 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 2010–2014 was lowest in Etelä-Savo (65 new RRT patients per million inhabitants) and highest in Kanta-Häme (128/million inhabitants).

Table 4. Number of new RRT patients by age group in healthcare districts and regions
Finnish Registry for Kidney Diseases 2010–2014

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	3.4	17.4	49.2	28.8	21.0	119.8	10	31	118	205	220	77
3	Varsinais-Suomi	1.0	4.4	15.4	12.0	7.6	40.4	10	30	118	234	177	86
4	Satakunta	0.4	2.0	7.8	5.6	4.4	20.2	8	33	119	205	188	90
5	Kanta-Häme	0.4	2.2	8.6	5.6	5.6	22.4	10	45	170	288	342	128
6	Pirkanmaa	1.4	6.0	19.8	11.0	11.0	49.2	12	36	143	205	247	95
7	Päijät-Häme	0.2	2.8	6.2	5.2	4.0	18.4	4	47	99	199	202	86
8	Kymenlaakso	0.0	2.4	4.4	3.8	2.2	12.8	0	51	84	176	122	73
9	Etelä-Karjala	0.6	1.4	4.8	4.8	2.4	14.0	23	39	121	298	169	106
10	Etelä-Savo	0.0	0.2	2.2	2.4	2.0	6.8	0	8	67	176	167	65
11	Itä-Savo	0.0	1.0	1.0	2.4	0.8	5.2	0	95	70	391	144	116
12	Pohjois-Karjala	0.2	1.6	5.2	4.0	1.6	12.6	6	35	100	204	94	74
13	Pohjois-Savo	0.6	5.0	11.0	8.0	2.4	27.0	11	72	149	293	98	109
14	Keski-Suomi	0.6	2.6	8.2	5.8	3.0	20.2	11	33	121	225	141	81
15	Etelä-Pohjanmaa	1.2	1.4	7.2	4.4	4.6	18.8	26	26	128	205	228	95
16	Vaasa	0.6	1.0	4.2	4.4	4.2	14.4	15	19	98	250	262	86
17	Keski-Pohjanmaa	0.6	1.0	2.8	2.4	1.4	8.2	30	45	134	291	199	105
18	Pohjois-Pohjanmaa	0.6	5.6	10.8	8.6	5.4	31.0	6	44	105	247	190	77
19	Kainuu	0.0	0.8	2.8	2.4	1.4	7.4	0	41	114	260	171	96
20	Länsi-Pohja	0.0	0.8	2.0	1.2	1.0	5.0	0	47	102	168	161	77
21	Lappi	0.2	1.0	3.2	2.2	1.8	8.4	8	31	86	170	165	71
22	Åland	0.0	0.0	1.6	1.0	0.2	2.8	0	0	198	321	83	98
Region	South	4.0	21.2	58.4	37.4	25.6	147	10	33	115	210	200	78
	Southwest	2.0	7.4	29.0	23.0	16.4	78	10	28	117	232	193	87
	West	3.2	12.4	41.8	26.2	25.2	109	13	38	136	217	250	98
	East	1.4	10.4	27.6	22.6	9.8	72	8	45	114	244	122	88
	North	1.4	9.2	21.6	16.8	11.0	60	8	42	105	232	181	81
Entire country		12	61	178	126	88	465	10	36	118	224	194	86

*Average annual incidence of RRT in subgroup

Table 4 presents the average annual number of new RRT patients and incidence of RRT in 2010–2014 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 194 new RRT patients per million age-related inhabitants and varied in healthcare districts in the range of 83–342 and in regions in the range of 122–250. In small healthcare districts, chance may cause great variation in incidence of RRT in age groups. The incidence of RRT among inhabitants older than 75 years was considerably smaller in Finland than in the other Nordic countries, in which it ranged between 362 and 430 new RRT patients per million age-related inhabitants (Annual Report 2013, http://www.era-edta-reg.org).

Table 5. Number of new RRT patients by age group and sex
Finnish Registry for Kidney Diseases 2004–2014

Age group		Number of new RRT patients					Incidence of RRT/million inhabitants				
		2004	2009	2012	2013	2014	2004	2009	2012	2013	2014
0–19 y	Males	9	6	7	12	9	14	10	11	19	15
	Females	6	3	2	2	5	10	5	3	3	8
	Total	15	9	9	14	14	12	7	7	12	12
20–44 y	Males	65	42	39	42	40	75	49	45	49	46
	Females	25	23	20	23	24	30	28	24	28	29
	Total	90	65	59	65	64	53	39	35	39	38
45–64 y	Males	114	123	119	126	139	156	160	158	169	189
	Females	83	62	51	59	51	113	80	67	78	69
	Total	197	185	170	185	190	134	120	112	123	128
65–74 y	Males	65	78	86	89	79	319	348	324	319	271
	Females	51	40	29	49	31	207	154	97	156	96
	Total	116	118	115	138	110	257	244	203	233	179
≥75 y	Males	56	49	64	62	53	442	323	385	359	296
	Females	34	24	35	27	30	134	87	122	93	101
	Total	90	73	99	89	83	237	171	219	192	174
Total	Males	309	298	315	331	320	121	114	118	123	119
	Females	199	152	137	160	141	74	56	50	58	51
	Total	508	450	452	491	461	97	84	83	90	84

Table 5 shows the number of new RRT patients and the incidence of RRT according to age group and sex in 2004–2014. 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 65 years and older, the incidence in 2014 was 29% lower than in 2004. The annual number of new RRT patients older than 65 years was only 6% smaller than in 2004, but the population in this age group has increased by 31%, explaining the decreased incidence. In the age group 45–64 years, the incidence has remained virtually unchanged in recent years.

Figure 2. Standardized incidence of RRT in regions
Finnish Registry for Kidney Diseases 2004–2014

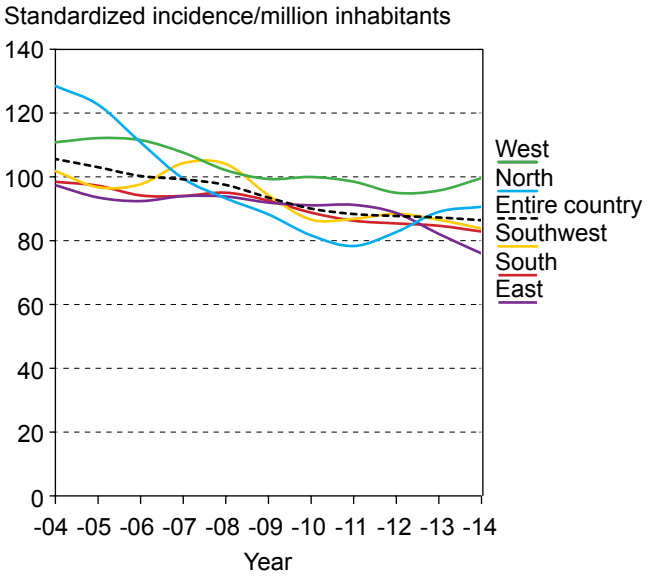


Figure 3. Standardized incidence of RRT in regions
90 days after the start of RRT
Finnish Registry for Kidney Diseases 2004–2014

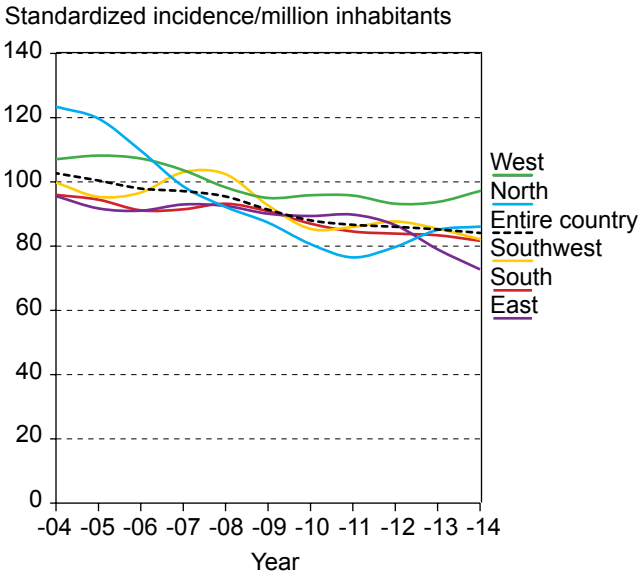
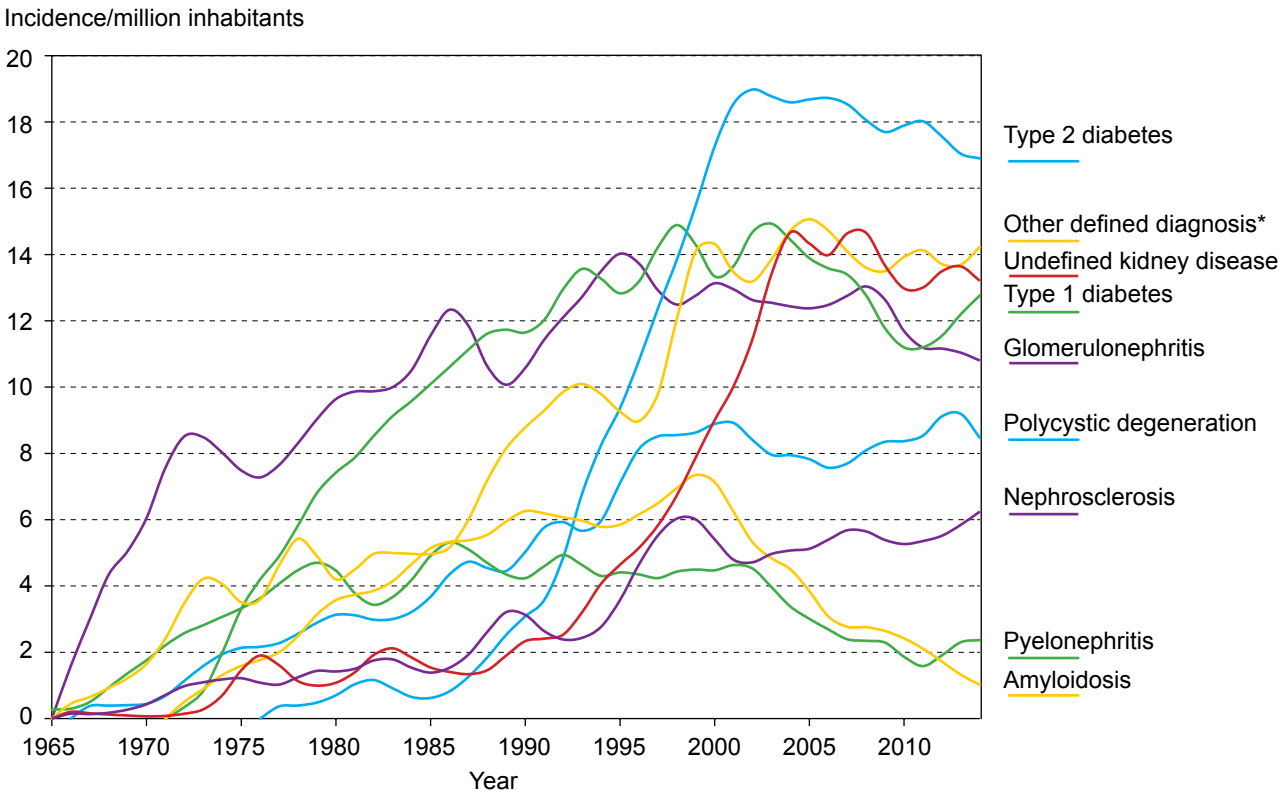


Figure 2 shows the regional incidence of RRT (i.e. dialysis and kidney transplantation) in 2004–2014 as smoothed averages. The incidence rates are age- and sex-standardized using the Finnish general population on 31 December 2014 as the reference population. Population changes in 2004–2014 have been taken into consideration. Standardization removes the effect of age and sex on regional differences in incidence rates. Nationwide, the standardized incidence has declined during 2004–2014. Regional differences in standardized incidence are small.

Figure 3 shows the age- and sex-standardized regional incidence of RRT 90 days after the start of RRT. The Finnish Registry for Kidney Diseases does not store data on patients who have regained renal function within 90 days from start of RRT because in that case RRT is not considered chronic. However, the registry does store information on patients who died or moved abroad within 90 days from start of RRT, but these patients were excluded from Figure 3.

Figure 4. Incidence of RRT according to diagnosis
Finnish Registry for Kidney Diseases 1965–2014



*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 4. 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 or nephrosclerosis has not changed in recent years. The number of amyloidosis patients entering RRT has decreased continuously since 2000.

Table 6. New ERA-EDTA primary renal disease code of patients entering RRT Finnish Registry for Kidney Diseases 2014

New ERA-EDTA code	New ERA-EDTA diagnosis	Number of patients	Primary renal disease, ICD-10	
			Defined	Undefined
2337	Diabetic nephropathy in type 2 diabetes - no histology	60	60	
2316	Diabetic nephropathy in type 1 diabetes - no histology	55	55	
2718	Autosomal dominant (AD) polycystic kidney disease	28	27	1
2359	Chronic hypertensive nephropathy - no histology	23	18	5
3555	Chronic renal failure (CRF) - etiology uncertain - no histology	22	2	20
1128	IgA nephropathy - histologically proven	22	22	
2344	Diabetic nephropathy in type 2 diabetes - histologically proven	18	18	
3749	Glomerulonephritis - no histology	11	4	7
2407	Ischemic nephropathy - no histology	10	7	3
1377	Glomerulonephritis - histologically indeterminate	9	8	1
1897	Tubulointerstitial nephritis - histologically proven	8	8	
1775	Obstructive nephropathy due to prostatic hypertrophy	8	7	1
2363	Chronic hypertensive nephropathy - histologically proven	7	7	
1417	Granulomatosis with polyangiitis - histologically proven	7	7	
3529	Chronic renal failure (CRF) caused by tumor nephrectomy	7	4	3
1035	Congenital nephrotic syndrome (CNS) - Finnish type - no histology	5	5	
1625	Congenital dysplasia / hypoplasia	5	5	
1267	Primary focal segmental glomerulosclerosis (FSGS)	4	4	
1222	Mesangiocapillary glomerulonephritis type 1	4	4	
3419	Acute kidney injury due to sepsis	4	2	2
2578	Myeloma kidney - no histology	3	3	
1752	Acquired obstructive uropathy / nephropathy	3	3	
3474	Renal cell carcinoma - histologically proven	2	2	
2584	Myeloma cast nephropathy - histologically proven	2	2	
1515	Henoch-Schönlein purpura / nephritis - histologically proven	2	2	
2513	AA amyloid secondary to chronic inflammation	2	2	
2521	AL amyloid secondary to plasma cell dyscrasia	2	2	
2385	Malignant hypertensive nephropathy - histologically proven	2	2	
1429	Microscopic polyangiitis - histologically proven	2	2	
1185	Membranous nephropathy - idiopathic	2	2	
2760	Alport syndrome - histologically proven	2	2	
1781	Obstructive nephropathy due to prostate cancer	2	2	
3403	Acute kidney injury due to circulatory failure	2	2	
1768	Acquired obstructive nephropathy due to neurogenic bladder	2	1	1
2328	Diabetic nephropathy in type 1 diabetes - histologically proven	2	2	
1639	Multicystic dysplastic kidneys	2	2	
3564	Chronic renal failure (CRF) - etiology uncertain - histologically proven	1	0	1
3708	Chronic renal failure	1	1	
2392	Ageing kidney - no histology	1	0	1
3461	Kidney tumor	1	1	
2610	Hemolytic uremic syndrome (HUS) - diarrhea associated	1	1	
2623	Atypical hemolytic uremic syndrome (HUS) - diarrhea negative	1	1	
2371	Malignant hypertensive nephropathy - no histology	1	1	
2482	Cardiorenal syndrome	1	0	1
2424	Renal artery stenosis	1	0	1
1396	Systemic vasculitis - ANCA positive - no histology	1	1	
2495	Hepatorenal syndrome	1	1	
3636	Chronic urate nephropathy - no histology	1	1	
1464	Anti-glomerular basement membrane (GBM) disease - no histology	1	1	
1493	Systemic lupus erythematosus / nephritis - histologically proven	1	1	
1116	IgA nephropathy - no histology	1	1	
1349	Mesangial proliferative glomerulonephritis	1	1	
1003	Adult nephrotic syndrome - no histology	1	0	1
1100	Minimal change nephropathy - histologically proven	1	1	
1251	Idiopathic rapidly progressive (crescentic) glomerulonephritis	1	1	
1354	Focal and segmental proliferative glomerulonephritis	1	1	
1809	Obstructive nephropathy due to other malignancies	1	1	
1799	Obstructive nephropathy due to bladder cancer	1	1	
2051	Nephropathy due to ciclosporin - histologically proven	1	0	1
2149	Nephropathy due to lithium - no histology	1	1	
2005	Drug-induced tubulointerstitial nephritis - no histology	1	1	
3426	Acute kidney injury due to rhabdomyolysis	1	1	
3643	Chronic renal failure due to systemic infection	1	0	1
2411	Ischemic nephropathy / microvascular disease - histologically proven	1	1	
1331	Diffuse endocapillary glomerulonephritis	1	1	
2725	Autosomal dominant (AD) polycystic kidney disease type I	1	1	
2739	Autosomal dominant (AD) polycystic kidney disease type II	1	1	
1660	Congenital pelvi-ureteric junction obstruction	1	1	
1673	Congenital vesico-ureteric junction obstruction	1	1	
1687	Posterior urethral valves	1	1	
ERA-EDTA diagnosis was not reported		76	59	17
Total		461	393	68

For patients who entered RRT in 2014 or later, the Finnish Registry for Kidney Diseases collects information on kidney disease using the new primary renal disease (PRD) code of ERA-EDTA (Venkat-Raman et al., Nephrol Dial Transplant 2012;27:4414–4419) in addition to the ICD-10 code. The new code is usually more specific than the ICD-10 code and also contains information on degree of diagnostic verification. Of the 461 patients who entered RRT in 2014, the new PRD code was reported for 385 (84%) (Table 6).

Currently, 273 ERA-EDTA PRD codes are available (www.era-edta-reg.org/prd.jsp). For patients who entered RRT in 2014, a total of 70 different codes were used; the most frequent ones are listed first in Table 6.

Of the 385 patients who had an ERA-EDTA PRD diagnosis, 51 (13%) had an undefined ICD-10 diagnosis (N18 or N19). Of these 51 patients, 22 had undefined kidney disease also according to the ERA-EDTA PRD code, but 29 had a more specific ERA-EDTA PRD code.

The ERA-EDTA PRD code is new and not all centers reported it for all patients entering RRT in 2014. Eight healthcare districts reported the ERA-EDTA PRD code for all patients entering RRT in 2014, six districts for 80–99% of patients, and seven districts for 14–62% of patients.

Table 7. 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 2010–2014

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	54 (9)	94 (16)	48 (8)	365 (62)	21 (4)	7 (1)	589 (100)
3	Varsinais-Suomi	49 (25)	34 (17)	0 (0)	106 (54)	8 (4)	1 (1)	198 (100)
4	Satakunta	29 (29)	10 (10)	0 (0)	58 (59)	2 (2)	0 (0)	99 (100)
5	Kanta-Häme	5 (5)	29 (28)	0 (0)	64 (61)	5 (5)	2 (2)	105 (100)
6	Pirkanmaa	30 (12)	39 (16)	2 (1)	173 (71)	0 (0)	1 (0)	245 (100)
7	Päijät-Häme	18 (20)	6 (7)	0 (0)	68 (74)	0 (0)	0 (0)	92 (100)
8	Kymenlaakso	4 (6)	15 (23)	2 (3)	43 (67)	0 (0)	0 (0)	64 (100)
9	Etelä-Karjala	1 (1)	7 (10)	3 (4)	55 (82)	0 (0)	1 (1)	67 (100)
10	Etelä-Savo	4 (13)	0 (0)	0 (0)	25 (81)	2 (6)	0 (0)	31 (100)
11	Itä-Savo	1 (4)	1 (4)	0 (0)	20 (77)	4 (15)	0 (0)	26 (100)
12	Pohjois-Karjala	8 (14)	13 (22)	0 (0)	37 (63)	1 (2)	0 (0)	59 (100)
13	Pohjois-Savo	6 (5)	32 (24)	14 (11)	76 (57)	3 (2)	2 (2)	133 (100)
14	Keski-Suomi	9 (9)	16 (16)	1 (1)	71 (72)	1 (1)	1 (1)	99 (100)
15	Etelä-Pohjanmaa	19 (22)	7 (8)	0 (0)	56 (64)	4 (5)	1 (1)	87 (100)
16	Vaasa	6 (8)	8 (11)	0 (0)	56 (78)	2 (3)	0 (0)	72 (100)
17	Keski-Pohjanmaa	3 (8)	1 (3)	0 (0)	31 (78)	5 (13)	0 (0)	40 (100)
18	Pohjois-Pohjanmaa	14 (9)	24 (16)	1 (1)	102 (67)	8 (5)	3 (2)	152 (100)
19	Kainuu	8 (24)	8 (24)	0 (0)	17 (50)	1 (3)	0 (0)	34 (100)
20	Länsi-Pohja	6 (24)	5 (20)	0 (0)	4 (16)	10 (40)	0 (0)	25 (100)
21	Lappi	13 (33)	1 (3)	0 (0)	25 (64)	0 (0)	0 (0)	39 (100)
22	Åland	0 (0)	0 (0)	0 (0)	14 (100)	0 (0)	0 (0)	14 (100)
Region	South	59 (8)	116 (16)	53 (7)	463 (64)	21 (3)	8 (1)	720 (100)
	Southwest	84 (22)	52 (14)	0 (0)	234 (61)	12 (3)	1 (0)	383 (100)
	West	72 (14)	81 (15)	2 (0)	361 (68)	9 (2)	4 (1)	529 (100)
	East	28 (8)	62 (18)	15 (4)	229 (66)	11 (3)	3 (1)	348 (100)
	North	44 (15)	39 (13)	1 (0)	179 (62)	24 (8)	3 (1)	290 (100)
Entire country		287 (13)	350 (15)	71 (3)	1466 (65)	77 (3)	19 (1)	2270 (100)

Table 7 presents the number of RRT patients at 90 days from start of RRT in 2010–2014 according to type of treatment in healthcare districts and regions. Of the 2270 patients, only 19 (0.8%) had received a kidney graft (Tx), 28% were on continuous ambulatory or automatic peritoneal dialysis (CAPD or APD), 3% were on home hemodialysis (home HD), and 68% were on either in-center hemodialysis (in-center HD) or hemodiafiltration (HDF).

Figure 5. International comparison of incidence of RRT in 2013
Finnish Registry for Kidney Diseases 2013

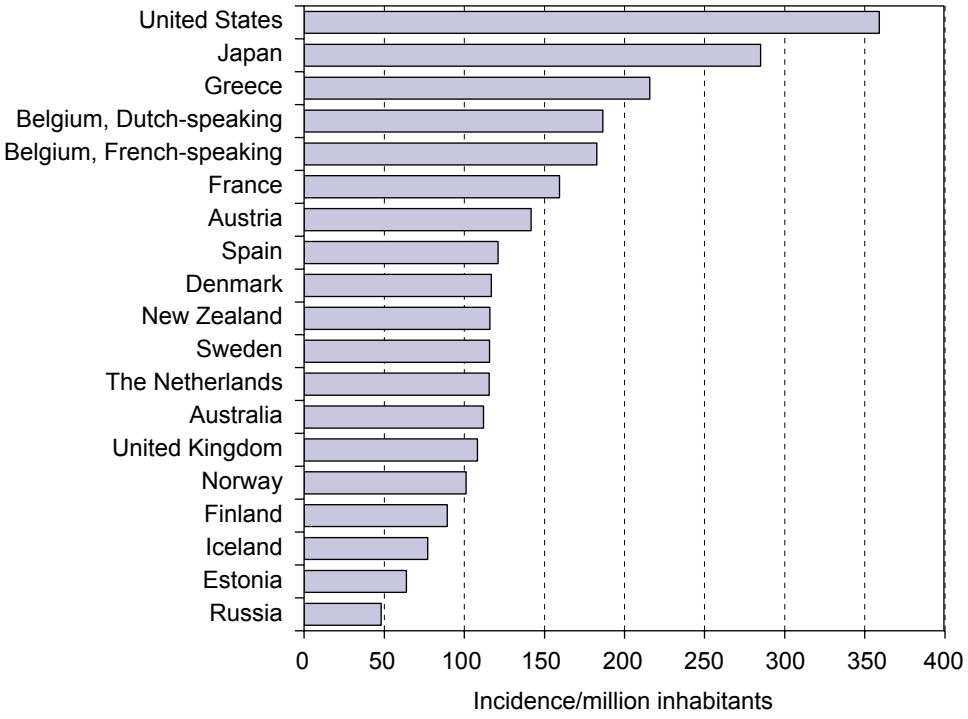


Figure 5 shows the incidence of RRT in 2013 in countries reporting to the ERA-EDTA Registry (Annual Report 2013, http://www.era-edta-reg.org) and in the United States, Australia, New Zealand, and Japan (The 2015 USRDS Annual Data Report Atlas, http://www.usrds.org). In 2013, the incidence of RRT in Finland was the second lowest among the Nordic countries. Relative to Finland, the incidence in Denmark was 31% higher, in Sweden 30% higher, in Norway 13% higher, and in Iceland 13% lower.

Table 8. Patients on RRT at end of year according to healthcare district and region
Finnish Registry for Kidney Diseases 2004–2014

Healthcare district		Number of RRT patients					Prevalence of RRT/million inhabitants				
		2004	2009	2012	2013	2014	2004	2009	2012	2013	2014
1	Helsinki-Uusimaa	961	1093	1190	1251	1268	670	722	761	791	793
3	Varsinais-Suomi	345	392	411	423	427	754	841	871	892	897
4	Satakunta	202	236	227	214	214	881	1044	1009	953	955
5	Kanta-Häme	110	130	145	148	162	656	748	826	843	924
6	Pirkanmaa	351	432	446	462	469	719	851	861	886	894
7	Päijät-Häme	143	172	175	172	183	681	810	820	806	859
8	Kymenlaakso	102	144	140	133	134	572	820	802	765	775
9	Etelä-Karjala	117	140	152	156	149	867	1051	1148	1180	1131
10	Etelä-Savo	65	90	87	89	87	592	845	830	852	838
11	Itä-Savo	36	46	50	55	49	749	1003	1114	1238	1112
12	Pohjois-Karjala	123	140	132	131	133	711	824	779	775	787
13	Pohjois-Savo	224	228	245	249	254	892	919	987	1002	1023
14	Keski-Suomi	136	149	169	165	174	563	603	675	658	693
15	Etelä-Pohjanmaa	101	114	138	127	130	507	574	694	639	656
16	Vaasa	95	106	117	134	133	588	641	696	794	784
17	Keski-Pohjanmaa	46	61	60	62	62	595	783	767	792	791
18	Pohjois-Pohjanmaa	244	276	284	294	310	644	703	708	729	764
19	Kainuu	61	63	60	63	68	742	795	775	821	893
20	Länsi-Pohja	46	68	53	56	59	691	1040	820	872	928
21	Lappi	80	74	84	84	78	668	625	711	710	660
22	Åland	15	23	30	28	25	565	829	1053	977	865
Region	South	1180	1377	1482	1540	1551	675	756	793	816	815
	Southwest	657	757	785	799	799	751	855	878	892	889
	West	705	848	904	909	944	662	776	817	819	850
	East	584	653	683	689	697	709	799	835	843	854
	North	477	542	541	559	577	658	739	732	754	778
Entire country		3603	4177	4395	4496	4568	688	781	810	825	835

Table 8 presents the number of RRT patients and the prevalence of RRT on 31 December 2004–2014. In the entire country, the prevalence at the end of 2014 was 835 RRT patients per million inhabitants; it had increased by 21% from 2004 and by 7% from 2009. On 31 December 2014, the prevalence was the highest in the southwestern region and the lowest in the northern region. In the healthcare districts, the prevalence varied between 656 and 1131 patients per million inhabitants.

Table 9. Patients on RRT according to age group and sex
Finnish Registry for Kidney Diseases 2004–2014

Age group		Number of RRT patients					Prevalence of RRT/million inhabitants				
		2004	2009	2012	2013	2014	2004	2009	2012	2013	2014
0–19 y	Males	82	68	65	66	70	130	109	105	107	114
	Females	51	51	52	48	50	85	85	88	81	85
	Total	133	119	117	114	120	108	97	97	94	100
20–44 y	Males	460	457	411	418	427	528	533	476	483	491
	Females	293	273	245	240	239	350	333	299	292	289
	Total	753	730	656	658	666	441	435	390	390	393
45–64 y	Males	1014	1225	1226	1226	1228	1387	1596	1628	1643	1665
	Females	629	725	720	730	722	856	937	947	970	971
	Total	1643	1950	1946	1956	1950	1121	1265	1286	1305	1317
65–74 y	Males	400	540	692	737	747	1961	2413	2606	2642	2566
	Females	291	325	372	394	411	1180	1252	1241	1258	1267
	Total	691	865	1064	1131	1158	1534	1790	1882	1910	1881
≥75 y	Males	220	312	388	408	441	1737	2059	2334	2362	2465
	Females	163	201	224	229	233	642	729	781	785	785
	Total	383	513	612	637	674	1007	1201	1351	1372	1416
Total	Males	2176	2602	2782	2855	2913	849	991	1043	1065	1082
	Females	1427	1575	1613	1641	1655	534	578	584	592	595
	Total	3603	4177	4395	4496	4568	688	781	810	825	835

Figure 6. Standardized prevalence of RRT in regions
Finnish Registry for Kidney Diseases 2004–2014

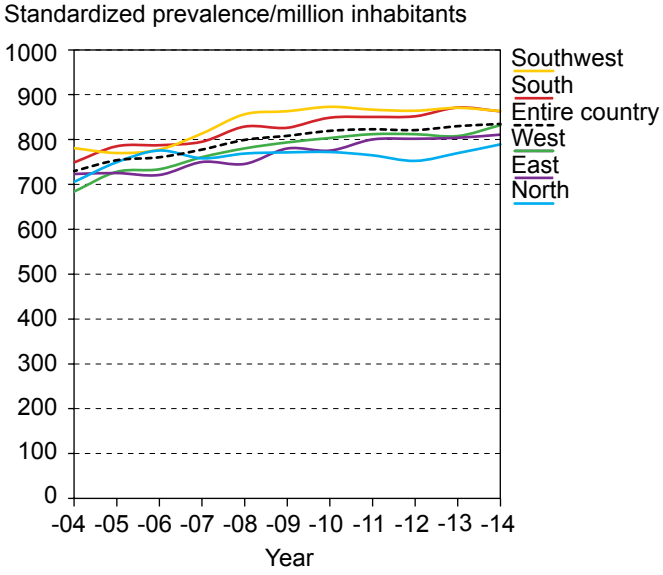
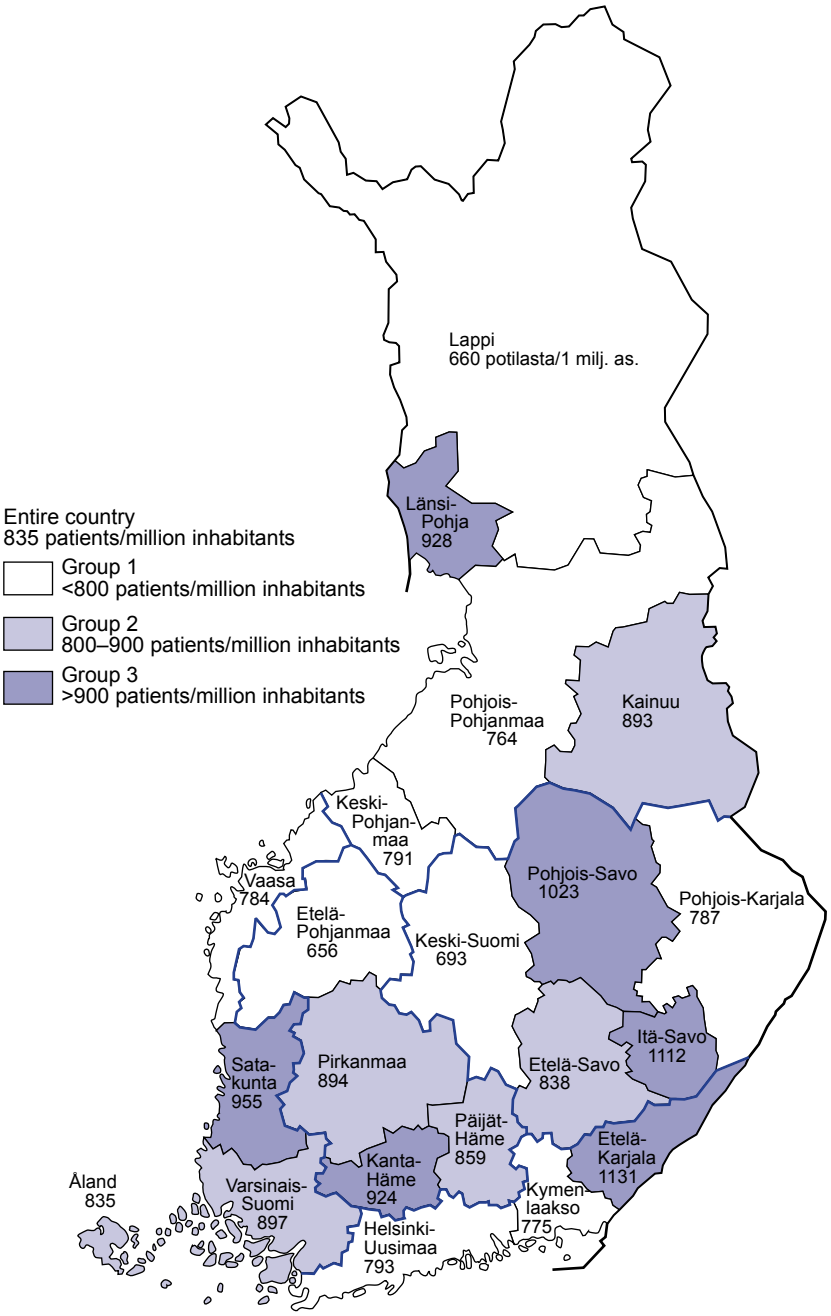


Table 9 shows the number of RRT patients and the prevalence of RRT on 31 December 2004–2014 according to age group and sex. The prevalence has increased by 21% since 2004. In the age group 75 years and older, the prevalence of RRT has increased by 61%. In 45–74-year-olds, the prevalence has increased by 17%. In the younger age groups, the prevalence has somewhat decreased during the past ten years. The highest prevalence, observed among men aged 65–74 years at the end of 2014, was 2566 cases per million age-related inhabitants. At the end of 2014, the prevalence was 82% 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 2004–2014 using the Finnish general population on 31 December 2014 as the reference population. Population changes during this period have been taken into consideration. The standardized prevalence rates have not increased in recent years.

Figure 7. Prevalence of RRT on 31 December 2014
Finnish Registry for Kidney Diseases 2014



The healthcare districts shown on the map are grouped according to the prevalence of RRT at the end of 2014 (Figure 7). The prevalence per million inhabitants was <800 in nine districts, 800–900 in six districts, and >900 in six 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 1965–2014

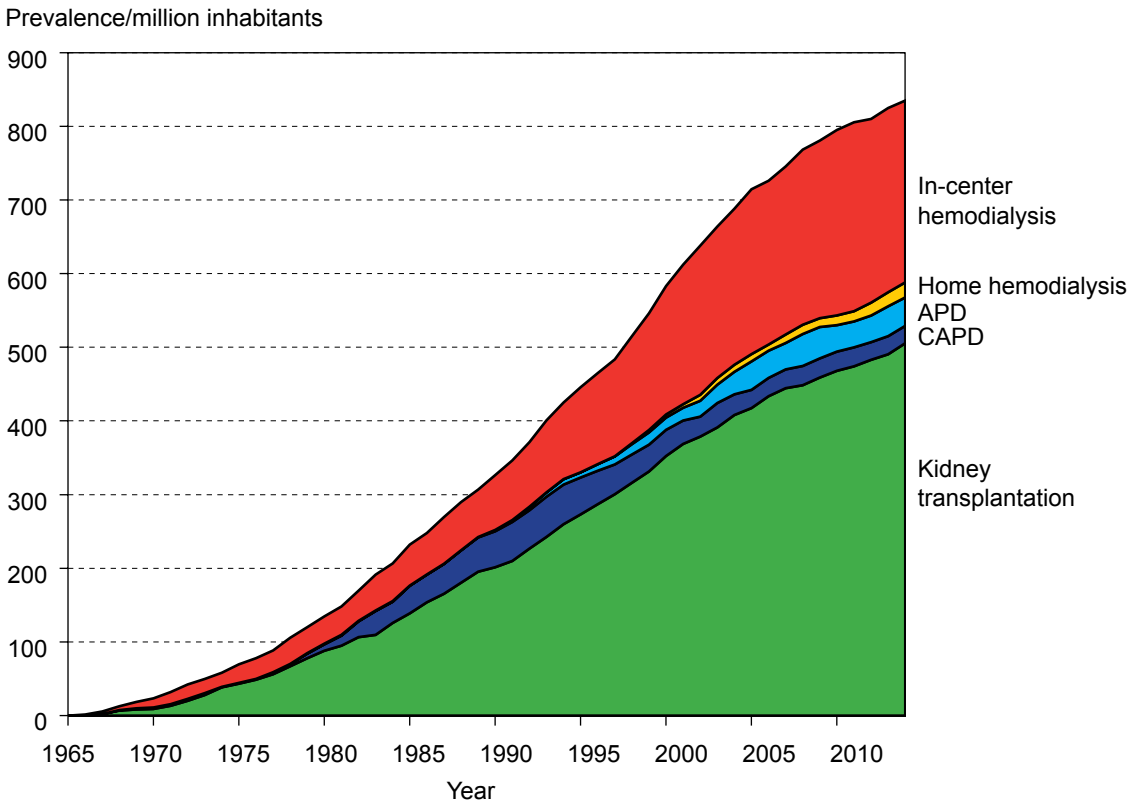


Figure 8 displays the prevalence of RRT according to treatment type. The prevalence of kidney transplantation has shown a continuous increase in the last decade, 24% in total. The number of in-center hemodialysis patients has not increased in the past five years. The number of patients on peritoneal dialysis has also remained virtually unchanged for decades, but the proportion of automated peritoneal dialysis (APD) has increased while that of continuous ambulatory peritoneal dialysis (CAPD) has decreased. The number of home hemodialysis patients has increased by 71% during the past five years.

Table 10. Prevalence of dialysis and kidney transplantation in healthcare districts and regions
Finnish Registry for Kidney Diseases 2004–2014

Healthcare district		Number of dialysis patients/ million inhabitants					Number of kidney transplantation patients/ million inhabitants				
		2004	2009	2012	2013	2014	2004	2009	2012	2013	2014
1	Helsinki-Uusimaa	263	278	280	300	287	406	444	481	491	506
3	Varsinais-Suomi	319	326	356	359	374	435	515	515	534	523
4	Satakunta	379	425	387	370	362	501	619	622	583	594
5	Kanta-Häme	370	426	399	359	416	286	322	427	484	508
6	Pirkanmaa	297	376	359	380	379	422	474	502	506	515
7	Päijät-Häme	328	330	318	300	347	352	480	501	506	512
8	Kymenlaakso	213	399	424	408	416	359	422	378	357	359
9	Etelä-Karjala	430	518	506	484	440	437	533	642	696	691
10	Etelä-Savo	164	310	324	316	289	428	535	506	536	549
11	Itä-Savo	250	480	423	563	409	499	523	691	675	704
12	Pohjois-Karjala	277	306	283	284	302	433	518	496	491	486
13	Pohjois-Savo	335	363	403	390	362	558	556	584	612	660
14	Keski-Suomi	232	226	304	263	263	331	376	371	395	430
15	Etelä-Pohjanmaa	161	227	342	317	318	346	348	352	322	338
16	Vaasa	260	230	262	332	295	328	411	434	462	489
17	Keski-Pohjanmaa	285	385	345	332	332	310	398	422	460	459
18	Pohjois-Pohjanmaa	264	278	264	297	301	380	425	444	431	463
19	Kainuu	304	341	245	287	276	438	454	529	534	617
20	Länsi-Pohja	240	597	402	498	550	450	444	418	374	377
21	Lappi	200	220	288	279	245	467	406	423	431	415
22	Åland	151	397	526	453	242	415	433	526	523	622
Region	South	271	307	310	323	309	404	448	483	493	505
	Southwest	319	335	351	359	352	432	520	527	532	538
	West	289	348	354	350	368	373	428	463	470	482
	East	265	309	339	329	312	444	489	496	514	541
	North	258	315	287	314	314	400	424	445	440	464
Entire country		280	322	327	334	329	408	459	483	491	506

Table 10 presents the prevalence of dialysis and kidney transplantation per million inhabitants in healthcare districts and regions in 2004–2014. The prevalence of dialysis has increased by 18% and that of kidney transplantation by 24% during the past ten years. At the end of 2014, the prevalence of dialysis varied between 242 and 550 and that of kidney transplantation between 338 and 704 per million inhabitants. In regions, the prevalence of dialysis varied between 313 and 359 and that of kidney transplantation between 440 and 534 per million inhabitants.

Table 11. Number of RRT patients at end of year according to type of treatment in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014

Healthcare district		Number of patients on 31 December 2014 (%)						
		CAPD	APD	Home HD	In-center HD	HDF	Tx	Total
1	Helsinki-Uusimaa	31 (2)	48 (4)	57 (4)	246 (19)	77 (6)	809 (64)	1268 (100)
3	Varsinais-Suomi	28 (7)	34 (8)	7 (2)	56 (13)	53 (12)	249 (58)	427 (100)
4	Satakunta	10 (5)	10 (5)	2 (1)	44 (21)	15 (7)	133 (62)	214 (100)
5	Kanta-Häme	1 (1)	9 (6)	1 (1)	42 (26)	20 (12)	89 (55)	162 (100)
6	Pirkanmaa	17 (4)	19 (4)	5 (1)	118 (25)	40 (9)	270 (58)	469 (100)
7	Päijät-Häme	6 (3)	10 (5)	2 (1)	52 (28)	4 (2)	109 (60)	183 (100)
8	Kymenlaakso	2 (1)	11 (8)	6 (4)	46 (34)	7 (5)	62 (46)	134 (100)
9	Etelä-Karjala	1 (1)	6 (4)	6 (4)	14 (9)	31 (21)	91 (61)	149 (100)
10	Etelä-Savo	3 (3)	1 (1)	2 (2)	20 (23)	4 (5)	57 (66)	87 (100)
11	Itä-Savo	0 (0)	1 (2)	0 (0)	0 (0)	17 (35)	31 (63)	49 (100)
12	Pohjois-Karjala	6 (5)	6 (5)	0 (0)	19 (14)	20 (15)	82 (62)	133 (100)
13	Pohjois-Savo	2 (1)	9 (4)	14 (6)	46 (18)	19 (7)	164 (65)	254 (100)
14	Keski-Suomi	3 (2)	4 (2)	2 (1)	32 (18)	25 (14)	108 (62)	174 (100)
15	Etelä-Pohjanmaa	6 (5)	13 (10)	0 (0)	13 (10)	31 (24)	67 (52)	130 (100)
16	Vaasa	1 (1)	4 (3)	3 (2)	20 (15)	22 (17)	83 (62)	133 (100)
17	Keski-Pohjanmaa	0 (0)	1 (2)	0 (0)	10 (16)	15 (24)	36 (58)	62 (100)
18	Pohjois-Pohjanmaa	0 (0)	16 (5)	3 (1)	64 (21)	39 (13)	188 (61)	310 (100)
19	Kainuu	5 (7)	3 (4)	0 (0)	11 (16)	2 (3)	47 (69)	68 (100)
20	Länsi-Pohja	2 (3)	2 (3)	1 (2)	1 (2)	29 (49)	24 (41)	59 (100)
21	Lappi	5 (6)	4 (5)	1 (1)	15 (19)	4 (5)	49 (63)	78 (100)
22	Åland	0 (0)	0 (0)	0 (0)	4 (16)	3 (12)	18 (72)	25 (100)
Region	South	34 (2)	65 (4)	69 (4)	306 (20)	115 (7)	962 (62)	1551 (100)
	Southwest	39 (5)	48 (6)	12 (2)	124 (16)	93 (12)	483 (60)	799 (100)
	West	30 (3)	51 (5)	8 (1)	225 (24)	95 (10)	535 (57)	944 (100)
	East	14 (2)	21 (3)	18 (3)	117 (17)	85 (12)	442 (63)	697 (100)
	North	12 (2)	26 (5)	5 (1)	101 (18)	89 (15)	344 (60)	577 (100)
Entire country		129 (3)	211 (5)	112 (2)	873 (19)	477 (10)	2766 (61)	4568 (100)

Table 11 presents the number of RRT patients according to type of treatment in healthcare districts and regions at the end of 2014. The proportion of peritoneal dialysis patients was the greatest in the healthcare districts of Varsinais-Suomi and Etelä-Pohjanmaa, where 15% of all RRT patients were receiving either continuous ambulatory peritoneal dialysis (CAPD) or automatic peritoneal dialysis (APD). The proportion of patients on home hemodialysis (home HD) was largest, 6%, in the healthcare district of Pohjois-Savo. The proportion of kidney transplantation patients varied between 41% and 72% in the healthcare districts (P=0.004 in age- and gender-adjusted analysis using binary logistic regression). The difference between regions was not significant (P=0.057).

Of all RRT patients, 25% were on home dialysis (CAPD, APD, or home HD) at the end of 2014. The proportion of home dialysis was higher than 30% in four healthcare districts (Varsinais-Suomi, Kainuu, Lappi, and Etelä-Pohjanmaa) and lower than 15% in three healthcare districts.

Figure 9. International comparison of prevalence of RRT on 31 December 2013
Finnish Registry for Kidney Diseases 2013

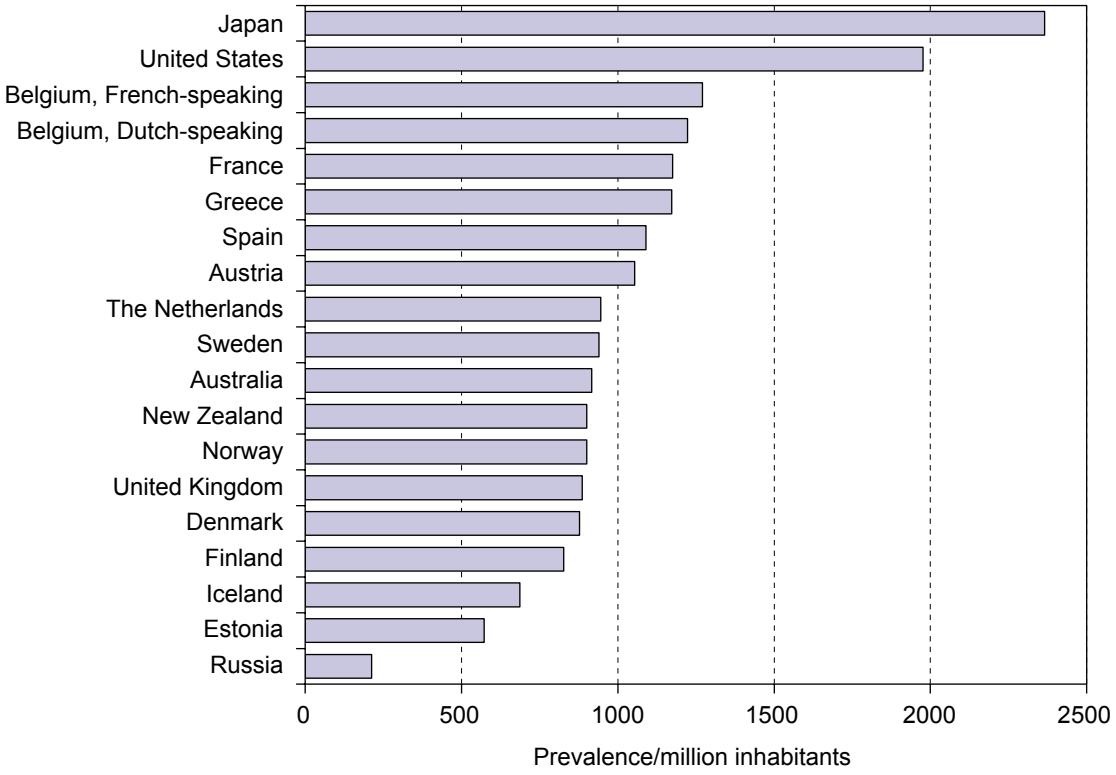


Figure 9 displays the prevalence of RRT on 31 December 2013 in countries reporting to the ERA-EDTA Registry (Annual Report 2013, http://www.era-edta-reg.org) and in the United States, Australia, New Zealand, and Japan (The 2015 USRDS Annual Data Report Atlas, http://www.usrds.org). The prevalence rate 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 9% higher, and in Denmark 6% higher. Figure 5 shows the international incidence rates.

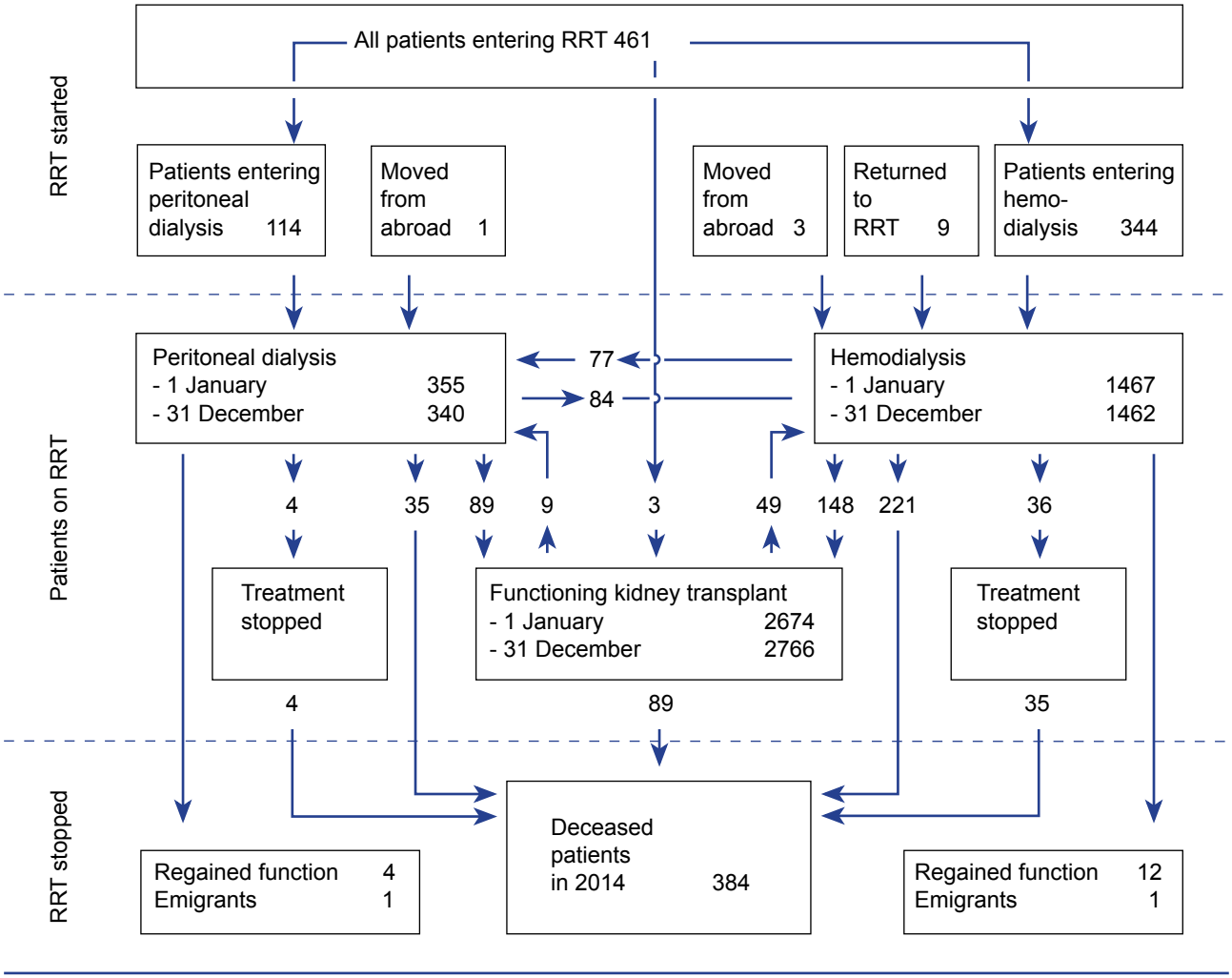
Table 12. Number of patient-years of all RRT patients according to diagnosis and type of treatment Finnish Registry for Kidney Diseases 2004–2014

Diagnosis	Number of patient-years in 2004 (%)				Number of patient-years in 2014 (%)			
	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total
Glomerulonephritis	57 (19.0)	177 (15.6)	592 (28.4)	827 (23.4)	58 (17.0)	226 (15.3)	714 (26.2)	999 (22.0)
Type 1 diabetes	91 (30.1)	115 (10.1)	407 (19.5)	613 (17.4)	71 (20.5)	166 (11.3)	484 (17.8)	721 (15.9)
Polycystic degeneration	11 (3.8)	108 (9.5)	324 (15.5)	442 (12.5)	32 (9.3)	150 (10.2)	478 (17.6)	660 (14.5)
Type 2 diabetes	38 (12.5)	228 (20.1)	38 (1.8)	304 (8.6)	39 (11.4)	299 (20.3)	105 (3.9)	443 (9.8)
Undefined kidney disease	23 (7.6)	141 (12.4)	75 (3.6)	239 (6.8)	54 (15.8)	243 (16.5)	140 (5.1)	437 (9.6)
Pyelonephritis	18 (6.1)	69 (6.1)	197 (9.5)	285 (8.1)	13 (3.7)	49 (3.3)	180 (6.6)	242 (5.3)
Nephrosclerosis	21 (6.8)	66 (5.8)	50 (2.4)	137 (3.9)	21 (6.1)	96 (6.5)	86 (3.1)	203 (4.5)
Other systemic diseases	10 (3.5)	53 (4.6)	56 (2.7)	119 (3.4)	12 (3.6)	59 (4.0)	109 (4.0)	180 (4.0)
Urinary tract obstruction	9 (3.0)	30 (2.6)	84 (4.0)	123 (3.5)	12 (3.5)	47 (3.2)	102 (3.7)	160 (3.5)
Congenital diseases	3 (0.9)	17 (1.5)	90 (4.3)	110 (3.1)	5 (1.3)	23 (1.6)	105 (3.9)	133 (2.9)
Other kidney diseases	3 (1.1)	21 (1.9)	27 (1.3)	52 (1.5)	11 (3.1)	43 (2.9)	41 (1.5)	94 (2.1)
Congenital nephrosis, Finnish type	5 (1.5)	2 (0.2)	53 (2.6)	60 (1.7)	2 (0.7)	6 (0.4)	84 (3.1)	92 (2.0)
Amyloidosis	5 (1.7)	69 (6.0)	46 (2.2)	120 (3.4)	6 (1.7)	25 (1.7)	35 (1.3)	66 (1.5)
Tubulointerstitial nephritis	2 (0.7)	14 (1.2)	33 (1.6)	49 (1.4)	1 (0.3)	13 (0.9)	36 (1.3)	50 (1.1)
Malignancies	4 (1.4)	23 (2.0)	4 (0.2)	31 (0.9)	5 (1.4)	25 (1.7)	11 (0.4)	41 (0.9)
Metabolic diseases	1 (0.3)	5 (0.4)	9 (0.4)	15 (0.4)	2 (0.6)	4 (0.3)	13 (0.5)	19 (0.4)
All	302 (100)	1137 (100)	2086 (100)	3525 (100)	343 (100)	1474 (100)	2722 (100)	4540 (100)

Table 12 presents the number of patient-years according to diagnosis of kidney disease and type of treatment in 2004 and 2014. The number of patient-years indicates time spent by patients in RRT during the year. Overall, the number of patient-years has increased by 29% since 2004. The number of patient-years has increased by 14% in peritoneal dialysis, by 30% in hemodialysis, and by 30% in kidney transplantation.

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 2014. 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 due to type 2 diabetes has increased by 46% during the past decade, and in 2014, type 2 diabetes was the most common kidney disease diagnosis among hemodialysis patients. Type 2 diabetes has earlier been a rare cause of end-stage renal disease among kidney transplantation patients, but during the past ten years the number of patient-years has increased threefold. The proportion of patient-years due to amyloidosis has decreased by 45% since 2004, and the number of patient-years due to pyelonephritis has also decreased. The proportion of undefined kidney disease has increased during the past decade and was 9.6% in 2014.

Figure 10. Net changes in type of treatment
Finnish Registry for Kidney Diseases 2014



During 2014 altogether 461 new patients entered RRT (Figure 10), and nine patients returned to RRT. In all, 4496 patients were receiving RRT at the beginning of the year. Altogether 384 patients died and dialysis was discontinued for 16 patients because the patient's own kidney function resumed. Of those who died, 89 had a functioning kidney transplant, 35 were receiving peritoneal dialysis, and 221 were on hemodialysis. During 2014 RRT was discontinued for 40 uremic patients. At the end of 2014, the number of peritoneal dialysis patients was 4% smaller and the number of kidney transplantation patients 3% larger than at the beginning of the year. The number of hemodialysis patients had remained virtually unchanged.

A total of 240 patients received a kidney transplant, which is an all-time record in Finland. Of these patients, 15 received a combined pancreas and kidney transplantation, two a combined liver 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. One kidney transplantation patient moved to Finland from abroad (not shown in Figure 10).

Table 13. Mortality of RRT patients by region
Finnish Registry for Kidney Diseases 2004–2014

Region	Deaths/1000 patient-years						Deaths/1000 patient-years[1)]					
	2004	2009	2012	2013	2014	2010–2014	2004	2009	2012	2013	2014	2010–2014
South	103	80	79	66	80	73	100	78	76	66	79	72
Southwest	81	80	92	78	101	86	77	80	92	77	98	85
West	103	97	91	101	90	98	96	91	91	100	86	95
East	116	78	102	90	76	91	112	76	101	85	72	89
North	118	86	100	105	75	92	110	86	97	100	73	90
Entire country	103	84	90	84	85	86	98	82	89	82	82	84

[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 2004–2014

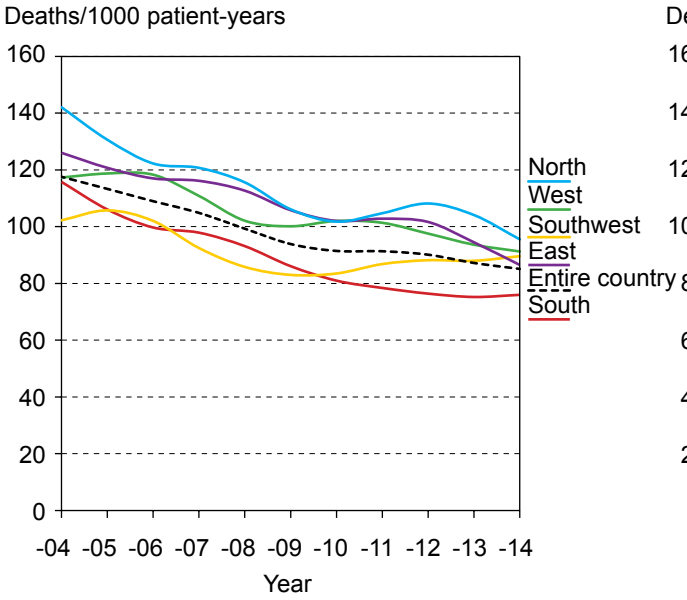


Figure 12. Standardized mortality of RRT patients by region (patients who died within 90 days of start of RRT excluded)
Finnish Registry for Kidney Diseases 2004–2014

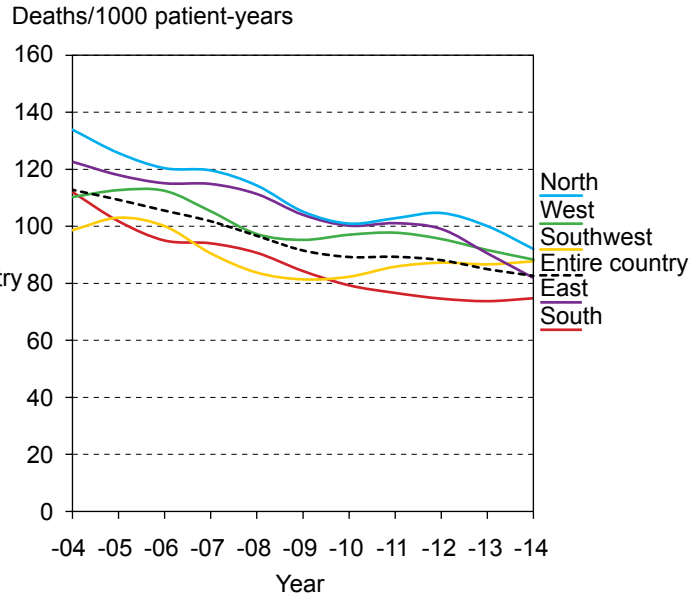


Table 13 shows RRT patients' mortality in 2004–2014 according to region. The mortality of patients who had been on RRT for at least 90 days is presented separately. The average mortality in 2010–2014 was lower in the southern and southwestern regions than elsewhere.

Figures 11 and 12 show regional mortality as smoothed averages. The regional mortality rates for 2004–2014 have been age- and sex-standardized using all patient-years in 2014 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 the start of RRT were excluded from Figure 12. During the period 2004–2014 the standardized mortality rate has declined in all regions.

Figure 13. Projected annual number of new RRT patients
Finnish Registry for Kidney Diseases 1990–2014

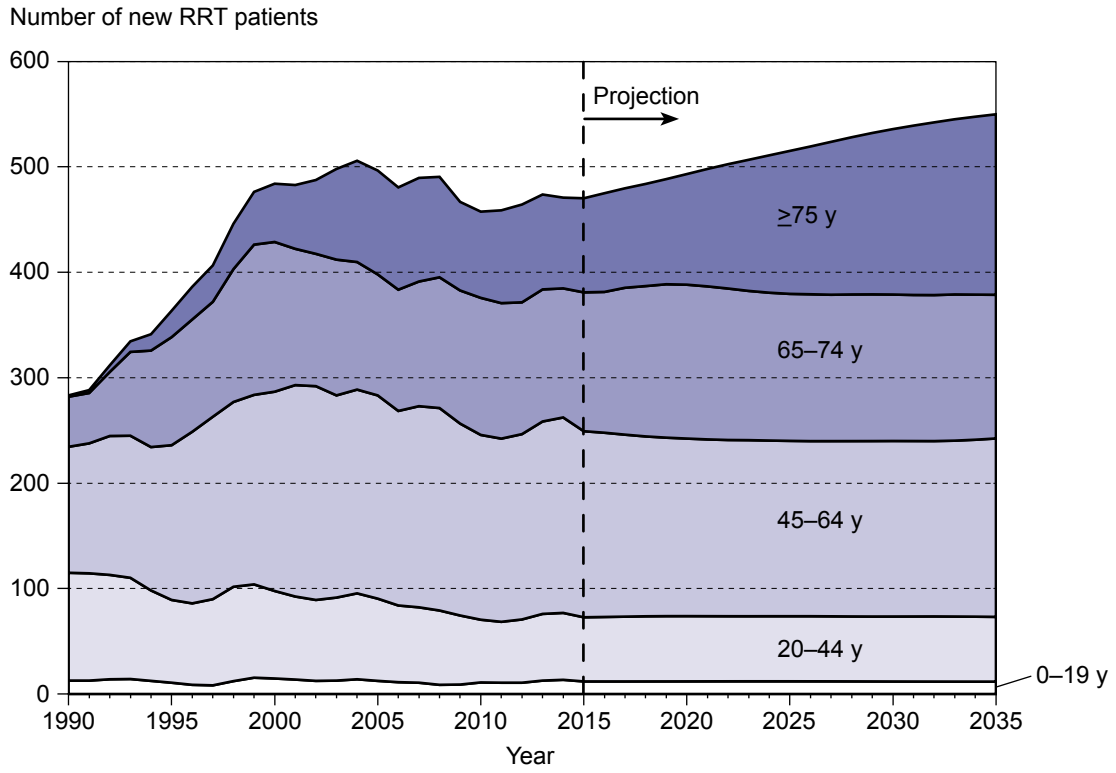


Figure 13 shows the projected annual number of patients entering RRT until the year 2035. The projection is based on the assumption that the average incidence of RRT in 2010–2014 will remain unchanged in age and gender groups. The population projection of Statistics Finland (updated on 30 October 2015, http://www.tilastokeskus.fi/til/vaenn/tau.html) was taken into account.

According to Statistics Finland, there will be 5.8 million inhabitants in Finland in 2035 (at end of year 2014 there were 5.5 million inhabitants). In 2035, the number of inhabitants aged over 75 years will be 84% larger, the number of 65–74-year-olds 7% larger, and the number of 45–64-year-olds 6% larger than in 2014. The number of inhabitants younger than 45 years is anticipated to remain virtually unchanged.

The incidence of RRT increased rapidly in the 1990s, approximately 5% per year. The increase occurred especially among those aged 65 years or older. After 2000, the increase in incidence has slowed down, and a few years later the incidence has started to slightly decrease. In recent years, the number of patients entering RRT has remained almost unchanged. In 2010–2014, an average of 465 new patients entered RRT annually. According to the projection, the number of patients entering RRT in 2035 will be 550. The proportion of new patients older than 75 years is forecasted to increase from 19% in 2014 to 31% in 2035.

Figure 14. Projected number of dialysis patients according to age group
Finnish Registry for Kidney Diseases 1990–2014

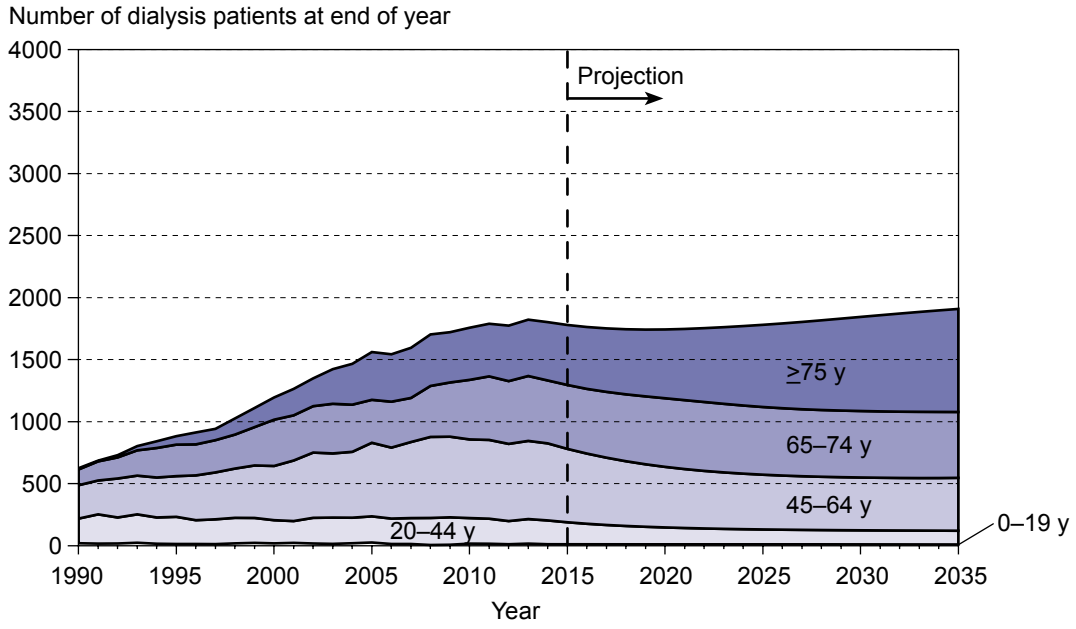
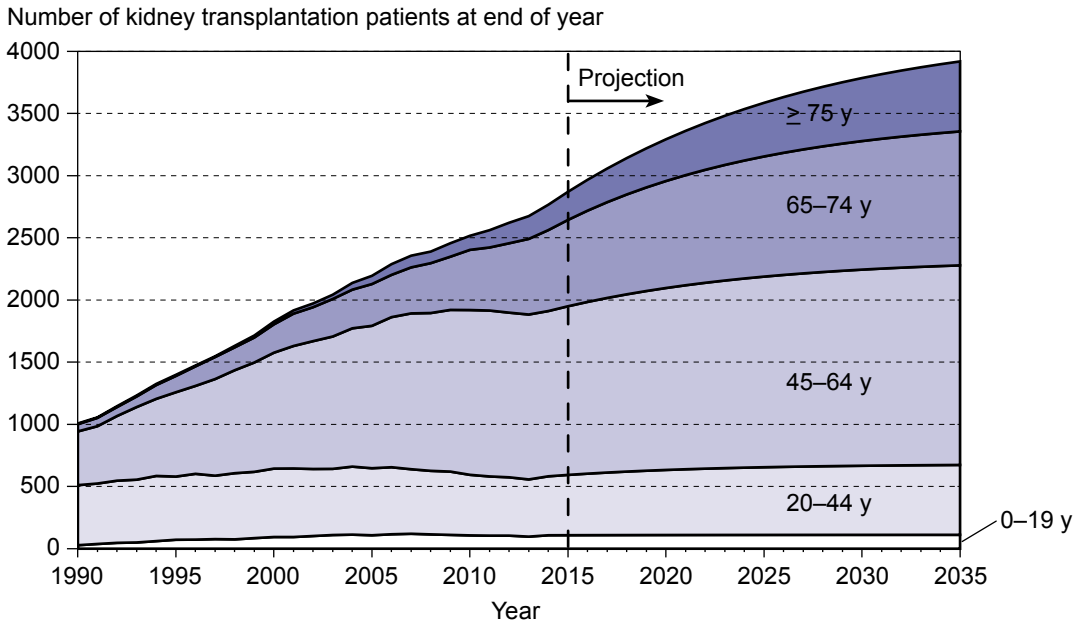


Figure 15. Projected number of kidney transplantation patients according to age group
Finnish Registry for Kidney Diseases 1990–2014



Figures 14 and 15 present the projected numbers of prevalent dialysis and kidney transplantation patients until the year 2035. The population projection of Statistics Finland was taken into account. The following assumptions were made: 1) the average incidence in 2010–2014 will remain unchanged in age and gender groups, 2) dialysis and kidney transplantation patients' average mortality in 2010–2014 will remain unchanged in age and gender groups, 3) the annual number of kidney transplantations will be 250 until the year 2035, and 4) the average risk of graft loss in 2010–2014 will remain unchanged in age and gender groups.

In 2014, altogether 240 kidney transplantations were performed, a larger number than in earlier years. In 2015, the number of kidney transplantations was similar. The projection model assumes that the number of kidney transplantation will remain at this level. In 2009–2013, the average annual number of kidney transplantations was 183.

According to the projection, in 2035 there will be only slightly more dialysis patients than now, but the patients will be considerably older. At the end of 2014, 26% of dialysis patients were 75 years or older; in 2035, this proportion is anticipated to be 44%. According to the projection, in 2035 there will be 3918 transplantation patients, 42% more than at the end of 2014.

Table 14. Number of RRT patients older than 20 years in hospitals
Finnish Registry for Kidney Diseases 2014

Region	Healthcare district	Hospital	No. of RRT patients (≥20 y) on 31 Dec 2014			
			PD	HD	Tx	Total
South (R1)			96	488	925	1509
	Helsinki-Uusimaa (1)		78	380	780	1238
		Helsinki University Central Hospital	78	275	687	1040
		Nephrology Polyclinic			686	686
		Dialysis unit DHK		70		70
		Dialysis unit DOK	78	85		163
		B. Braun Malmi		61		61
		B. Braun Pitäjänmäki		59		59
		Unit of Transplantation and Liver Surgery			1	1
		Hyvinkää Hospital		31	24	55
		Lohja Hospital		30	25	55
		Länsi-Uusimaa Hospital		16	20	36
		Porvoo Hospital		28	24	52
	Kymenlaakso (8)		12	59	57	128
		Kymenlaakso Central Hospital	12	59	57	128
	Etelä-Karjala (9)		6	49	88	143
		South Karelia Central Hospital	6	33	88	127
		Honkaharju Hospital		16		16
Southwest (R2)			90	229	457	776
	Varsinais-Suomi (3)		62	116	242	420
		Turku University Central Hospital	62	116	242	420
	Satakunta (4)		22	60	126	208
		Satakunta Central Hospital	22	60	126	208
	Vaasa (16)		6	46	71	123
		Vaasa Central Hospital	6	38	70	114
		Pietarsaari Hospital		8	1	9
	Åland (22)			7	18	25
		Åland Central Hospital		7	18	25
West (R3)			73	328	507	908
	Kanta-Häme (5)		10	63	86	159
		Central Hospital of Tavastia	10	63	86	159
	Pirkanmaa (6)		31	164	250	445
		Tampere University Hospital	31	148	248	427
		Valkeakoski Regional Hospital		16	2	18
	Päijät-Häme (7)		16	58	109	183
		Päijänne Tavastia Central Hospital	16	58	109	183
	Etelä-Pohjanmaa (15)		16	43	62	121
		Southern Ostrobothnia Central Hospital	16	43	62	121
East (R4)			35	219	436	690
	Etelä-Savo (10)		4	22	50	76
		Mikkeli Central Hospital	4	22	50	76
	Itä-Savo (11)		1	17	36	54
		Central hospital of Savonlinna	1	17	36	54
	Pohjois-Karjala (12)		10	38	76	124
		North Karelia Central Hospital	10	38	76	124
	Pohjois-Savo (13)		11	84	160	255
		Kuopio University Hospital	11	54	141	206
		Regional Hospital of Iisalmi		13	11	24
		Regional Hospital of Varkaus		17	8	25
	Keski-Suomi (14)		9	58	114	181
		Central Finland Central Hospital	9	58	114	181
North (R5)			36	196	333	565
	Keski-Pohjanmaa (17)		1	24	39	64
		Central Hospital of Keski-Pohjanmaa	1	24	39	64
	Pohjois-Pohjanmaa (18)		15	108	176	299
		Oulu University Hospital	15	108	176	299
	Kainuu (19)		7	13	47	67
		Kainuu Central Hospital	7	13	47	67
	Länsi-Pohja (20)		4	30	24	58
		Central Hospital of Länsi-Pohja	4	30	24	58
	Lappi (21)		9	21	47	77
		Lapland Central Hospital	9	21	47	77
Entire country			330	1460	2658	4448

At the end of 2014, dialysis and kidney transplantation patients were treated and followed up in 30 hospitals of 21 healthcare districts in five regions (Table 14). 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 26–35, 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 16. Hemoglobin distribution of dialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2004–2014

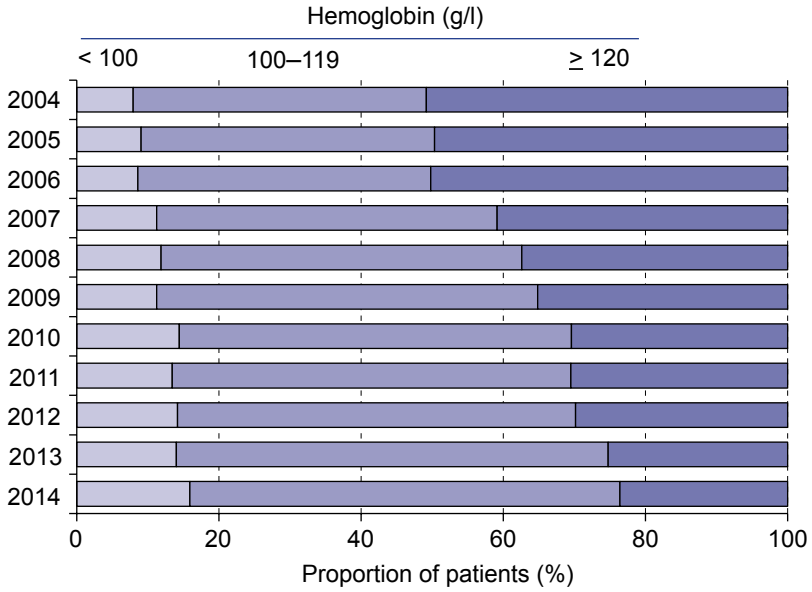
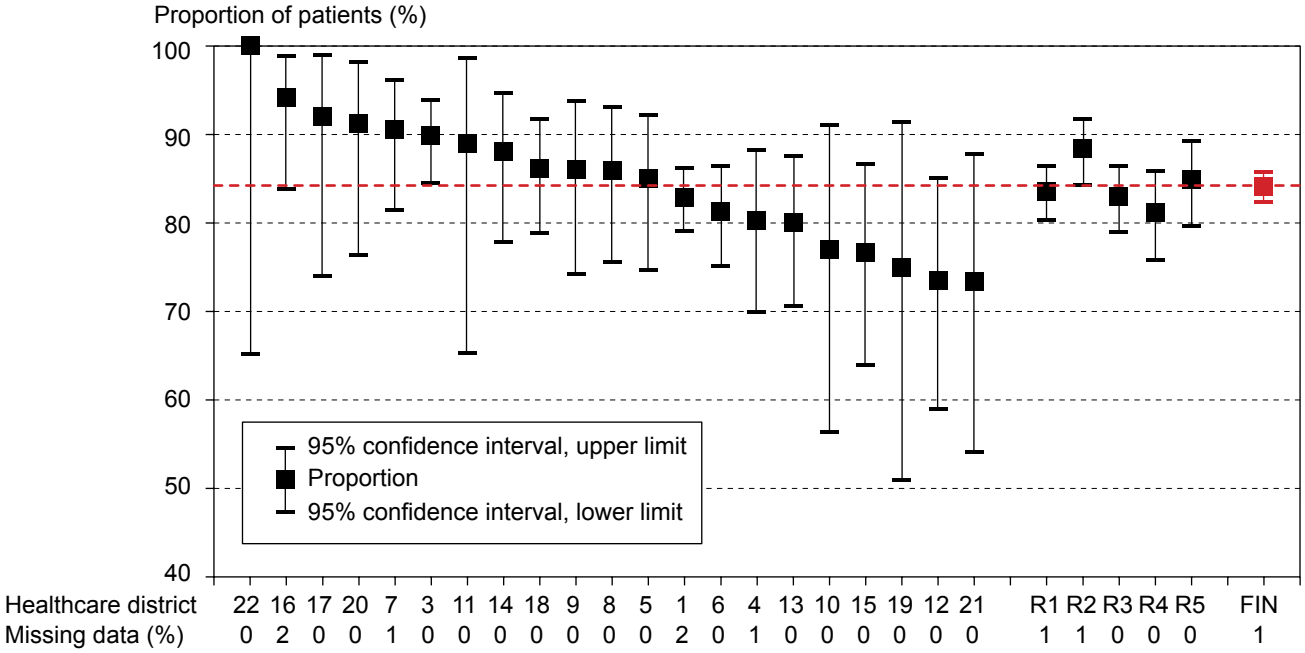


Figure 17. Proportion of dialysis patients older than 20 years with hemoglobin concentration ≥100 g/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014



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 UK and Sweden have in their reports used target levels of hemoglobin 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 doubled and was 16% at the end of 2014. The proportion of patients with a hemoglobin concentration of 120 g/l or higher has decreased. 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 2014, the proportion of dialysis patients reaching this target was 84% and varied from 73% to 100% in the healthcare districts (P=0.049; but significance was lost after adjustment for age and sex, P=0.106) and from 81% to 88% in the regions (P=0.211). 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 2004–2014

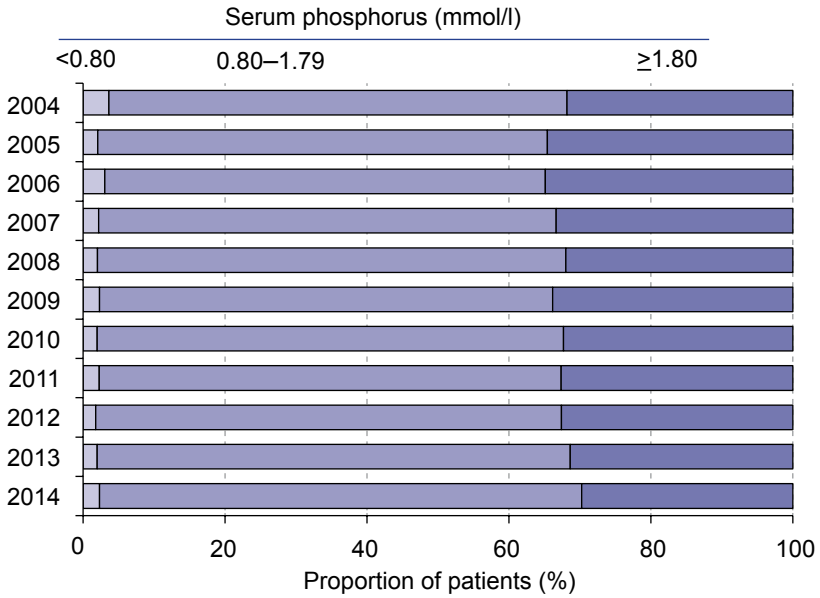
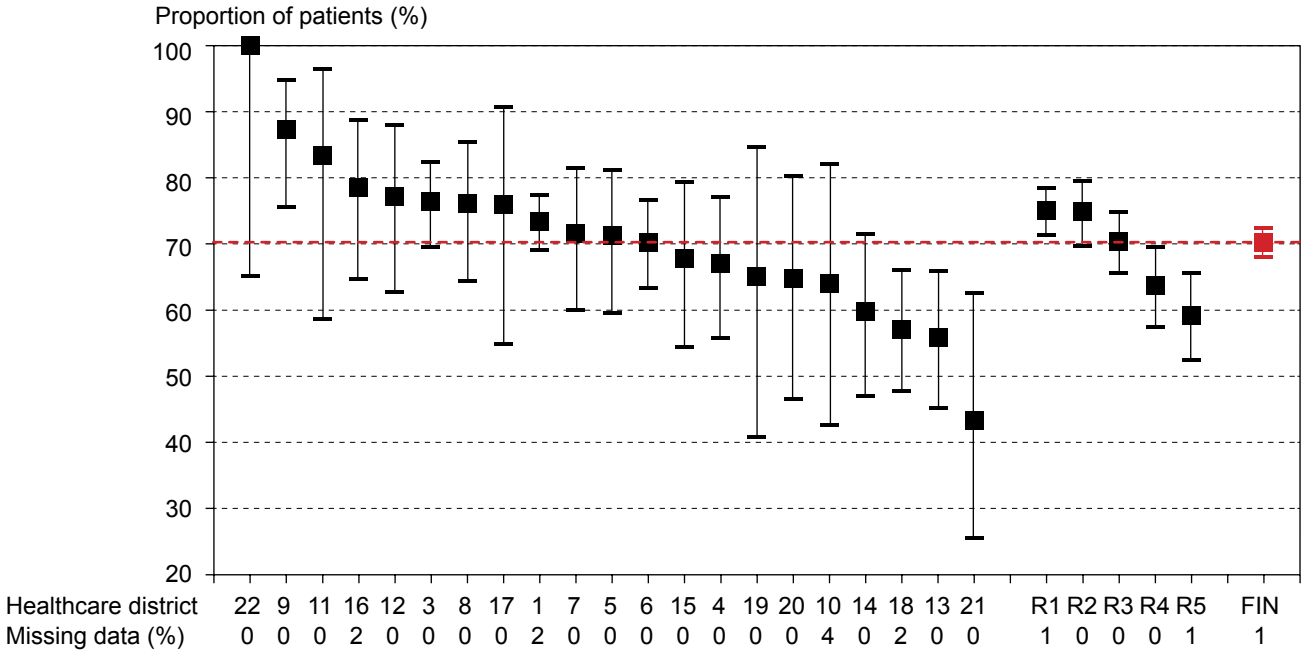


Figure 19. Proportion of dialysis patients older than 20 years with serum phosphorus lower than 1.8 mmol/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014

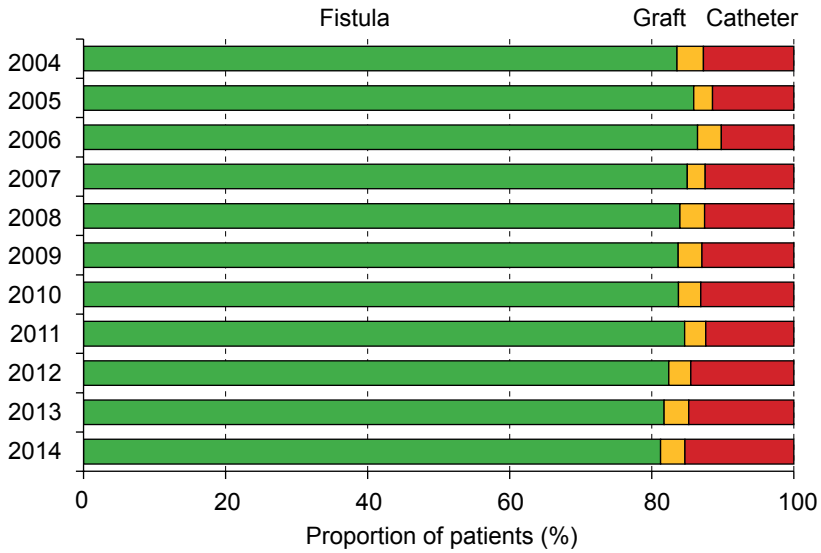


Hyperphosphatemia among patients with kidney disease is associated with vascular calcification and increased mortality. The guideline of the Kidney Disease Global Outcomes (KDIGO) suggests that elevated serum phosphorus of dialysis patients should be lowered towards the normal range with diet, intensified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

At the end of 2014, 70% 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).

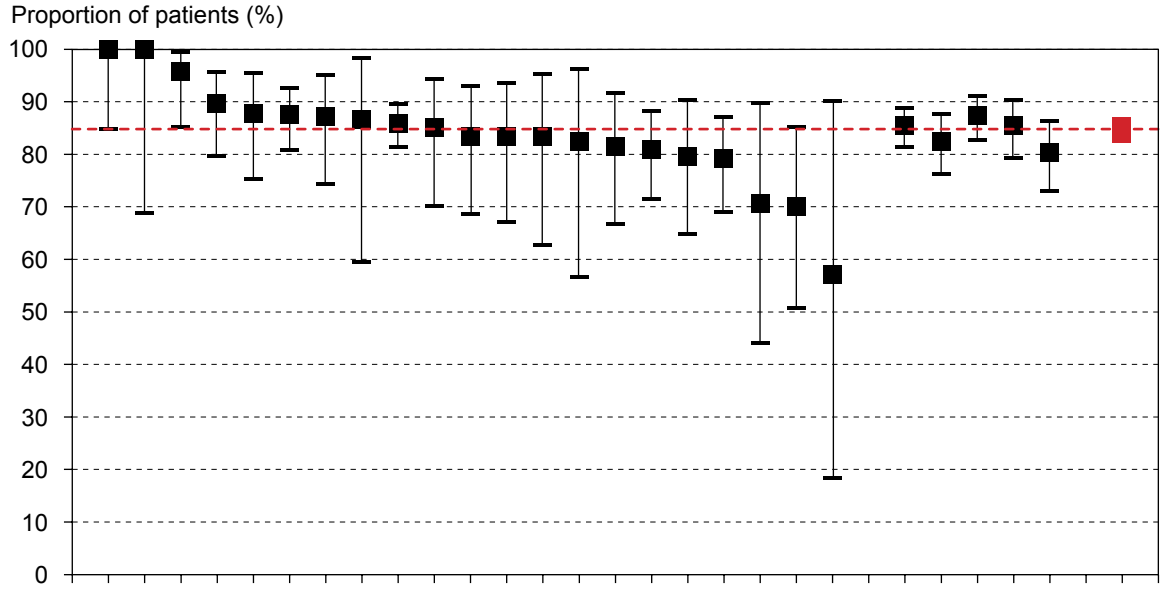
The proportion of patients reaching the treatment target (serum phosphorus <1.8 mmol/l) varied between 44% and 96% in the healthcare districts (P<0.001) and between 59% and 75% in the regions (P=0.001) (Figure 19). Men reached the treatment target less frequently than women (67% vs. 76%, P=0.001).

Figure 20. Vascular access of hemodialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2004–2014



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

Figure 21. Proportion of hemodialysis patients older than 20 years with a fistula or graft in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014



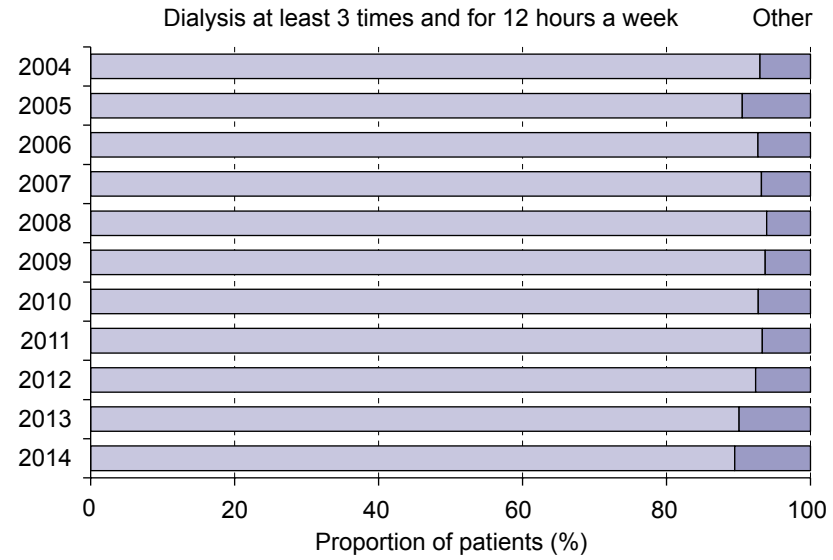
Healthcare district	10	19	5	13	8	6	4	11	1	16	14	15	20	17	7	3	9	18	21	12	22	R1	R2	R3	R4	R5	FIN
Missing data (%)	0	0	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0	0	6	0	1	1	0	2	0	1

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 slightly, to 85%, in 2014 (Figure 20).

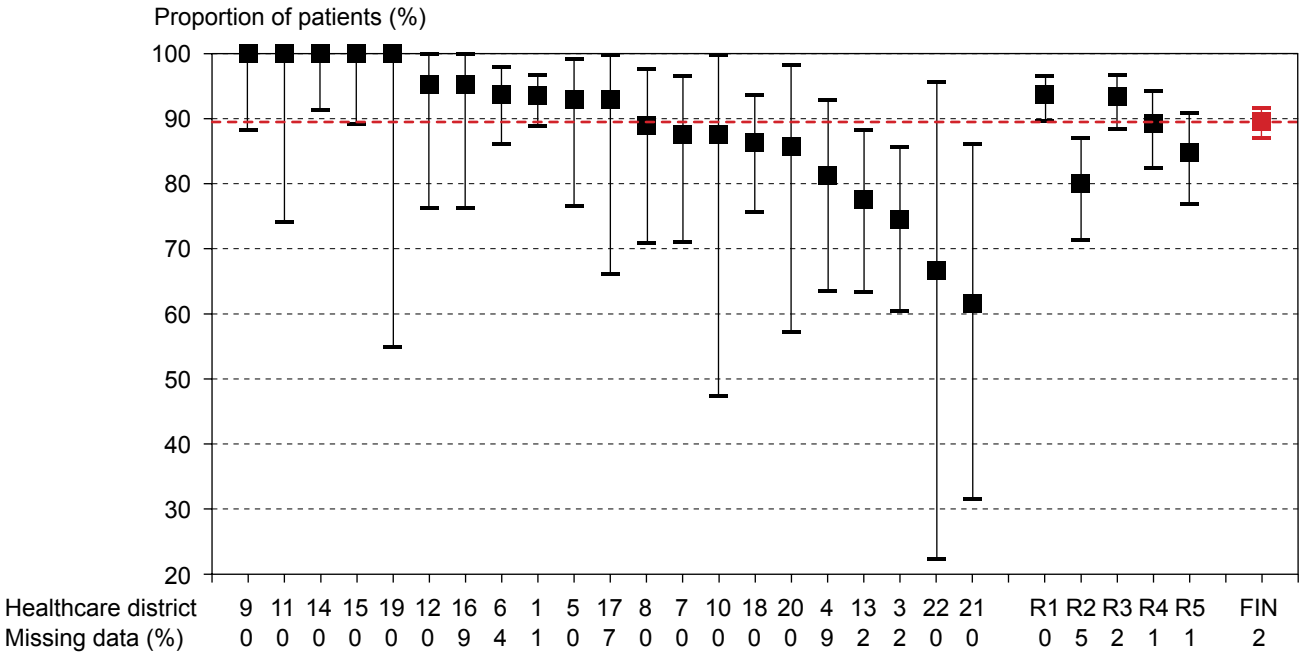
At the end of 2014, the proportion of patients with a fistula or graft varied between 57% and 100% in healthcare districts (P=0.103) and between 80% and 87% in regions (P=0.323) (Figure 21). This is a change compared with earlier years; in 2012, there was a significant difference between both healthcare districts and regions, and in 2013 a significant difference between healthcare districts, but not between regions. At the end of 2014, female hemodialysis patients less frequently than male patients had a fistula or graft (79% vs. 87%, P<0.001).

Figure 22. Sufficiency of dialysis time among hemodialysis patients aged 20–74 years
Finnish Registry for Kidney Diseases 2004–2014



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

Figure 23. Proportion of hemodialysis patients aged 20–74 years with sufficient dialysis time in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014

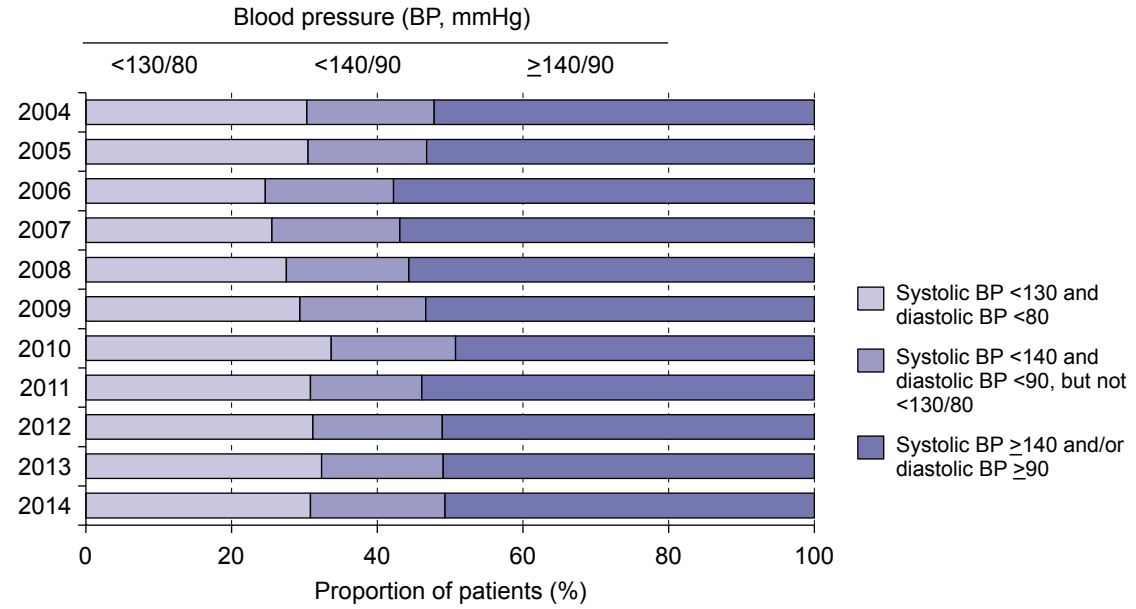


Patients who had been on RRT less than one year and home hemodialysis patients were excluded (n=743).

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, 89% of 20–74-year-old in-center hemodialysis patients received sufficient hemodialysis time at the end of 2014. This proportion was the largest in 2008 and 2009 (Figure 22).

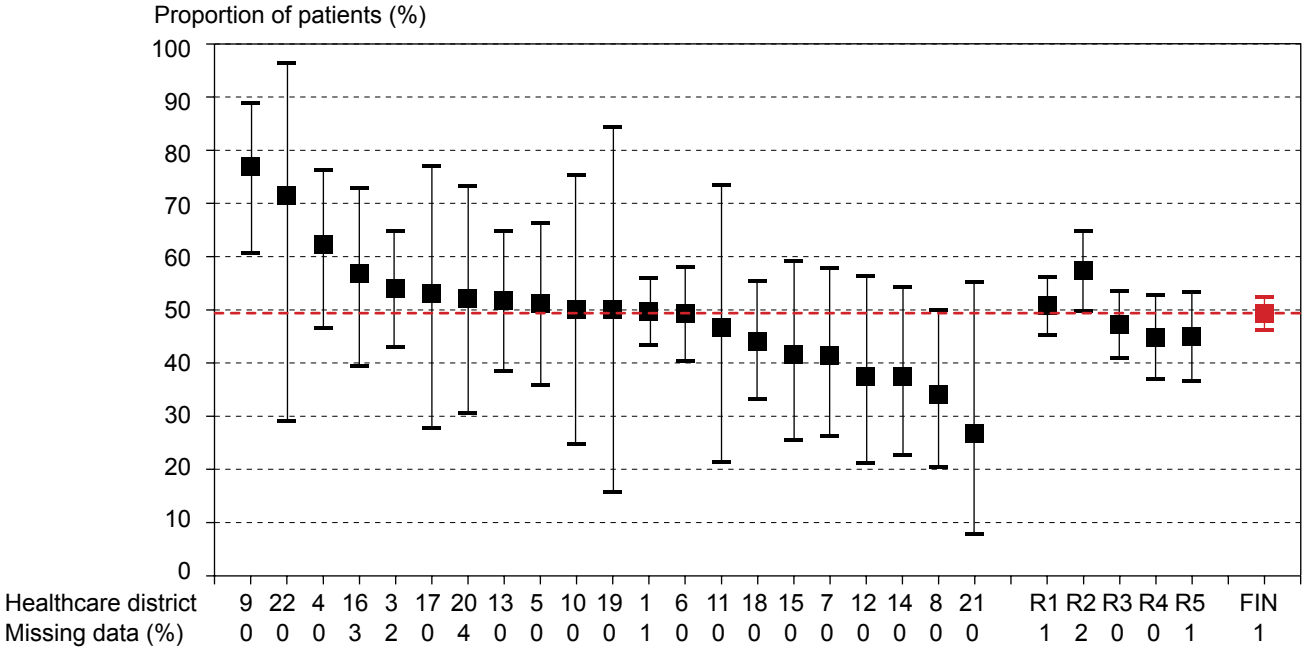
At the end of 2014, the proportion varied between 62% and 100% in healthcare districts (P<0.001) and between 80% and 94% in regions (P=0.001) (Figure 23). After adjustment for age and sex, difference between healthcare districts was not significant (P=0.051). At the end of 2014 female hemodialysis patients less frequently than males had sufficient dialysis time (85% vs. 92%, P=0.004).

Figure 24. Distribution of predialytic blood pressure among hemodialysis patients older than 20 years
Finnish Registry for Kidney Diseases 2004–2014



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

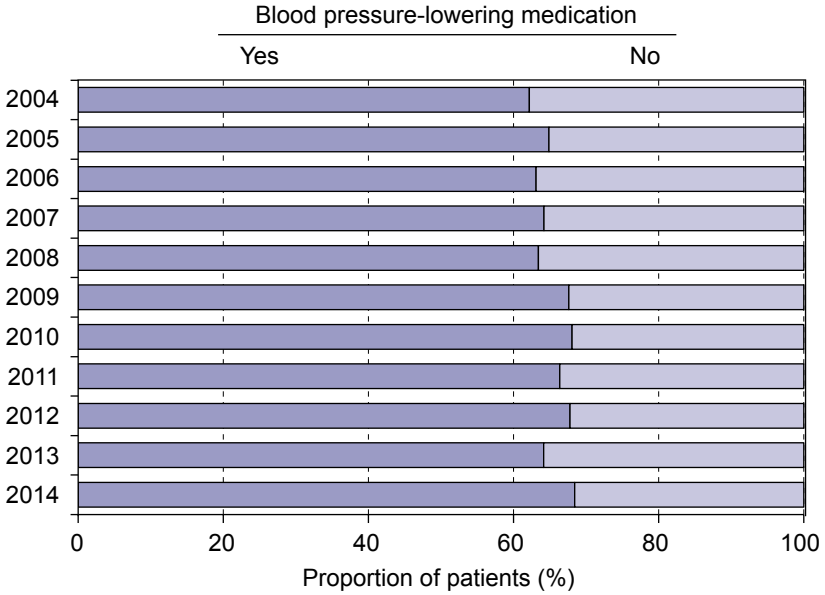
Figure 25. Proportion of hemodialysis patients older than 20 years with predialytic blood pressure lower than 140/90 mmHg in healthcare districts and regions
Finnish Registry for Kidney Diseases 2013



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

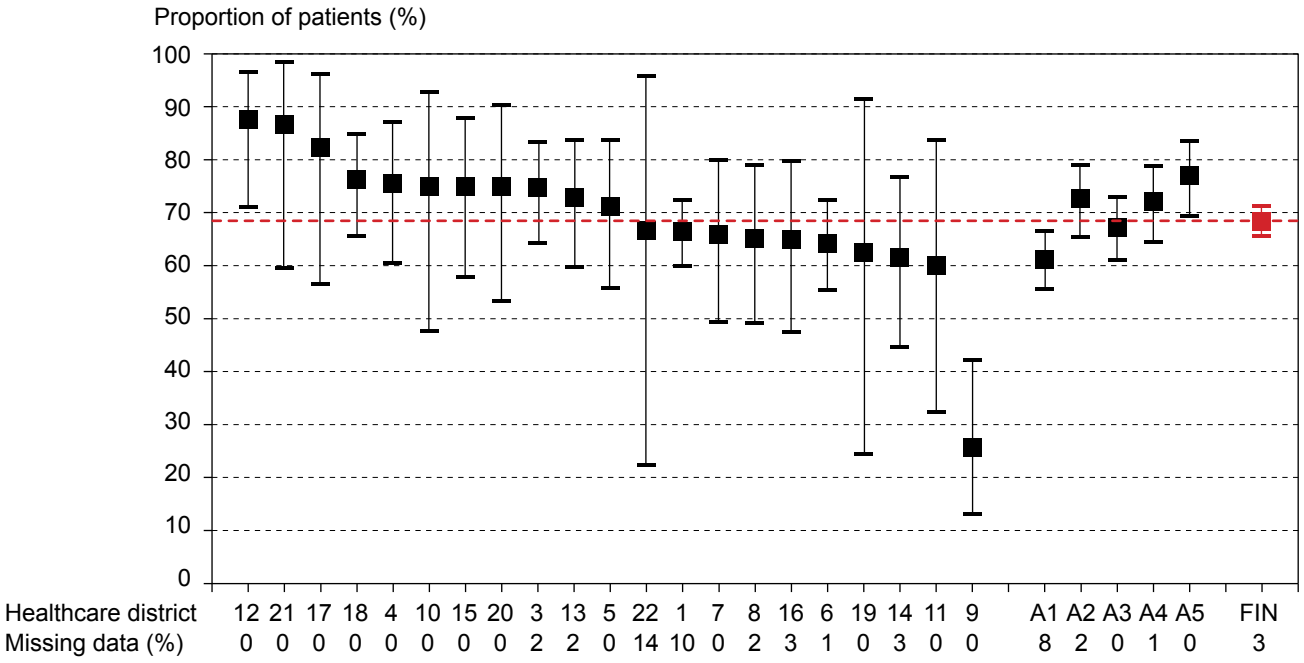
According to the guidelines of the Kidney Disease Outcome Quality Initiative (KDOQI), hemodialysis patients' target for predialytic blood pressure is lower than 140/90 mmHg. At the end of 2014, 49% of hemodialysis patients reached this target (Figure 24). The proportion of patients reaching this target varied between 27% and 77% in healthcare districts (P=0.041) and between 45% and 57% in regions (P=0.100) (Figure 25). There was no significant difference in proportions of males and females reaching the target blood pressure.

Figure 26. Use of blood pressure-lowering medication among hemodialysis patients older than 20 years
Finnish Registry for Kidney Diseases 2004–2014



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

Figure 27. Proportion of hemodialysis patients older than 20 years using blood pressure-lowering medication in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014



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

Of the hemodialysis patients, 68% used blood pressure-lowering medication at the end of 2014. This proportion has remained virtually unchanged since 2004 (Figure 26). At the end of 2014, the proportion of hemodialysis patients using blood pressure-lowering medication varied between 26% and 88% in healthcare districts (P<0.001) and between 61% and 77% in regions (P=0.004) (Figure 27). The proportions of males and females using blood pressure-lowering medication did not differ.

Figure 28. Distribution of blood pressure of kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2004–2014

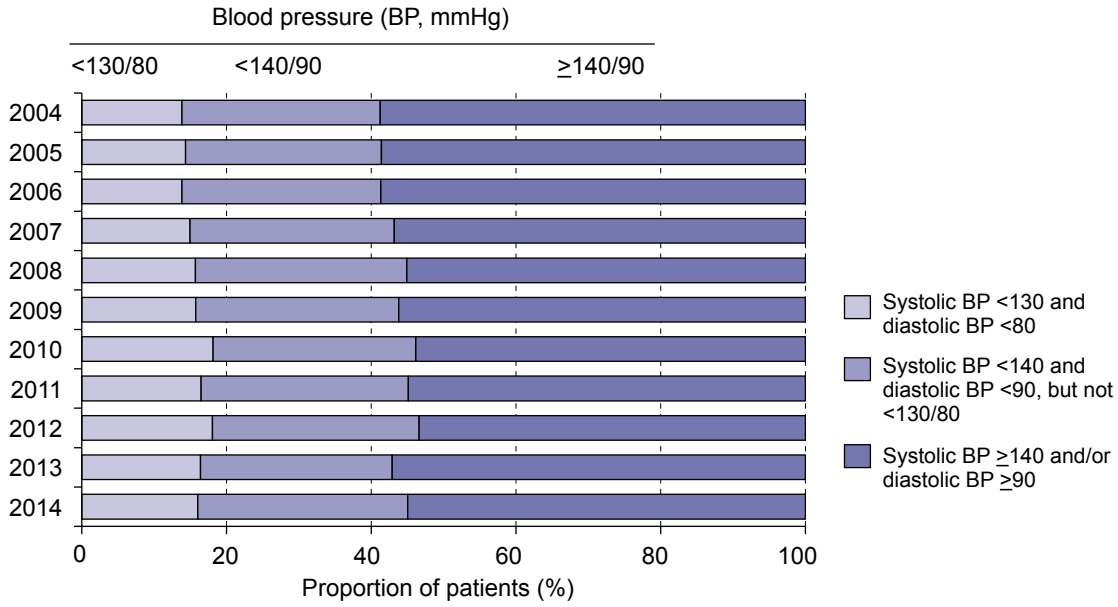
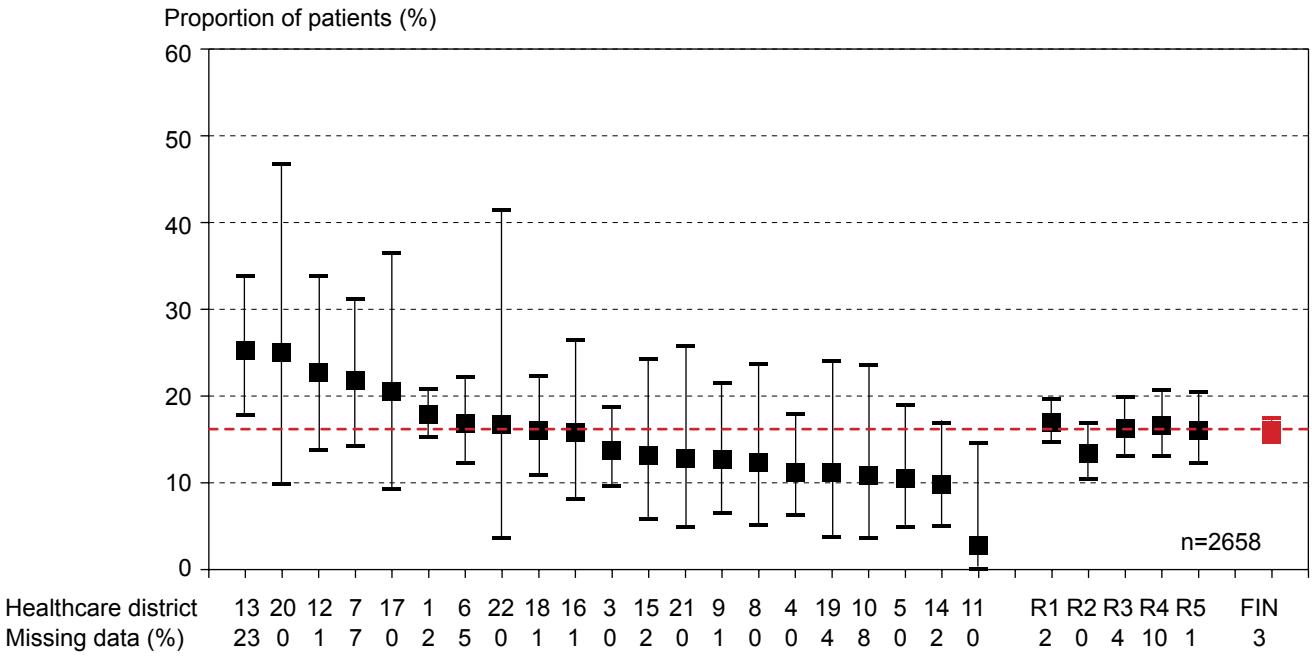


Figure 29. Proportion of kidney transplantation patients older than 20 years with blood pressure lower than 130/80 mmHg in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014



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 28 shows the blood pressure distribution of kidney transplantation patients at the end of the years 2004–2014. The proportion of patients reaching the target (<130/80 mmHg) was 14% in 2004 and 16% in 2014.

At the end of 2014, the proportion of kidney transplantation patients reaching the blood pressure target varied between 3% and 25% in healthcare districts (P=0.029, after adjustment for age and sex P=0.050) and between 13% and 17% in regions (P=0.547) (Figure 29). No significant difference was observed between the genders.

Figure 30. Use of blood pressure-lowering medication among kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2004–2014

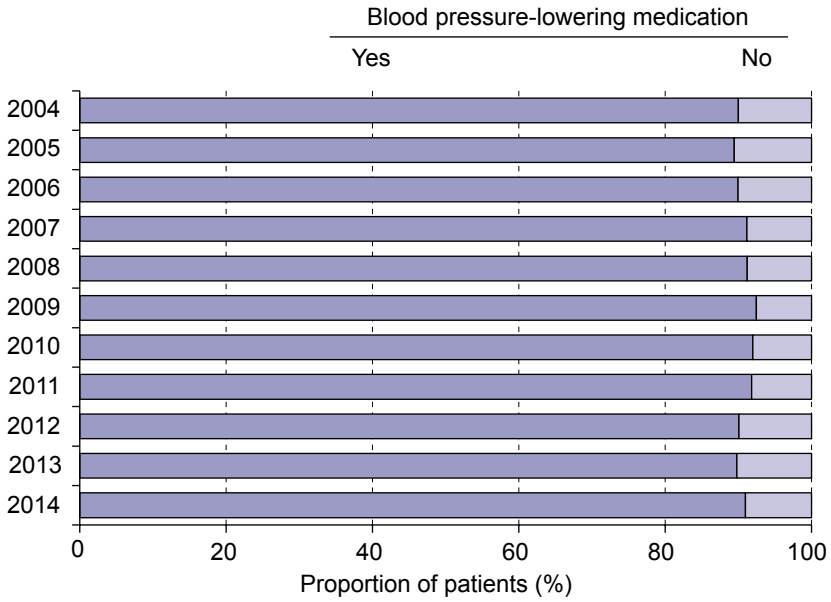
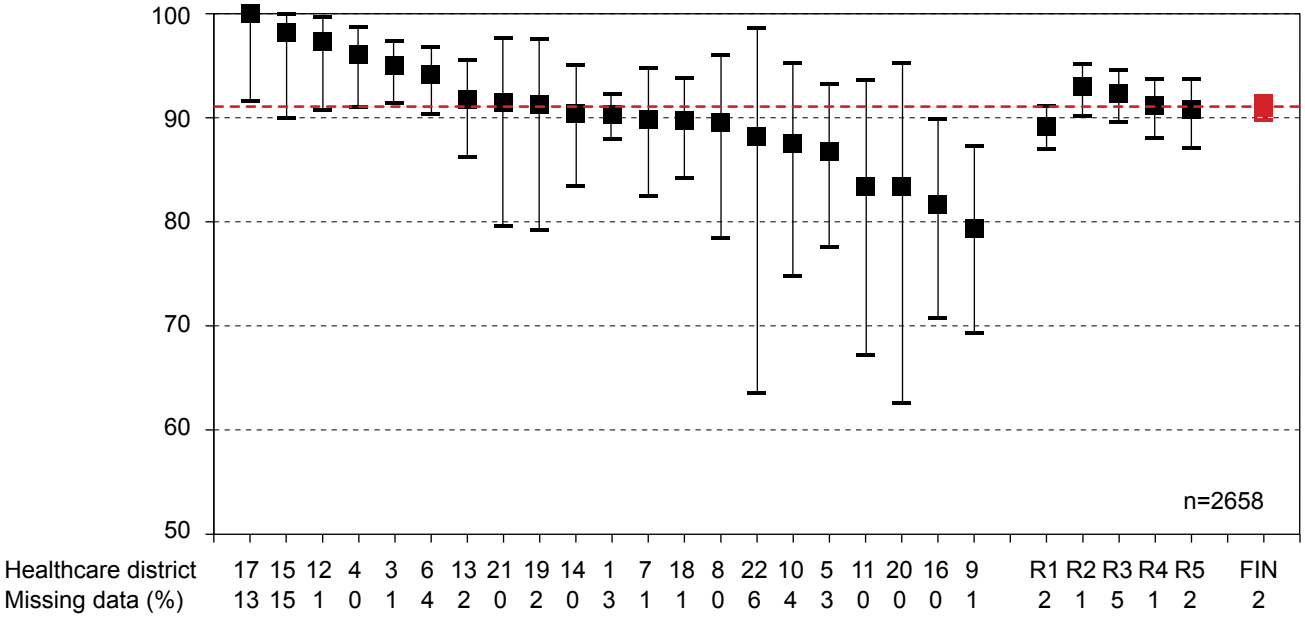


Figure 31. Proportion of kidney transplantation patients older than 20 years using blood pressure-lowering medication in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014



Of the kidney transplantation patients, 91% used blood pressure-lowering medication at the end of 2013. This proportion has remained virtually unchanged since 2004 (Figure 30). At the end of 2014, the proportion of kidney transplantation patients using blood pressure-lowering drugs varied between 79% and 100% in healthcare districts (P<0.001) and between 89% and 93% in regions (P=0.139) (Figure 31). Men more frequently than women used blood pressure-lowering medication (94% vs. 86%, P<0.001).

Figure 32. Distribution of serum LDL cholesterol among kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2004–2014

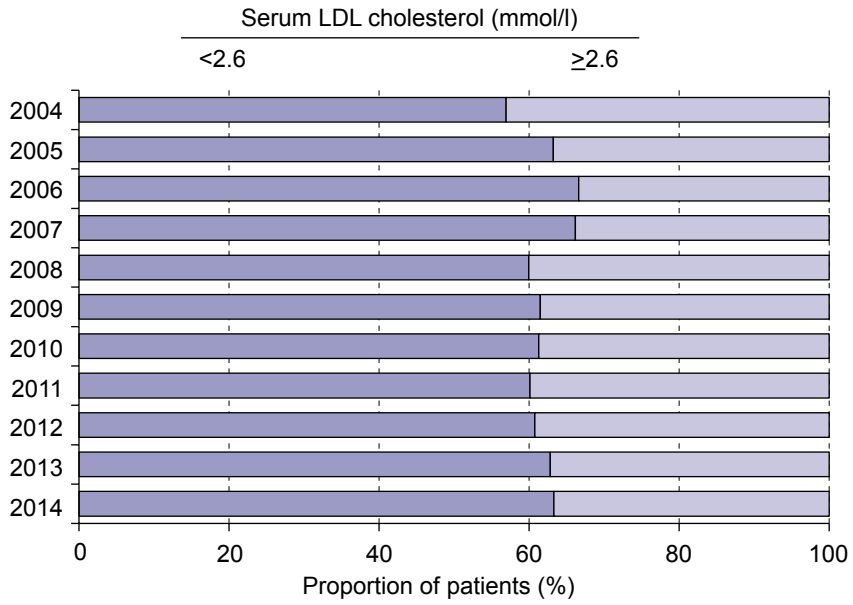
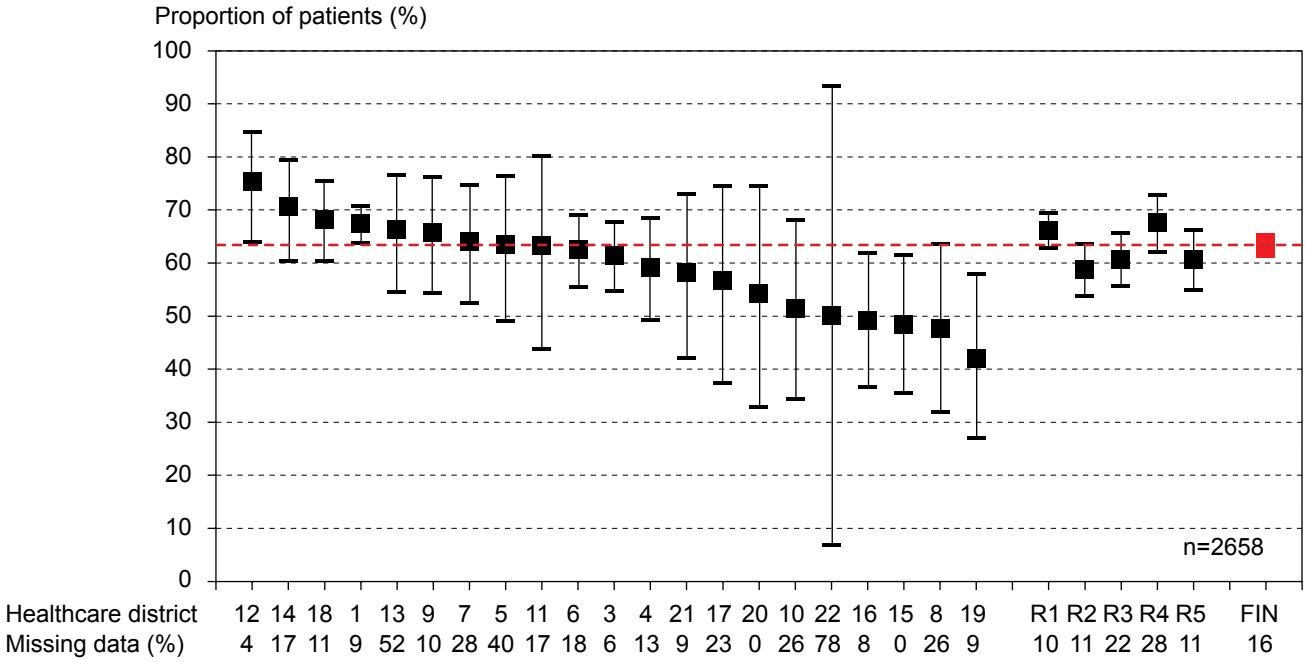


Figure 33. Proportion of kidney transplantation patients older than 20 years with serum LDL cholesterol lower than 2.6 mmol/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2014



According to the KDIGO and KDOQI guidelines, kidney transplantation patients' concentration of serum low-density lipoprotein (LDL) cholesterol should be lower than 2.6 mmol/l. In 2004, 57% of the kidney transplantation patients reached this target, and in 2014 this proportion was 63% (Figure 32).

The proportion of kidney transplantation patients reaching the treatment target for LDL cholesterol varied between 42% and 76% in healthcare districts (P=0.002) and between 58% and 68% in regions (P=0.024) (Figure 33).

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).

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Finnish Registry for Kidney Diseases

Report 2014

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