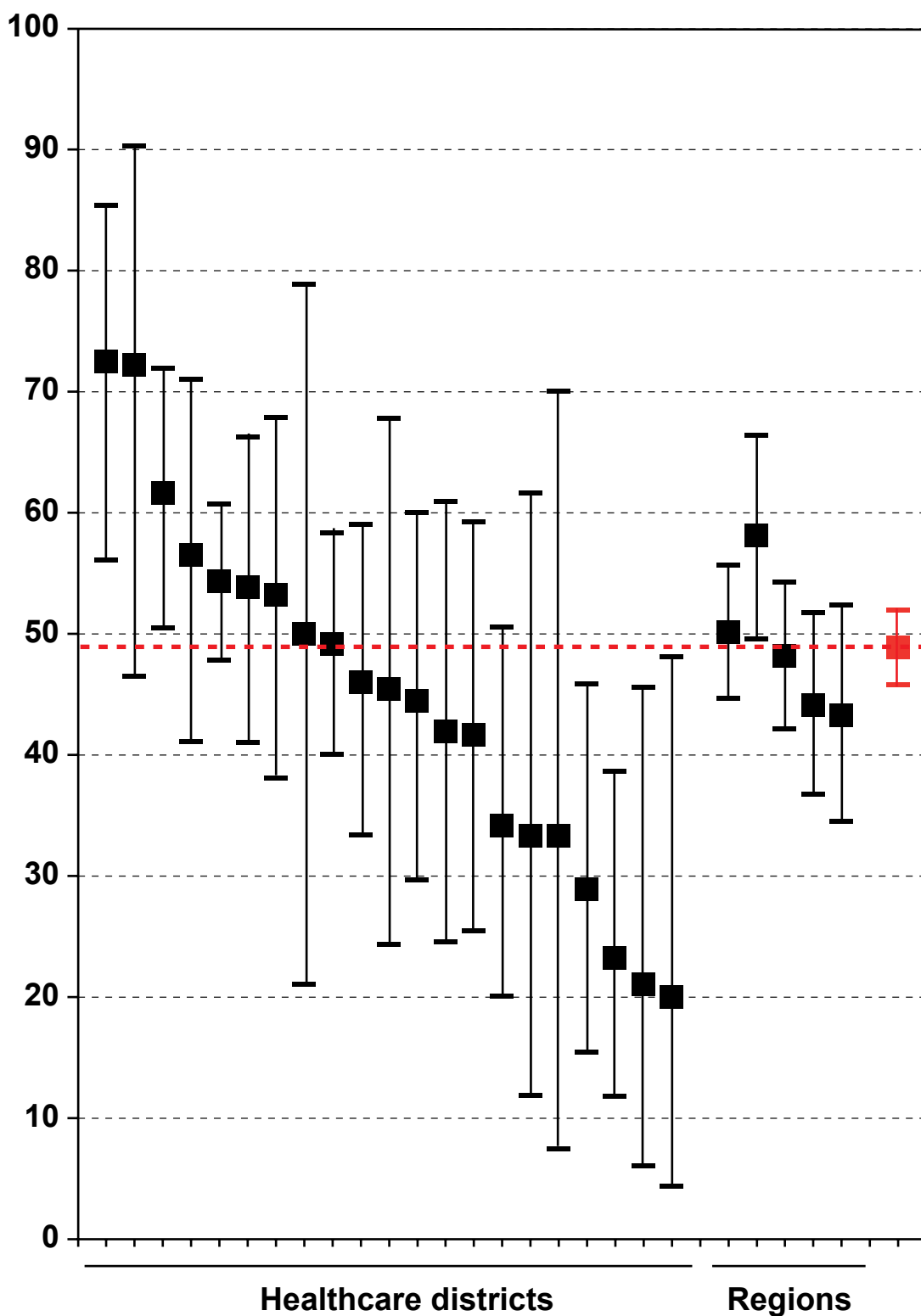


Report 2012

Finnish Registry for Kidney Diseases

Proportion of patients reaching treatment target (%)



Finnish Registry for Kidney Diseases – Report 2012

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Finnish Registry for Kidney Diseases 2012

In its Report 2012, the Finnish Registry for Kidney Diseases presents data on Finnish dialysis and kidney transplantation patients up to 31 December 2012. The registry contains data on 13 168 patients since 1964. At the end of 2012, altogether 4371 patients were alive.

During 2002–2008 approximately 500 new patients entered RRT each year, but thereafter the number has been around 450 new patients per year. The incidence of renal replacement therapy (RRT, dialysis or kidney transplantation) is smaller in Finland than in the other Nordic countries, and the largest difference is observed in the age group above 75 years, with a 50% lower incidence in Finland. The incidence of RRT varies between the healthcare districts, but the differences decrease after adjustment for age and gender. Because of the small number of patients in some healthcare districts, some of the differences are due to chance.

The number of kidney transplantation patients continues to grow, while the number of dialysis patients has not increased during the past four years. The yearly number of new dialysis patients is smaller than before, but the number of dialysis patients receiving a kidney transplant has remained unchanged at almost 200. At the end of 2012, there were 2611 kidney transplantation patients and 1760 dialysis patients. The proportion of kidney transplantation patients of all RRT patients was 60%.

Report 2012 presents special analyses on treatment quality. The Ministry of Social Affairs and Health has granted the Finnish Registry for Kidney Diseases funding for evaluating the potential to develop the registry to a quality register. A quality register monitors achievements of treatment targets and performs benchmarking and comparisons between treatment centers. Quality measurement and openly publishing data have been shown to improve quality of treatment. In November 2013, the Finnish Registry for Kidney Diseases arranged a meeting for the chief nephrologists of all 21 healthcare districts in Finland.

The quality analyses presented in Report 2012 were discussed, and the nephrologists did not oppose open publication of quality data.

In the field of nephrology, it is challenging to select relevant quality variables because very few large randomized controlled treatment trials exist. However, international guidelines regarding treatment targets for dialysis and kidney transplantation patients are available, and these have been consulted in the choice of quality variables in Report 2012. Results on quality of renal care have been presented in the reports of the Swedish Renal Registry and the UK Renal Registry, and these reports served as examples. One must be careful when comparing the results of various healthcare districts. Especially in small healthcare districts, chance may have a marked impact. In the analyses, P values and confidence intervals are presented; they help to estimate the role of chance.

The Finnish Registry for Kidney Diseases is a national healthcare registry financed by the Finnish government through the National Institute for Health and Welfare. The patients gave written consent for data collection. The Finnish Kidney and Liver Association is responsible for the technical maintenance of the registry. Statistics in this report were updated using data obtained from the Registry for the Follow-up of Kidney Transplantation Patients, maintained by the Kidney Transplantation Unit of Helsinki University Central Hospital. The Board of the Finnish Registry for Kidney Diseases thanks all supporters and participating hospitals for their cooperation. Astonishingly, every year updated information is provided for 100% of patients.

Patrik Finne
Administrative Director

Carola Grönhagen-Riska
Chairman of the Board

Board of the Finnish Registry for Kidney Diseases

Ilpo Ala-Houhala, Docent
Carola Grönhagen-Riska, Professor
Eero Honkanen, Docent
Sari Högström, MSc
Risto Ikäheimo, Docent
Pauli Karhapää, Docent
Kaj Metsärinne, Docent
Satu Mäkelä, Docent
Asko Räsänen
Kai Rönnholm, Docent
Kaija Salmela, Professor
Salla Säkinen

Patrik Finne, Docent
Rauni Jukkara, Secretary

Table 1. The Finnish population and its distribution in healthcare districts
Finnish Registry for Kidney Diseases 2002–2012

Healthcare district		Year					Change (%) 2002–2012
		2002	2007	2010	2011	2012	
1	Helsinki-Uusimaa	1416	1480	1528	1545	1563	10.4
3	Varsinais-Suomi	455	463	468	470	472	3.9
4	Satakunta	230	227	226	225	225	-2.4
5	Kanta-Häme	166	171	175	175	175	5.8
6	Pirkanmaa	481	501	511	515	518	7.7
7	Päijät-Häme	209	211	213	213	214	2.0
8	Kymenlaakso	179	176	175	175	174	-2.4
9	Etelä-Karjala	136	134	133	133	132	-2.6
10	Etelä-Savo	111	108	106	105	105	-5.5
11	Itä-Savo	49	47	46	45	45	-7.9
12	Pohjois-Karjala	174	171	170	170	169	-2.7
13	Pohjois-Savo	252	249	248	248	248	-1.5
14	Keski-Suomi	239	245	248	249	250	4.7
15	Etelä-Pohjanmaa	199	199	198	199	199	-0.1
16	Vaasa	161	163	166	167	168	4.3
17	Keski-Pohjanmaa	78	78	78	78	78	0.9
18	Pohjois-Pohjanmaa	374	387	395	398	401	7.3
19	Kainuu	83	80	79	78	77	-7.2
20	Länsi-Pohja	67	66	65	65	65	-3.7
21	Lappi	121	119	118	118	118	-2.0
22	Åland	26	27	28	28	29	8.5
Region							
	South	1731	1790	1837	1852	1870	8.0
	Southwest	711	717	722	724	726	2.0
	West	1217	1245	1263	1269	1274	4.7
	East	825	819	818	818	818	-0.9
	North	723	729	736	738	739	2.3
Entire country		5206	5300	5375	5401	5427	4.2

Figure 1. Healthcare districts and regions in Finland
Finnish Registry for Kidney Diseases 2012

On 31 December 2012, the population of Finland was 5.427 million (Table 1, Source: Statistics Finland). During the past ten years the population of the country has increased by 4.2%, 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.

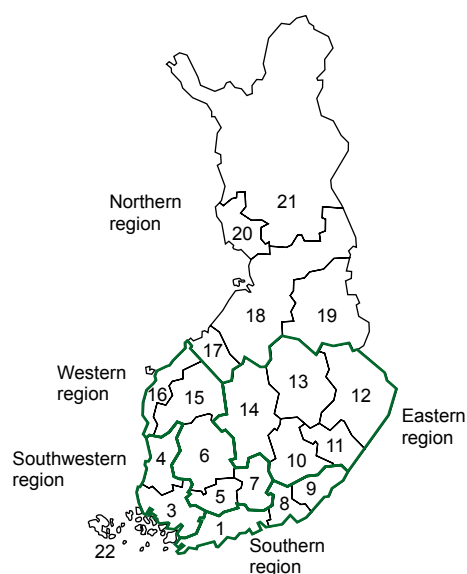


Table 2. The Finnish population (as thousands of inhabitants) according to region, age group, and gender
Finnish Registry for Kidney Diseases 2002–2012

Region	2002					2012				
	0– 19 y (%)	20– 64 y (%)	65– 74 y (%)	> 75 y (%)	Entire country	0– 19 y (%)	20– 64 y (%)	65– 74 y (%)	> 75 y (%)	Entire country
South										
Men	208 (25)	542 (65)	55 (7)	30 (4)	835 (100)	212 (23)	570 (63)	82 (9)	45 (5)	909 (100)
Women	201 (22)	556 (62)	71 (8)	68 (8)	895 (100)	204 (21)	577 (60)	98 (10)	82 (9)	961 (100)
Total	409 (24)	1098 (63)	125 (7)	99 (6)	1731 (100)	416 (22)	1147 (61)	179 (10)	127 (7)	1870 (100)
Southwest										
Men	83 (24)	215 (62)	29 (8)	18 (5)	346 (100)	79 (22)	211 (60)	39 (11)	25 (7)	355 (100)
Women	79 (22)	213 (58)	36 (10)	38 (10)	366 (100)	75 (20)	209 (56)	43 (12)	43 (12)	371 (100)
Total	163 (23)	428 (60)	65 (9)	56 (8)	711 (100)	154 (21)	420 (58)	82 (11)	69 (9)	726 (100)
West										
Men	148 (25)	368 (62)	49 (8)	31 (5)	595 (100)	145 (23)	374 (60)	66 (10)	43 (7)	627 (100)
Women	141 (23)	355 (57)	61 (10)	64 (10)	621 (100)	139 (22)	361 (56)	73 (11)	74 (11)	647 (100)
Total	289 (24)	723 (59)	110 (9)	95 (8)	1217 (100)	285 (22)	734 (58)	139 (11)	117 (9)	1274 (100)
East										
Men	100 (25)	250 (62)	36 (9)	21 (5)	406 (100)	88 (22)	242 (60)	44 (11)	29 (7)	404 (100)
Women	96 (23)	237 (57)	44 (10)	43 (10)	419 (100)	85 (21)	230 (56)	48 (12)	50 (12)	414 (100)
Total	195 (24)	487 (59)	79 (10)	64 (8)	825 (100)	173 (21)	472 (58)	93 (11)	80 (10)	818 (100)
North										
Men	99 (27)	219 (61)	28 (8)	16 (4)	362 (100)	94 (25)	219 (59)	35 (9)	23 (6)	371 (100)
Women	95 (26)	203 (56)	33 (9)	29 (8)	360 (100)	90 (24)	204 (55)	38 (10)	37 (10)	368 (100)
Total	194 (27)	423 (58)	61 (8)	45 (6)	723 (100)	184 (25)	423 (57)	72 (10)	61 (8)	739 (100)
Entire country										
Men	638 (25)	1594 (63)	197 (8)	116 (5)	2545 (100)	619 (23)	1616 (61)	266 (10)	166 (6)	2667 (100)
Women	612 (23)	1563 (59)	244 (9)	242 (9)	2661 (100)	593 (21)	1581 (57)	300 (11)	287 (10)	2760 (100)
Total	1250 (24)	3158 (61)	441 (8)	358 (7)	5206 (100)	1212 (22)	3196 (59)	565 (10)	453 (8)	5427 (100)

Table 2 shows the age- and gender distribution of the Finnish population at the end of 2002 and 2012. At the end of 2012, 18% of the Finnish inhabitants were older than 65 years. In the southern region, the proportion of inhabitants older than 65 years was the smallest, 16%, whereas in the other regions it was 18–21%. The proportion of inhabitants aged 20–64 years was largest in the southern region, 61%. 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 number of inhabitants younger than 20 years has decreased by 3%, while the number of 65–74-year-olds has increased by 28% and the number of inhabitants older than 75 years by 27%. The number of 20–64-year-olds has remained virtually unchanged.

Table 3. Number of new RRT patients and incidence of RRT by healthcare district and region
Finnish Registry for Kidney Diseases 2002–2012

Healthcare district	Number of new RRT patients						Incidence of RRT/million inhabitants					
	2002	2007	2010	2011	2012	2008–2012 on average	2002	2007	2010	2011	2012	2008–2012 on average
1 Helsinki-Uusimaa	109	99	114	112	113	114	77	67	75	72	72	74
3 Varsinais-Suomi	39	44	33	38	46	41	86	95	70	81	97	88
4 Satakunta	33	30	19	21	23	23	143	132	84	93	102	101
5 Kanta-Häme	14	15	20	29	14	19	84	87	115	165	80	110
6 Pirkanmaa	44	67	46	48	42	46	91	134	90	93	81	91
7 Päijät-Häme	32	21	22	18	13	19	153	99	103	84	61	88
8 Kymenlaakso	20	28	17	8	16	15	112	159	97	46	92	88
9 Etelä-Karjala	12	16	21	13	12	16	88	119	158	98	91	123
10 Etelä-Savo	8	10	8	8	5	8	72	93	76	76	48	75
11 Itä-Savo	4	3	5	5	6	6	82	64	110	111	134	127
12 Pohjois-Karjala	25	17	14	13	7	13	143	99	82	77	41	74
13 Pohjois-Savo	29	30	21	33	31	27	115	121	85	133	125	110
14 Keski-Suomi	26	21	22	21	19	21	109	86	89	84	76	85
15 Etelä-Pohjanmaa	25	17	17	24	21	18	126	85	86	121	106	91
16 Vaasa	12	17	16	16	12	15	74	104	96	96	71	89
17 Keski-Pohjanmaa	3	4	7	5	9	8	39	52	90	64	115	108
18 Pohjois-Pohjanmaa	28	31	35	21	30	30	75	80	89	53	75	75
19 Kainuu	12	10	6	5	6	5	144	125	76	64	77	66
20 Länsi-Pohja	6	7	5	4	2	6	89	106	77	62	31	95
21 Lappi	7	7	5	15	7	8	58	59	42	127	59	68
22 Åland	1	2	2	4	4	4	38	74	71	141	140	129
Region South	141	143	152	133	141	145	81	80	83	72	75	79
Southwest	73	76	54	63	73	68	103	106	75	87	101	94
West	127	137	121	135	102	117	104	110	96	106	80	93
East	92	81	70	80	68	75	112	99	86	98	83	91
North	56	59	58	50	54	58	77	81	79	68	73	78
Entire country	489	496	455	461	438	462	94	94	85	85	81	86
Children <15 y	8	11	8	6	7	6	9	12	9	7	8	7

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 in 2012 was somewhat smaller than in 2010 and 2011 and 14% smaller than in 2002. All patients who entered RRT in 2012 might not have yet been reported to the Finnish Registry for Kidney Diseases, which may partly explain the lower incidence in

2012.

In 2008–2012, the average incidence was highest in the southwestern region and lowest in the northern region. In the healthcare districts, the average incidence in 2008–2012 was lowest in Kainuu (66 new RRT patients/million inhabitants) and highest in Åland (129/million inhabitants).

Table 4. Number of new RRT patients by age group in healthcare districts and regions
Finnish Registry for Kidney Diseases 2008–2012

Healthcare district		Average annual number of new RRT patients in 2008–2012 by age group (y)						Incidence*/million inhabitants in 2008–2012 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	2.8	17.6	45.6	28.6	19.0	114	8	32	110	229	211	74
3	Varsinais-Suomi	0.4	4.0	17.0	12.4	7.4	41	4	27	129	268	178	88
4	Satakunta	0.2	2.6	10.2	5.6	4.2	23	4	42	151	221	186	101
5	Kanta-Häme	0	3.0	7.0	4.8	4.4	19	0	60	137	273	277	110
6	Pirkanmaa	0.4	5.2	17.2	12.8	10.8	46	4	31	123	262	253	91
7	Päijät-Häme	0	3.0	6.6	4.8	4.4	19	0	50	103	203	233	88
8	Kymenlaakso	0	2.8	5.2	4.2	3.2	15	0	59	96	213	183	88
9	Etelä-Karjala	0.2	1.0	5.8	5.4	4.0	16	7	27	143	358	294	123
10	Etelä-Savo	0.2	1.4	2.8	2.2	1.4	8	9	53	83	172	121	75
11	Itä-Savo	0	1.0	1.6	2.0	1.2	6	0	92	108	348	222	127
12	Pohjois-Karjala	0.2	1.8	4.4	3.6	2.6	13	6	39	82	199	159	74
13	Pohjois-Savo	0.4	4.2	11.4	7.2	4.0	27	7	60	151	284	169	110
14	Keski-Suomi	0.4	3.2	8.0	5.6	3.8	21	7	41	115	237	186	85
15	Etelä-Pohjanmaa	1.0	1.4	6.2	4.8	4.6	18	21	26	108	243	232	91
16	Vaasa	1.4	1.4	3.8	4.8	3.4	15	35	27	87	297	218	89
17	Keski-Pohjanmaa	0.4	1.0	3.4	2.2	1.4	8	20	45	158	294	205	108
18	Pohjois-Pohjanmaa	0.6	5.6	11.2	7.2	5.2	30	6	45	109	225	194	75
19	Kainuu	0	0.6	2.8	1.2	0.6	5	0	30	110	138	76	66
20	Länsi-Pohja	0.2	0.6	1.6	1.8	2.0	6	13	34	79	274	333	95
21	Lappi	0.2	0.4	3.4	2.8	1.2	8	8	12	90	227	118	68
22	Åland	0	0.2	1.6	1.2	0.6	4	0	24	199	428	256	129
Region South		3.0	21.4	56.6	38.2	26.2	145	7	34	111	240	216	79
Southwest		0.6	6.8	28.8	19.2	12.2	68	4	31	139	258	184	94
West		2.8	14.0	40.8	32.0	27.6	117	10	37	114	254	245	93
East		1.2	11.6	28.2	20.6	13.0	75	7	50	114	241	168	91
North		1.4	8.2	22.4	15.2	10.4	58	8	38	108	227	180	78
Entire country		9.0	62.0	176.8	125.2	89.4	462	7	37	116	244	205	86

*Average annual incidence of RRT in subgroup

Table 4 presents the average number of new RRT patients and incidence of RRT in 2008–2012 according to healthcare district, region, and age group. In most healthcare districts, the incidence was highest among 65–74-year-olds. In the age group of 75 years and older, the incidence varied considerably between healthcare districts and between regions. In small healthcare districts, chance may cause great variation in incidence of RRT in age groups. In seven healthcare districts, the average annual number of patients entering RRT was less than 10. Both the highest and the lowest incidence rates were observed among these healthcare districts.

Figure 2. Average annual incidence of RRT in healthcare districts and regions
Finnish Registry for Kidney Diseases 2008–2012

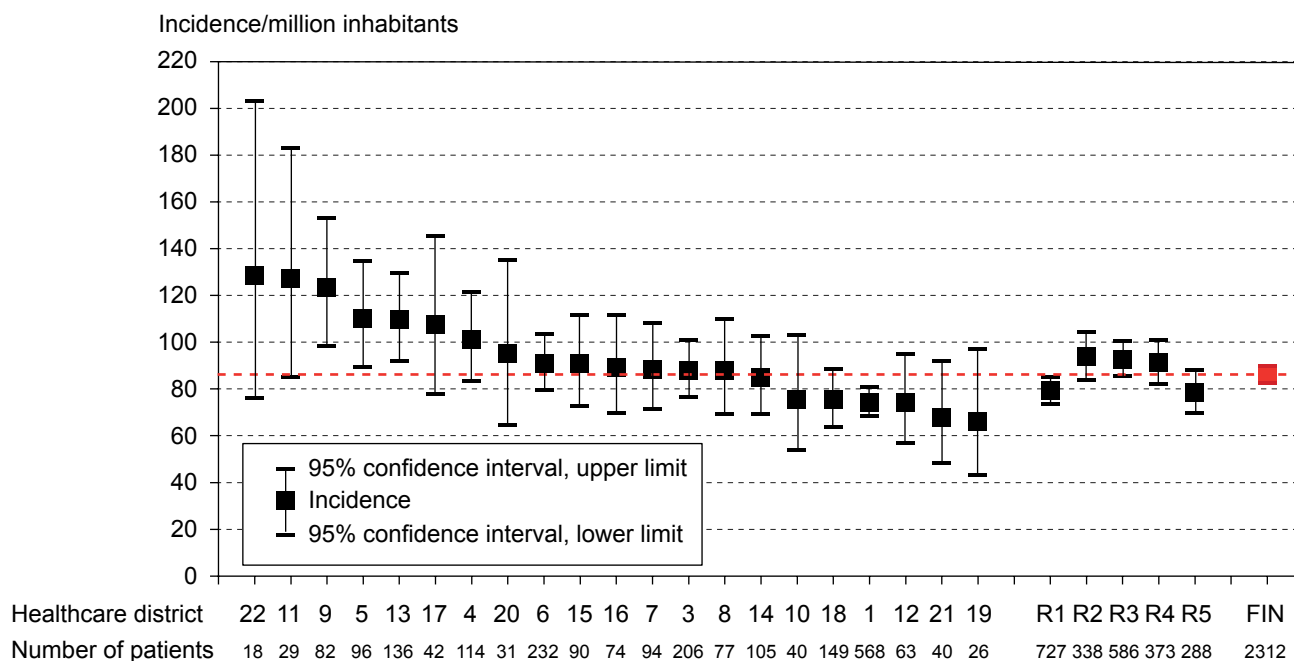


Figure 3. Age- and gender-standardized average annual incidence of RRT in healthcare districts and regions
Finnish Registry for Kidney Diseases 2008–2012

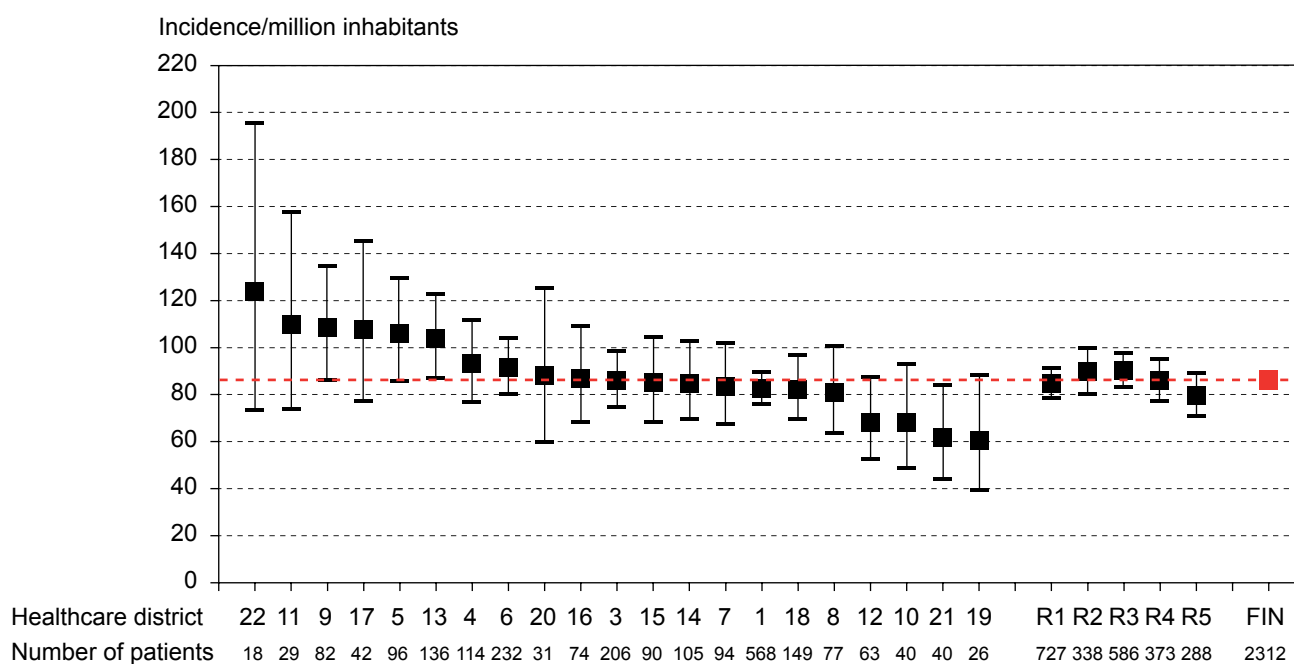


Figure 2 shows the average yearly incidence of RRT in 2008–2012 in healthcare districts and regions (see also Table 4). The figure displays the 95% confidence intervals of the incidence. The incidence varied in the range of 66–129 across the healthcare districts, with 78–94 new patients per million inhabitants in the regions.

In Figure 3, the average annual incidence in 2008–2012 in healthcare districts and regions has been age- and gender-standardized using the Finnish general population on 31 December 2012 as the reference population. Standardization decreased the differences in incidence in districts and regions.

Figure 4. Average annual incidence of RRT among those 75 years and older in healthcare districts and regions
Finnish Registry for Kidney Diseases 2008–2012

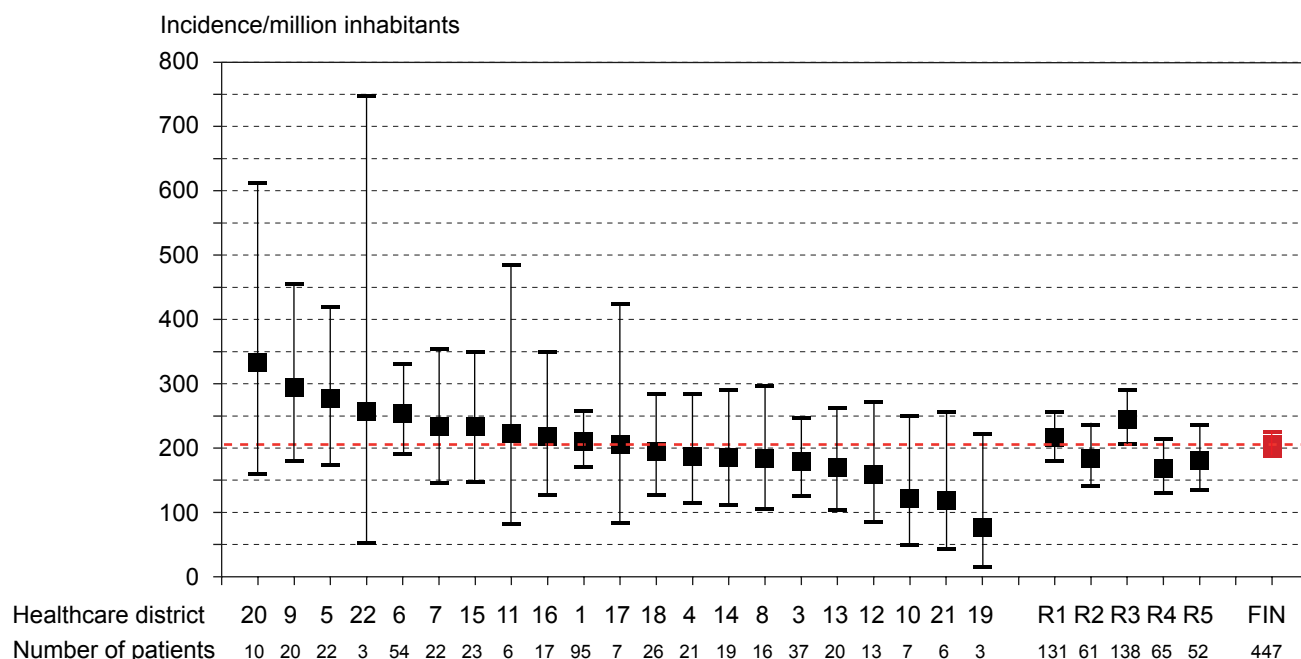


Figure 4 shows the average annual incidence of RRT in 2008–2012 in the age group of 75 years and older in healthcare districts and regions. In the entire country, the incidence was 205 (95% confidence interval 187–225) new patients per million inhabitants in the age group. The incidence varied in the range of 76–333 across the healthcare districts. The confidence intervals of the incidences in the healthcare districts are often wide due to the small numbers of patients, and all of the confidence intervals include the incidence estimate of the entire country.

In the Annual Report 2011 of the ERA-EDTA Registry

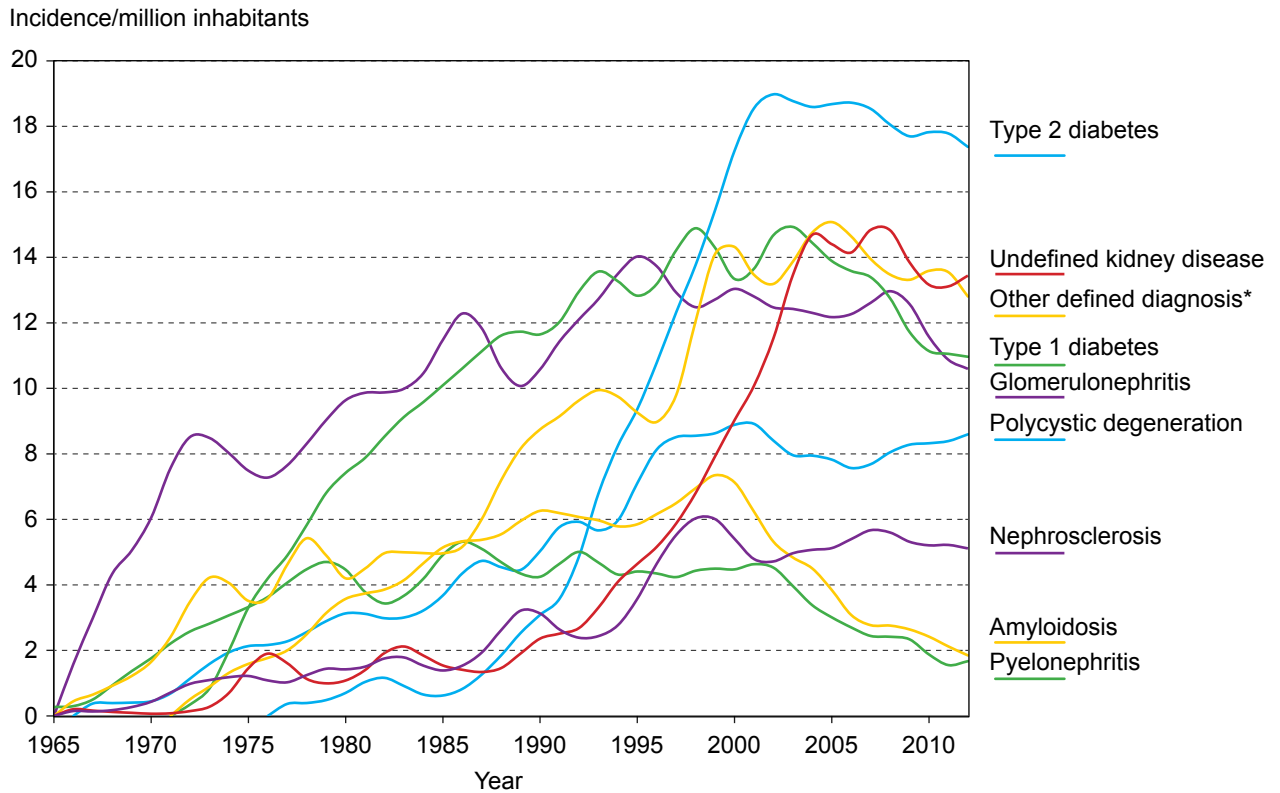
(<http://www.era-edta-reg.org>), the incidence of RRT by age groups in 2011 was reported for a few countries. The incidence of RRT in the age group of 75 years and older was the smallest in Finland, with 191 new RRT patients per million inhabitants. Among the countries compared, the second lowest incidence, 342, was in the United Kingdom. In Norway, Sweden, Denmark, and Iceland, the incidence was 384–426, i.e., twice as high as in Finland. In Belgium and Greece, the incidence among those 75 years and older exceeded 800 RRT patients per million inhabitants.

Table 5. Incidence of RRT by age group and gender
Finnish Registry for Kidney Diseases 2002–2012

Age group		Number of new RRT patients					Incidence/million inhabitants				
		2002	2007	2010	2011	2012	2002	2007	2010	2011	2012
0–19 y	Males	6	7	5	3	6	9	11	8	5	10
	Females	4	7	7	8	1	7	12	12	13	2
	Total	10	14	12	11	7	8	11	10	9	6
20–44 y	Males	50	46	38	37	38	57	53	44	43	44
	Females	31	23	18	20	20	37	28	22	24	24
	Total	81	69	56	57	58	47	41	33	34	34
45–64 y	Males	149	139	120	117	115	208	184	157	154	153
	Females	72	66	48	61	49	100	87	62	80	64
	Total	221	205	168	178	164	154	135	109	117	108
65–74 y	Males	75	75	92	88	83	381	353	391	351	313
	Females	44	35	41	43	27	180	140	152	151	90
	Total	119	110	133	131	110	270	238	263	244	195
≥75 y	Males	30	64	58	56	64	260	448	371	348	385
	Females	28	34	28	28	35	116	126	100	99	122
	Total	58	98	86	84	99	162	238	197	189	219
Total	Males	310	331	313	301	306	122	127	119	113	115
	Females	179	165	142	160	132	67	61	52	58	48
	Total	489	496	455	461	438	94	94	85	85	81

Table 5 shows the number of new RRT patients and the incidence of RRT according to age group and gender in 2002–2012. During recent years the incidence of RRT has been approximately twice as high in men as in women, and the difference has been especially large in those older than 75 years. In those 75 years and older, the incidence was 35% higher in 2012 than in 2002. In the younger age groups, the incidence was lower in 2012 than in 2002.

Figure 5. Incidence of RRT according to diagnosis
Finnish Registry for Kidney Diseases 1965–2012



*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 5. In the 1990s, the number of type 2 diabetes patients entering RRT increased rapidly, but since 2002 the number has stabilized. Since 1999, type 2 diabetes has been the most common cause of end-stage renal disease. Type 1 diabetes and glomerulonephritis are the second most common causes leading to initiation of

RRT. The incidence of RRT due to type 1 diabetes has decreased in recent years.

The annual number of amyloidosis patients entering RRT increased continuously up to the year 2000, thereafter decreasing substantially. The incidence of end-stage renal disease caused by pyelonephritis has also decreased.

Figure 6. International comparison of incidence of RRT in 2011
Finnish Registry for Kidney Diseases 2011

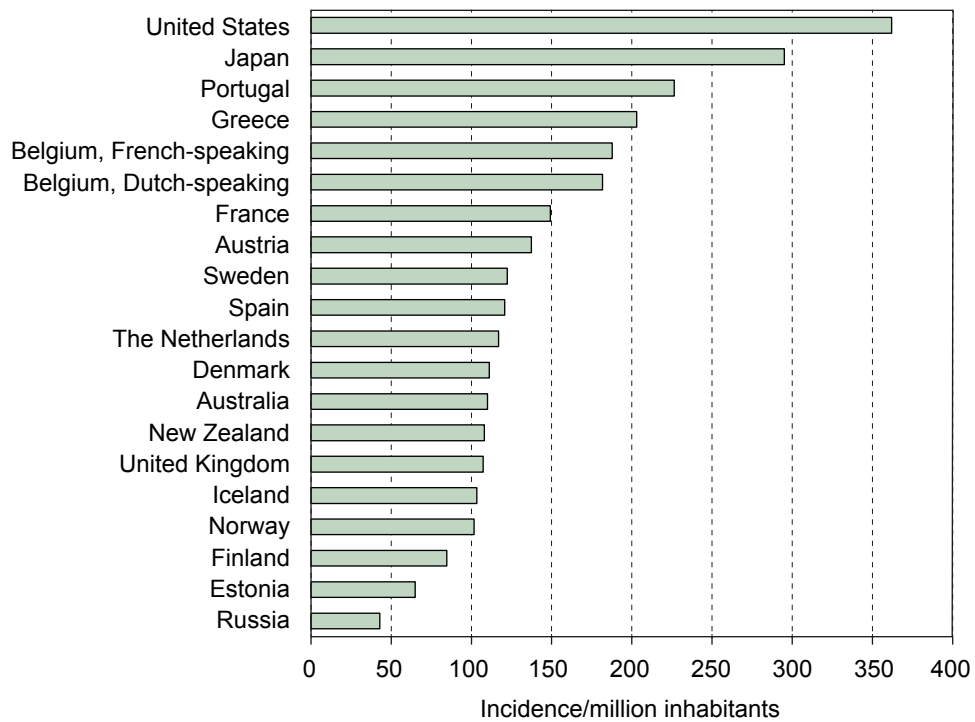


Figure 6 shows the incidence of RRT in 2011 in countries reporting to the ERA-EDTA Registry (Annual Report 2011, <http://www.era-edta-reg.org>) and in the United States, Australia, New Zealand, and Japan (The 2013 USRDS Annual Data Report Atlas, <http://www.usrds.org>). In 2011, the incidence of RRT in Finland was the lowest among the Nordic countries. Relative to Finland, the incidence in Sweden was 45% higher, in Denmark 41% higher, in Norway 20% higher, and in Iceland 22% higher.

Table 6. Patients on RRT at end of year according to healthcare district and region
Finnish Registry for Kidney Diseases 2002–2012

Healthcare district		Number of RRT patients					Prevalence of RRT/million inhabitants				
		2002	2007	2010	2011	2012	2002	2007	2010	2011	2012
1	Helsinki-Uusimaa	887	1029	1133	1158	1181	626	695	741	749	756
3	Varsinais-Suomi	296	367	397	403	411	651	793	847	857	871
4	Satakunta	181	219	237	231	225	785	964	1050	1025	1000
5	Kanta-Häme	88	115	135	144	145	530	671	773	822	826
6	Pirkanmaa	322	404	430	435	443	669	807	841	845	855
7	Päijät-Häme	121	164	178	176	175	578	776	836	825	820
8	Kymenlaakso	106	135	142	138	143	593	765	810	789	820
9	Etelä-Karjala	95	134	147	152	151	699	1001	1106	1147	1141
10	Etelä-Savo	65	81	89	90	86	586	752	840	853	821
11	Itä-Savo	33	42	49	50	49	677	898	1074	1105	1092
12	Pohjois-Karjala	120	136	136	136	131	689	796	801	801	773
13	Pohjois-Savo	231	221	222	234	241	917	888	895	943	971
14	Keski-Suomi	131	145	160	168	166	548	593	644	674	663
15	Etelä-Pohjanmaa	101	110	120	133	137	507	553	605	669	689
16	Vaasa	82	105	117	118	119	509	643	704	705	708
17	Keski-Pohjanmaa	32	51	61	59	60	413	657	782	755	767
18	Pohjois-Pohjanmaa	236	265	286	283	283	631	685	723	711	706
19	Kainuu	62	73	62	61	61	743	910	788	782	788
20	Länsi-Pohja	47	59	63	58	53	700	896	965	892	820
21	Lappi	69	77	75	85	82	572	649	635	718	694
22	Åland	17	16	24	27	29	647	589	857	952	1018
Region	South	1088	1298	1422	1448	1475	629	725	774	782	789
	Southwest	494	602	658	661	665	694	840	911	913	917
	West	714	898	980	1006	1019	587	721	776	793	800
	East	580	625	656	678	673	703	763	802	829	823
	North	446	525	547	546	539	617	720	744	740	729
Entire country		3322	3948	4263	4339	4371	638	745	793	803	805

Table 6 presents the number of RRT patients and the prevalence of RRT on 31 December 2002–2012. In the entire country, the prevalence at the end of 2012 was 805 RRT patients per million inhabitants; it had increased by 26% from 2002 and by 8% from 2007. On 31 December 2012, the prevalence was the highest in the southwestern region and the lowest in the northern region. In the healthcare districts, the prevalence varied between 663 and 1141 patients per million inhabitants.

Table 7. Patients on RRT according to age group and gender
Finnish Registry for Kidney Diseases 2002–2012

Age group		Number of RRT patients					Prevalence of RRT/million inhabitants				
		2002	2007	2010	2011	2012	2002	2007	2010	2011	2012
0–19 y	Males	79	77	70	66	64	124	123	112	106	103
	Females	43	58	54	55	51	70	97	90	92	86
	Total	122	135	124	121	115	98	110	102	99	95
20–44 y	Males	425	442	427	425	409	485	514	497	494	474
	Females	320	285	265	252	244	380	346	324	308	297
	Total	745	727	692	677	653	434	432	413	403	388
45–64 y	Males	970	1161	1245	1239	1221	1351	1538	1627	1631	1621
	Females	584	701	707	724	714	810	922	915	944	939
	Total	1554	1862	1952	1963	1935	1080	1229	1269	1286	1279
65–74 y	Males	362	443	607	651	686	1840	2084	2579	2598	2583
	Females	285	283	356	365	370	1169	1132	1318	1279	1234
	Total	647	726	963	1016	1056	1468	1569	1905	1896	1868
≥75 y	Males	129	300	333	351	387	1116	2099	2129	2179	2328
	Females	125	198	199	211	225	516	734	713	746	785
	Total	254	498	532	562	612	710	1207	1221	1267	1351
Total	Males	1965	2423	2682	2732	2767	772	933	1017	1030	1038
	Females	1357	1525	1581	1607	1604	510	564	578	585	581
	Total	3322	3948	4263	4339	4371	638	745	793	803	805

Figure 7. Standardized prevalence of RRT in regions
Finnish Registry for Kidney Diseases 2002–2012

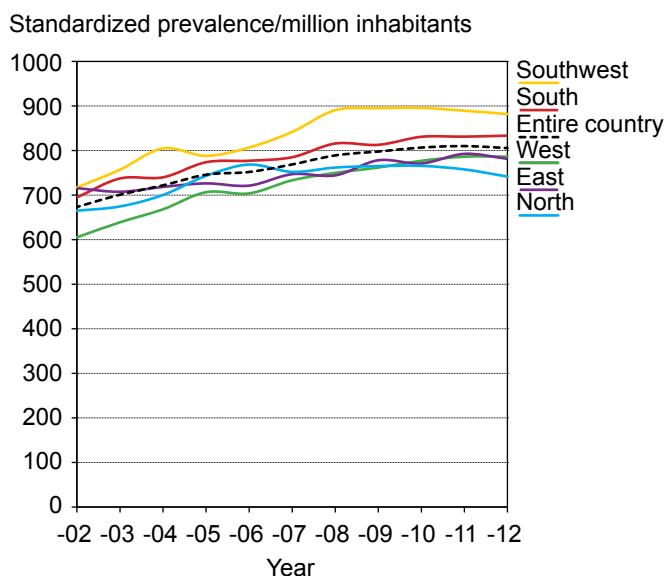
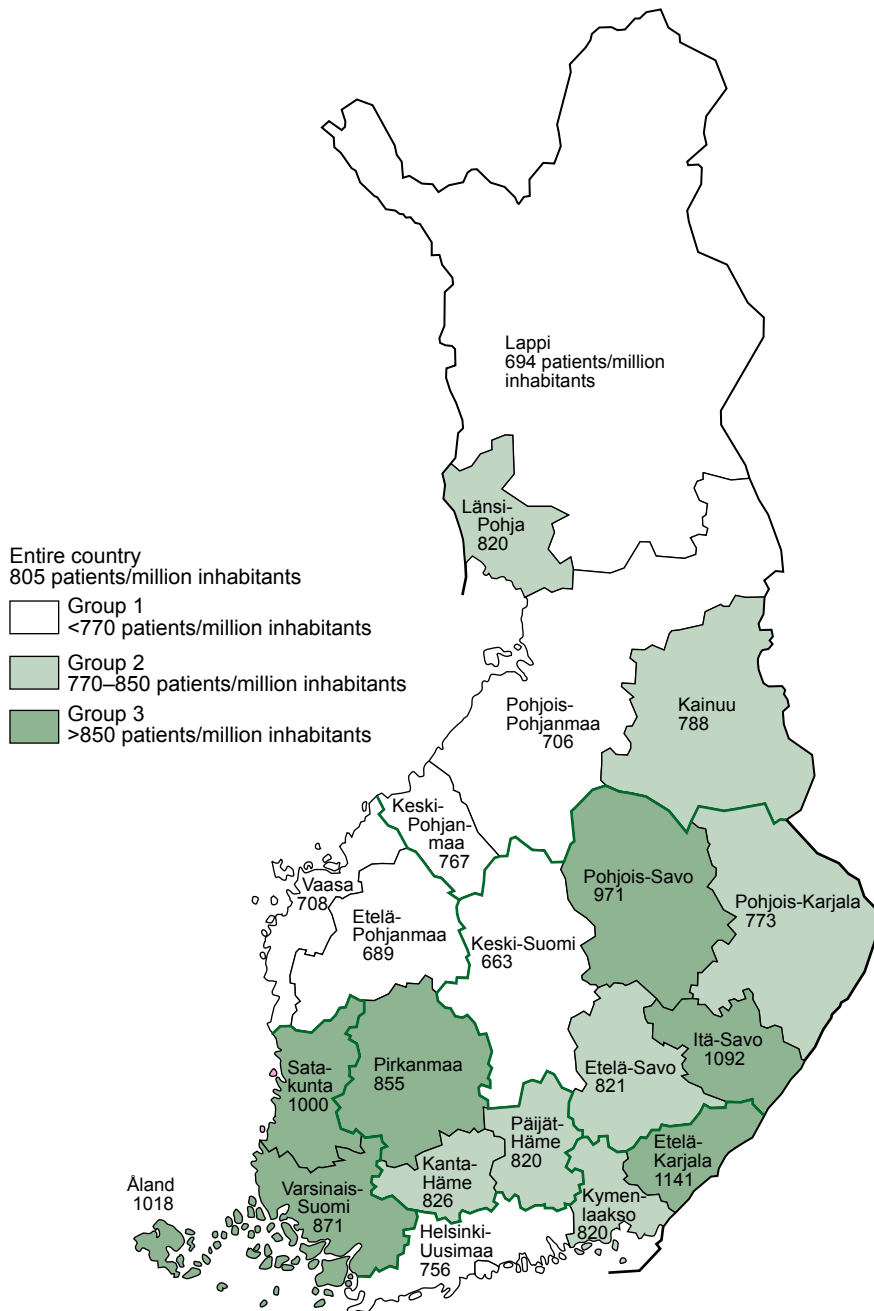


Table 7 shows the number of RRT patients and the prevalence of RRT on 31 December 2002–2012 according to age group and gender. The prevalence has increased by 26% since 2002. In the age group 75 years and older, the prevalence of RRT has increased by 90%. In 45–74-year-olds, the prevalence has increased by 18–27%. In 20–44-year-olds, the prevalence has decreased by 11%. The highest prevalence, observed among men aged 65–74 years at the end of 2012, was 2583 cases per million inhabitants. At the end of 2012, the prevalence was 79% greater among men than women, and the gender difference was even more pronounced in the oldest age group, in which it was three-fold in men compared with women.

Figure 7 shows the age- and gender-standardized prevalence rates for 2002–2012 using the Finnish general population on 31 December 2012 as the reference population. Population changes during this period have been taken into consideration. The prevalence differences between regions diminish slightly after standardization, but also in this analysis the prevalence is greatest in the southwestern region.

Figure 8. Prevalence of RRT on 31 December 2012
Finnish Registry for Kidney Diseases 2012



The healthcare districts shown on the map are grouped according to the prevalence of RRT at the end of 2012 (Figure 8). The prevalence per million inhabitants was <770 in seven districts, 770–850 in seven districts, and >850 in seven districts. The borders of the regions are indicated with thick lines.

Figure 9. International comparison of prevalence of RRT on 31 December 2011
Finnish Registry for Kidney Diseases 2011

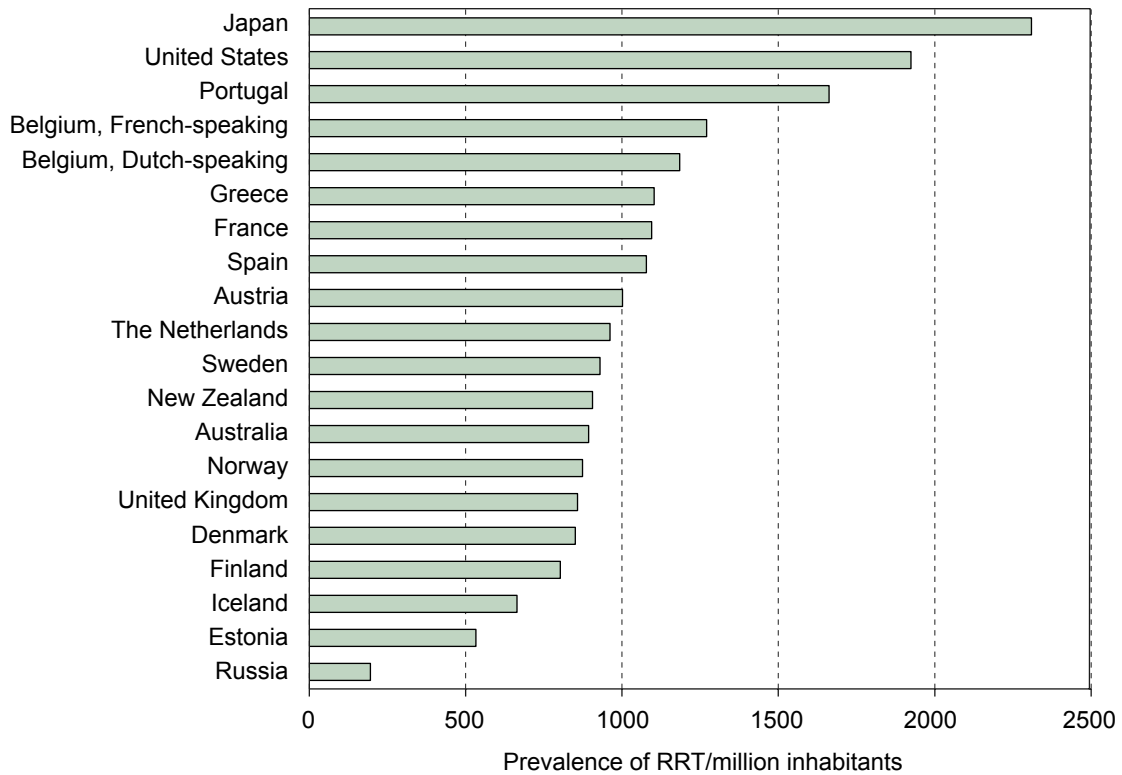


Figure 9 displays the prevalence of RRT on 31 December 2011 in countries reporting to the ERA-EDTA Registry (Annual Report 2011, <http://www.era-edta-reg.org>) and in the United States, Australia, New Zealand, and Japan (The 2013 USRDS Annual Data Report Atlas, <http://www.usrds.org>). The prevalence rate in Finland was the fourth lowest internationally and the second lowest of the Nordic countries. Relative to Finland, the prevalence in Sweden was 16% higher, in Norway 9% higher, and in Denmark 6% higher. Figure 6 shows the international incidence rates.

Table 8. Number of patient-years of all RRT patients according to diagnosis and type of treatment
Finnish Registry for Kidney Diseases 2002–2012

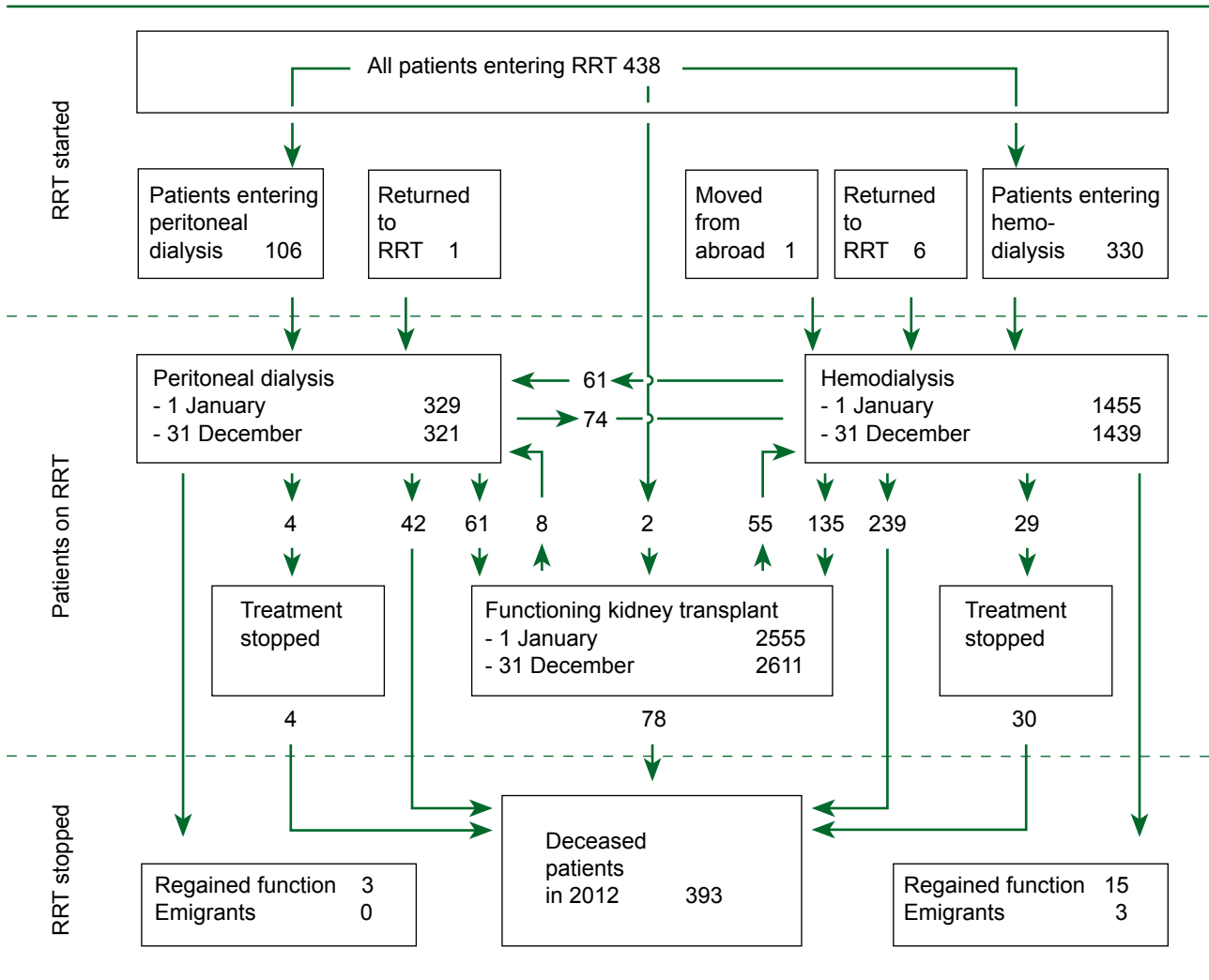
Diagnosis	Number of patient-years in 2002 (%)				Number of patient-years in 2012 (%)			
	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total
Glomerulonephritis	54 (20.2)	171 (16.1)	576 (29.7)	801 (24.5)	62 (19.2)	221 (15.4)	680 (26.2)	964 (22.1)
Type 1 diabetes	62 (23.2)	115 (10.9)	384 (19.8)	561 (17.2)	72 (22.4)	160 (11.1)	477 (18.4)	710 (16.3)
Polycystic degeneration	21 (7.7)	112 (10.6)	284 (14.6)	417 (12.7)	22 (6.9)	121 (8.4)	448 (17.2)	591 (13.6)
Type 2 diabetes	35 (13.2)	197 (18.7)	27 (1.4)	260 (7.9)	44 (13.6)	291 (20.2)	85 (3.3)	420 (9.6)
Undefined kidney disease	19 (7.0)	113 (10.7)	59 (3.0)	191 (5.8)	45 (13.9)	235 (16.3)	139 (5.4)	419 (9.6)
Pyelonephritis	20 (7.3)	63 (6.0)	203 (10.4)	285 (8.7)	9 (2.7)	53 (3.7)	188 (7.2)	249 (5.7)
Nephrosclerosis	17 (6.1)	69 (6.5)	42 (2.2)	127 (3.9)	18 (5.5)	94 (6.6)	76 (2.9)	188 (4.3)
Other systemic diseases	9 (3.5)	36 (3.4)	54 (2.8)	100 (3.1)	14 (4.3)	62 (4.3)	98 (3.8)	174 (4.0)
Urinary tract obstruction	4 (1.5)	29 (2.7)	79 (4.1)	112 (3.4)	9 (2.9)	53 (3.7)	97 (3.8)	160 (3.7)
Congenital diseases	6 (2.3)	13 (1.2)	84 (4.3)	102 (3.1)	7 (2.2)	21 (1.5)	97 (3.7)	126 (2.9)
Congenital nephrosis, Finnish type	6 (2.2)	0 (0.0)	49 (2.5)	55 (1.7)	5 (1.5)	5 (0.4)	74 (2.8)	84 (1.9)
Other kidney diseases	6 (2.2)	28 (2.6)	18 (0.9)	52 (1.6)	7 (2.2)	38 (2.6)	37 (1.4)	82 (1.9)
Amyloidosis	5 (2.0)	76 (7.2)	45 (2.3)	126 (3.9)	2 (0.7)	33 (2.3)	38 (1.5)	74 (1.7)
Tubulointerstitial nephritis	2 (0.7)	13 (1.2)	32 (1.6)	47 (1.4)	1 (0.5)	17 (1.2)	35 (1.3)	53 (1.2)
Malignancies	2 (0.6)	17 (1.6)	2 (0.1)	20 (0.6)	3 (1.1)	29 (2.0)	10 (0.4)	43 (1.0)
Metabolic diseases	1 (0.3)	5 (0.5)	7 (0.3)	13 (0.4)	2 (0.5)	5 (0.3)	15 (0.6)	21 (0.5)
All	269 (100)	1057 (100)	1942 (100)	3268 (100)	322 (100)	1440 (100)	2596 (100)	4358 (100)

Table 8 presents the number of patient-years according to diagnosis of kidney disease and type of treatment in 2002 and 2012. The number of patient-years indicates time spent by patients in RRT during the year. Overall, the number of patient-years has increased by 33% since 2002. The number of patient-years has increased by 20% in peritoneal dialysis, by 36% in hemodialysis, and by 33% 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 2012. 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 62% during the past decade, and in 2012, type 2 diabetes was the most common kidney disease diagnosis among hemodialysis patients. Among kidney transplantation patients, type 2 diabetes is a rare cause of end-stage renal disease. The proportion of patient-years due to amyloidosis has decreased since 2002. The proportion of undefined kidney disease was only 3% in 2002, but had increased to 10% in 2012.

Figure 10. Net changes in type of treatment
Finnish Registry for Kidney Diseases 2012



During 2012 altogether 438 new patients entered RRT (Figure 10), and seven patients returned to RRT. In all, 4339 patients were receiving RRT at the beginning of the year. Altogether 393 patients died and dialysis was discontinued for 18 patients because patients' own kidney function resumed. Of those who died, 78 had a functioning transplant, 42 were receiving peritoneal dialysis, and 239 were on hemodialysis. RRT was discontinued for 34 uremic patients, and the treatment of one patient who died in 2012 had been discontinued in 2011. At the end of 2012 the number

of peritoneal dialysis and hemodialysis patients was slightly smaller than at the beginning of the year.

A total of 199 patients received a kidney transplant. Eight of these patients received a combined pancreas and kidney transplantation, one received a combined heart and kidney transplantation, and one received a combined lung and kidney transplantation (source: Kidney Transplantation Unit, Helsinki University Central Hospital). Eleven kidney transplants were received from living donors.

Table 9. Mortality of RRT patients by region
Finnish Registry for Kidney Diseases 2002–2012

Region	Deaths/1000 patient-years						Deaths/1000 patient-years ¹⁾					
	2002	2007	2010	2011	2012	2008–2012	2002	2007	2010	2011	2012	2008–2012
South	96	92	69	72	78	75	94	88	68	71	75	73
Southwest	106	78	73	87	93	83	97	78	72	86	93	82
West	129	94	100	111	91	98	124	88	94	107	91	95
East	110	93	97	92	105	97	103	93	94	92	103	96
North	92	119	88	94	100	96	87	119	88	92	96	94
Entire country	106	94	83	89	90	87	101	91	81	87	88	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 2002–2012

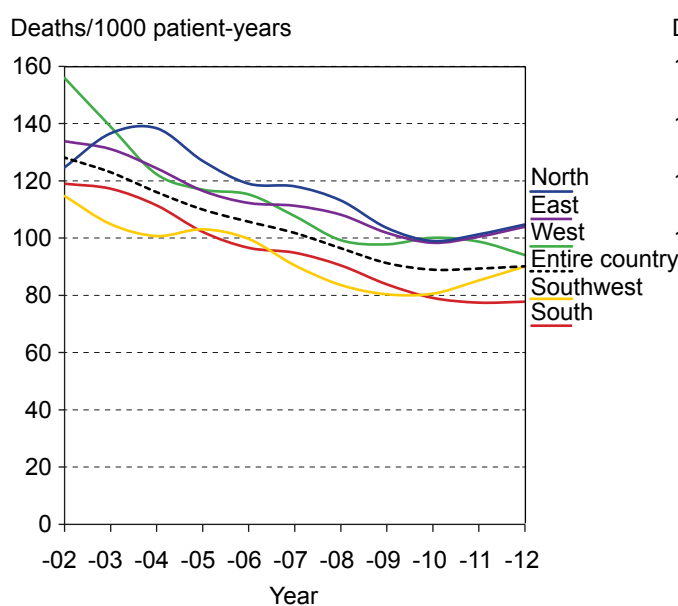


Figure 12. Standardized mortality of RRT patients by region (patients who died within 90 days of start of RRT excluded)
Finnish Registry for Kidney Diseases 2002–2012

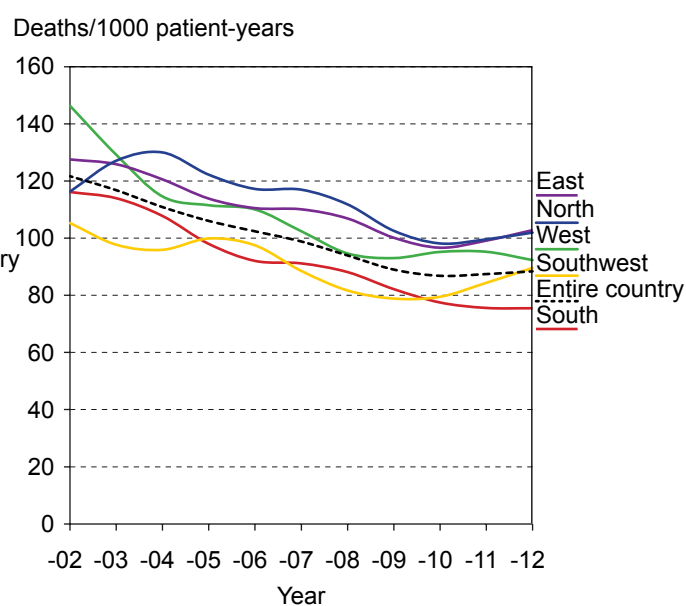


Table 9 shows RRT patients' mortality in 2002–2012 according to region. The mortality of patients who had been on RRT for at least 90 days is presented separately. The average mortality in 2008–2012 was lower in the southern and southwestern regions than elsewhere. Figures 11 and 12 show regional mortality as smoothed averages. The regional mortality rates for 2002–2012 have been age- and gender-standardized using all patient-years

in 2012 as the reference. Changes in age and gender 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. The standardized mortality rate has long been decreasing in all regions, but after 2010 mortality has no longer decreased. Standardized mortality was lower in the southern region than elsewhere.

Table 10. Number of RRT patients older than 20 years in hospitals
Finnish Registry for Kidney Diseases 2012

Region	Healthcare district	Hospital	No. of RRT patients (≥20 y) 31 Dec 2012			
			PD	HD	Tx	Total
South (R1)						
	Helsinki-Uusimaa (1)		93	484	861	1438
		Helsinki University Central Hospital	73	364	720	1157
		Nephrology Polyclinic			604	604
		Dialysis unit DHK		61		61
		Dialysis unit DOK	73	76		149
		B. Braun Malmi		63		63
		B. Braun Pitäjänmäki		57		57
		Unit of Transplantation and Liver Surgery			20	20
		Hyvinkää Hospital		32	28	60
		Lohja Hospital		26	25	51
		Länsi-Uusimaa Hospital		21	19	40
		Porvoo Hospital		28	24	52
	Kymenlaakso (8)		15	59	60	134
		Kymenlaakso Central Hospital	15	59	60	134
	Etelä-Karjala (9)		5	61	81	147
		South Karelia Central Hospital	5	43	81	129
		Honkajarju Hospital		18		18
Southwest (R2)						
	Varsinais-Suomi (3)		65	198	388	651
		Turku University Central Hospital	45	120	237	402
	Satakunta (4)		20	64	136	220
		Satakunta Central Hospital	20	64	136	220
	Åland (22)			14	15	29
		Åland Central Hospital		14	15	29
West (R3)						
	Kanta-Häme (5)		66	357	543	966
		Central Hospital of Tavastia	16	51	75	142
	Pirkanmaa (6)		16	51	75	142
		Tampere University Hospital	20	140	237	397
		Valkeakoski Regional Hospital		18	2	20
	Päijät-Häme (7)		12	56	104	172
		Päijänne Tavastia Central Hospital	12	56	104	172
	Etelä-Pohjanmaa (15)		10	52	65	127
		Southern Ostrobothnia Central Hospital	10	52	65	127
	Vaasa (16)		8	40	60	108
		Vaasa Central Hospital	8	33	57	98
		Pietarsaari Hospital		7	3	10
East (R4)						
	Etelä-Savo (10)		44	231	398	673
		Mikkeli Central Hospital	4	26	43	73
	Itä-Savo (11)		3	18	34	55
		Central hospital of Savonlinna	3	18	34	55
	Pohjois-Karjala (12)		6	41	80	127
		North Karelia Central Hospital	6	41	80	127
	Pohjois-Savo (13)		9	90	143	242
		Kuopio University Hospital	9	54	125	188
		Regional Hospital of Iisalmi		22	10	32
		Regional Hospital of Varkaus		14	8	22
	Keski-Suomi (14)		22	56	98	176
		Central Finland Central Hospital	22	56	98	176
North (R5)						
	Keski-Pohjanmaa (17)		45	165	318	528
		Central Hospital of Keski-Pohjanmaa	2	26	36	64
	Pohjois-Pohjanmaa (18)		2	26	36	64
		Oulu University Hospital	22	81	168	271
	Kainuu (19)		22	81	168	271
		Kainuu Central Hospital	6	15	41	62
	Länsi-Pohja (20)		6	15	41	62
		Central Hospital of Länsi-Pohja	7	20	27	54
	Lapland (21)		7	20	27	54
		Lapland Central Hospital	8	23	46	77
		Lapland Central Hospital	8	23	46	77
Entire country			313	1435	2508	4256

At the end of 2012, dialysis and kidney transplantation patients were treated and followed up in 30 hospitals in 21 healthcare districts in five regions (Table 10). In the initial portion of this report, the healthcare district of the patient is determined according to place of residence. In the analysis

of treatment quality on pages 22–36, healthcare district of the patient is determined according to treating hospital. In the entire country 98%, of the patients lived in the same healthcare district where they were treated.

Table 11. Number of RRT patients older than 20 years at 90 days from start of RRT according to type of treatment in healthcare districts and regions
Finnish Registry for Kidney Diseases 2008–2012

Healthcare district		Number of patients (%) at 90 days from start of RRT in 2008–2012						
		CAPD	APD	Home HD	In-center HD	HDF	Tx	Total
1	Helsinki-Uusimaa	64 (12)	87 (16)	45 (8)	334 (61)	20 (4)	2 (0)	552 (100)
3	Varsinais-Suomi	44 (22)	35 (18)	1 (1)	117 (59)	3 (2)	0 (0)	200 (100)
4	Satakunta	37 (34)	11 (10)	0 (0)	59 (54)	2 (2)	0 (0)	109 (100)
5	Kanta-Häme	8 (9)	26 (30)	0 (0)	51 (58)	2 (2)	1 (1)	88 (100)
6	Pirkanmaa	24 (11)	24 (11)	3 (1)	167 (76)	1 (0)	0 (0)	219 (100)
7	Päijät-Häme	10 (11)	10 (11)	0 (0)	73 (78)	0 (0)	0 (0)	93 (100)
8	Kymenlaakso	6 (8)	22 (29)	0 (0)	48 (62)	0 (0)	1 (1)	77 (100)
9	Etelä-Karjala	3 (4)	5 (7)	3 (4)	63 (85)	0 (0)	0 (0)	74 (100)
10	Etelä-Savo	4 (11)	1 (3)	0 (0)	30 (83)	1 (3)	0 (0)	36 (100)
11	Itä-Savo	5 (15)	1 (3)	0 (0)	28 (82)	0 (0)	0 (0)	34 (100)
12	Pohjois-Karjala	10 (17)	11 (19)	0 (0)	38 (64)	0 (0)	0 (0)	59 (100)
13	Pohjois-Savo	9 (7)	28 (21)	7 (5)	86 (64)	3 (2)	2 (1)	135 (100)
14	Keski-Suomi	12 (11)	20 (18)	0 (0)	80 (71)	0 (0)	0 (0)	112 (100)
15	Etelä-Pohjanmaa	12 (17)	3 (4)	0 (0)	52 (73)	4 (6)	0 (0)	71 (100)
16	Vaasa	3 (4)	13 (19)	0 (0)	48 (72)	2 (3)	1 (1)	67 (100)
17	Keski-Pohjanmaa	5 (12)	0 (0)	0 (0)	35 (83)	2 (5)	0 (0)	42 (100)
18	Pohjois-Pohjanmaa	12 (8)	27 (19)	0 (0)	102 (72)	1 (1)	0 (0)	142 (100)
19	Kainuu	3 (12)	8 (31)	0 (0)	15 (58)	0 (0)	0 (0)	26 (100)
20	Länsi-Pohja	6 (21)	4 (14)	0 (0)	14 (48)	5 (17)	0 (0)	29 (100)
21	Lappi	15 (43)	2 (6)	0 (0)	18 (51)	0 (0)	0 (0)	35 (100)
22	Åland	0 (0)	0 (0)	0 (0)	17 (100)	0 (0)	0 (0)	17 (100)
Region South		73 (10)	114 (16)	48 (7)	445 (63)	20 (3)	3 (0)	703 (100)
Southwest		81 (25)	46 (14)	1 (0)	193 (59)	5 (2)	0 (0)	326 (100)
West		57 (11)	76 (14)	3 (1)	391 (73)	9 (2)	2 (0)	538 (100)
East		40 (11)	61 (16)	7 (2)	262 (70)	4 (1)	2 (1)	376 (100)
North		41 (15)	41 (15)	0 (0)	184 (67)	8 (3)	0 (0)	274 (100)
Entire country		292 (13)	338 (15)	59 (3)	1475 (67)	46 (2)	7 (0)	2217 (100)

Table 11 shows the number of RRT patients at 90 days from start of RRT in 2008–2012 according to type of treatment in healthcare districts and regions. Of the 2217 patients, only seven (0.3%) 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 69% were on either in-center hemodialysis (in-center HD) or hemodiafiltration (HDF).

Figure 13. 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 2008–2012

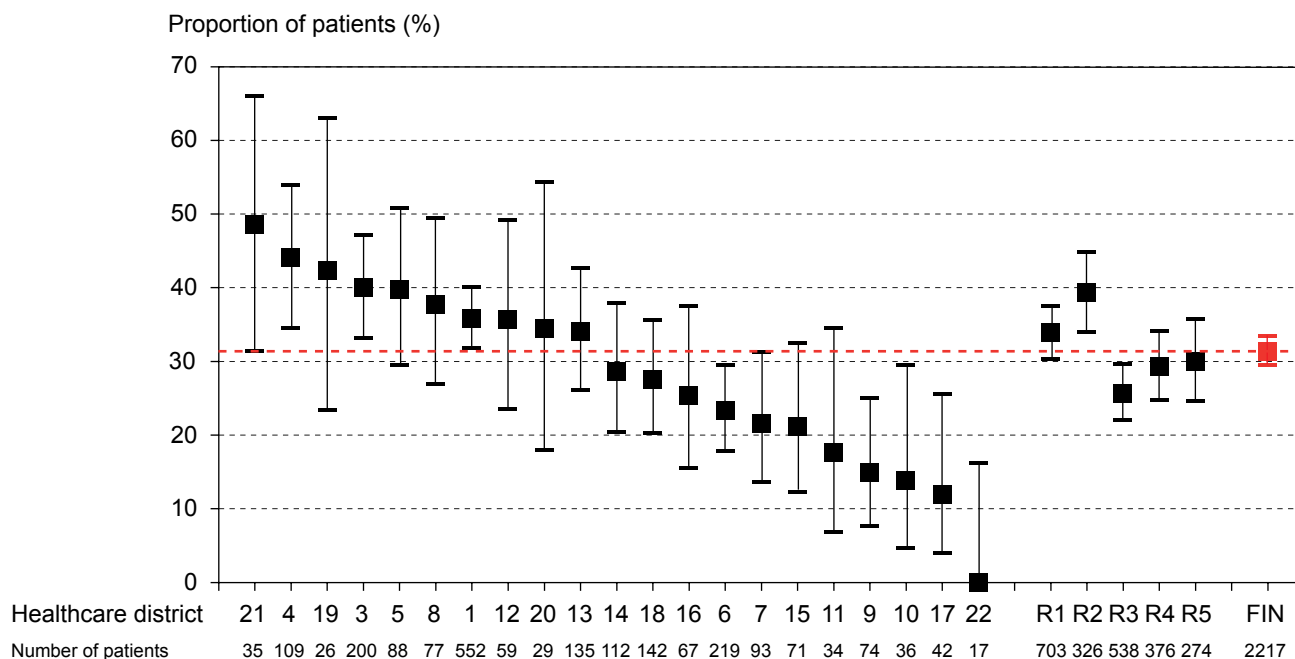


Figure 13 shows the proportion of home dialysis (peritoneal dialysis and home hemodialysis) and kidney transplantation patients of all RRT patients at 90 days from start of RRT in 2008–2012. The proportion varied significantly between healthcare districts ($P < 0.001$) and regions ($P < 0.001$).

Table 12. Number of RRT patients older than 20 years at end of year according to type of treatment in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012

Healthcare district		Number of patients on 31 December 2012 (%)						Total
		CAPD	APD	Home HD	In-center HD	HDF	Tx	
1	Helsinki-Uusimaa	28 (2)	45 (4)	41 (4)	250 (22)	73 (6)	720 (62)	1157 (100)
3	Varsinais-Suomi	22 (5)	23 (6)	11 (3)	68 (17)	41 (10)	237 (59)	402 (100)
4	Satakunta	11 (5)	9 (4)	3 (1)	51 (23)	10 (5)	136 (62)	220 (100)
5	Kanta-Häme	3 (2)	13 (9)	1 (1)	37 (26)	13 (9)	75 (53)	142 (100)
6	Pirkanmaa	10 (2)	10 (2)	5 (1)	125 (30)	28 (7)	239 (57)	417 (100)
7	Päijät-Häme	3 (2)	9 (5)	3 (2)	48 (28)	5 (3)	104 (60)	172 (100)
8	Kymenlaakso	3 (2)	12 (9)	4 (3)	45 (34)	10 (7)	60 (45)	134 (100)
9	Etelä-Karjala	2 (1)	3 (2)	8 (5)	38 (26)	15 (10)	81 (55)	147 (100)
10	Etelä-Savo	4 (5)	0 (0)	0 (0)	18 (25)	8 (11)	43 (59)	73 (100)
11	Itä-Savo	1 (2)	2 (4)	0 (0)	15 (27)	3 (5)	34 (62)	55 (100)
12	Pohjois-Karjala	4 (3)	2 (2)	1 (1)	40 (31)	0 (0)	80 (63)	127 (100)
13	Pohjois-Savo	3 (1)	6 (2)	7 (3)	69 (29)	14 (6)	143 (59)	242 (100)
14	Keski-Suomi	6 (3)	16 (9)	4 (2)	46 (26)	6 (3)	98 (56)	176 (100)
15	Etelä-Pohjanmaa	7 (6)	3 (2)	0 (0)	23 (18)	29 (23)	65 (51)	127 (100)
16	Vaasa	2 (2)	6 (6)	0 (0)	34 (31)	6 (6)	60 (56)	108 (100)
17	Keski-Pohjanmaa	1 (2)	1 (2)	0 (0)	12 (19)	14 (22)	36 (56)	64 (100)
18	Pohjois-Pohjanmaa	4 (1)	18 (7)	1 (0)	77 (28)	3 (1)	168 (62)	271 (100)
19	Kainuu	4 (6)	2 (3)	0 (0)	10 (16)	5 (8)	41 (66)	62 (100)
20	Länsi-Pohja	5 (9)	2 (4)	0 (0)	3 (6)	17 (31)	27 (50)	54 (100)
21	Lappi	8 (10)	0 (0)	3 (4)	20 (26)	0 (0)	46 (60)	77 (100)
22	Åland	0 (0)	0 (0)	1 (3)	12 (41)	1 (3)	15 (52)	29 (100)
Region South		33 (2)	60 (4)	53 (4)	333 (23)	98 (7)	861 (60)	1438 (100)
Southwest		33 (5)	32 (5)	15 (2)	131 (20)	52 (8)	388 (60)	651 (100)
West		25 (3)	41 (4)	9 (1)	267 (28)	81 (8)	543 (56)	966 (100)
East		18 (3)	26 (4)	12 (2)	188 (28)	31 (5)	398 (59)	673 (100)
North		22 (4)	23 (4)	4 (1)	122 (23)	39 (7)	318 (60)	528 (100)
Entire country		131 (3)	182 (4)	93 (2)	1041 (24)	301 (7)	2508 (59)	4256 (100)

Table 12 presents the number of RRT patients older than 20 years according to type of treatment in healthcare districts and regions at the end of 2012. The proportion of peritoneal dialysis patients was the greatest in the healthcare district of Länsi-Pohja, where 9% of all RRT patients were on continuous ambulatory peritoneal dialysis (CAPD) and 4% were on automatic peritoneal dialysis (APD). The proportion of patients on home hemodialysis (home HD) was largest, 5%, in the healthcare district of Etelä-Karjala. The proportion of kidney transplantation patients varied between 45% and

66% in the healthcare districts, but no significant difference between the districts was observed ($P=0.319$ in age- and gender-adjusted analysis using binary logistic regression).

Of all RRT patients aged 20 years or older, 23% were on home dialysis (CAPD, APD, or home HD) at the end of 2012. The proportion of home dialysis was higher than 30% in three healthcare districts (Lapland, Satakunta, and Keski-Suomi) and lower than 15% in six healthcare districts ($P=0.001$).

Figure 14. Hemoglobin distribution of dialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2002–2012

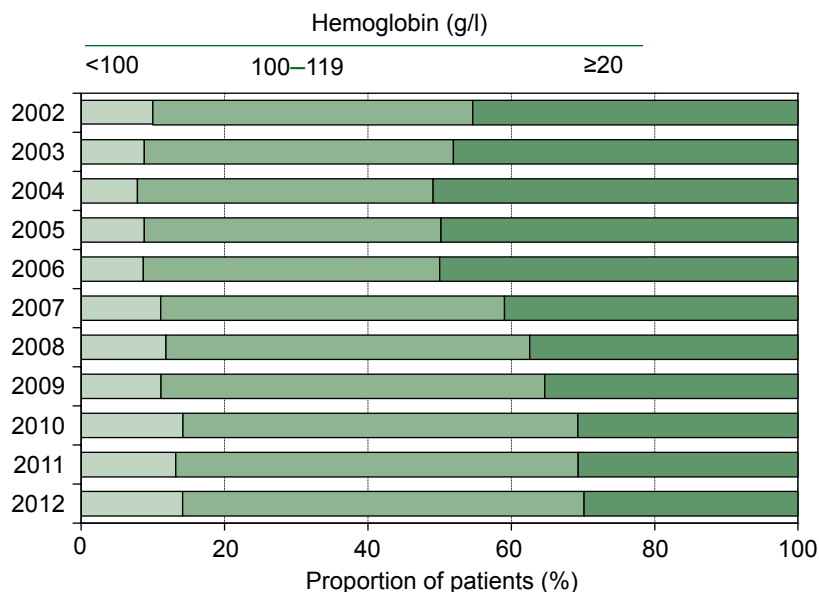
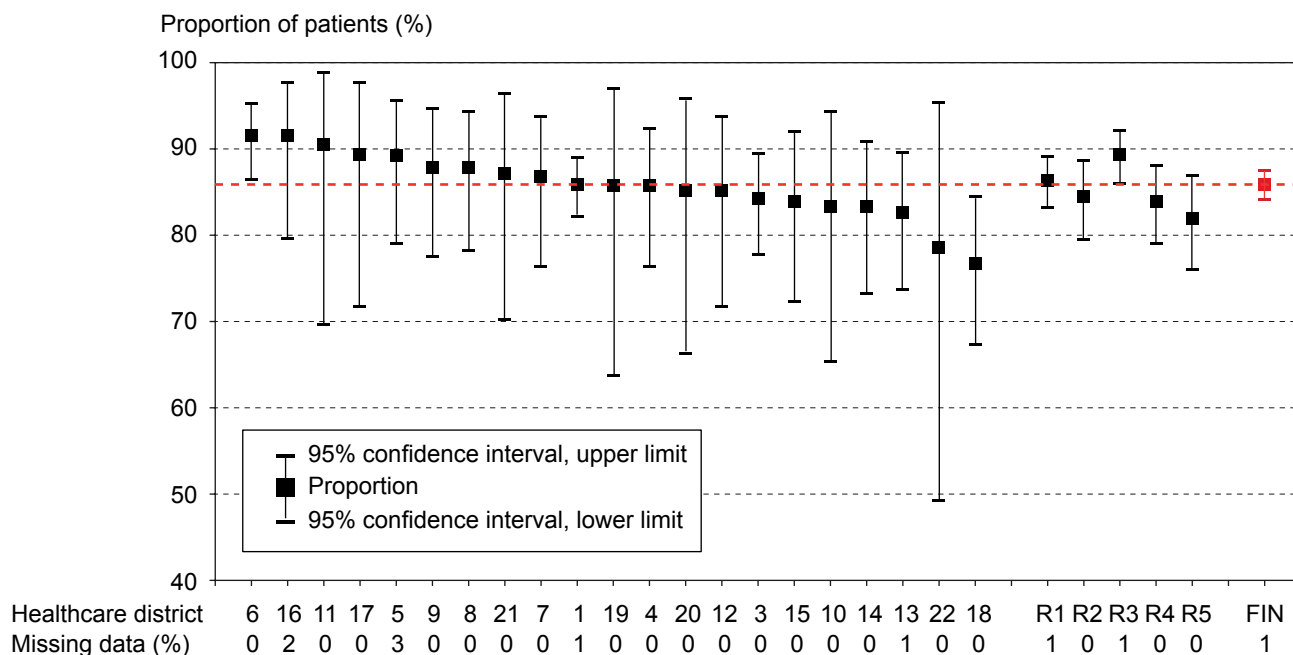


Figure 15. Proportion of dialysis patients older than 20 years with hemoglobin concentration ≥ 100 g/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012



Several guidelines exist regarding the target for blood hemoglobin concentration among 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 erythropoiesis-stimulating agents (ESA) 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 Finnish Registry for Kidney Diseases stores information on ESA only at start of RRT, not at the

end of each calendar year. Thus, patients on ESA cannot be analyzed separately, and Figures 14 and 15 include all dialysis patients.

At the end of 2012, 56% of dialysis patients had a hemoglobin concentration of 100–119 g/l, and 86% had a concentration of 100 g/l or higher (Figure 14). Patients' hemoglobin concentration was somewhat lower than ten years earlier.

In Figure 15, the hemoglobin target is 100 g/l or higher. At the end of 2012, the proportion of dialysis patients reaching this target varied from 77% to 92% in the healthcare districts ($P=0.620$) and from 82% to 89% in the regions ($P=0.086$). Men more frequently than women had a hemoglobin concentration of 100 g/l or higher (87% vs. 83%, $P=0.015$).

Figure 16. Distribution of serum phosphorus among dialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2002–2012

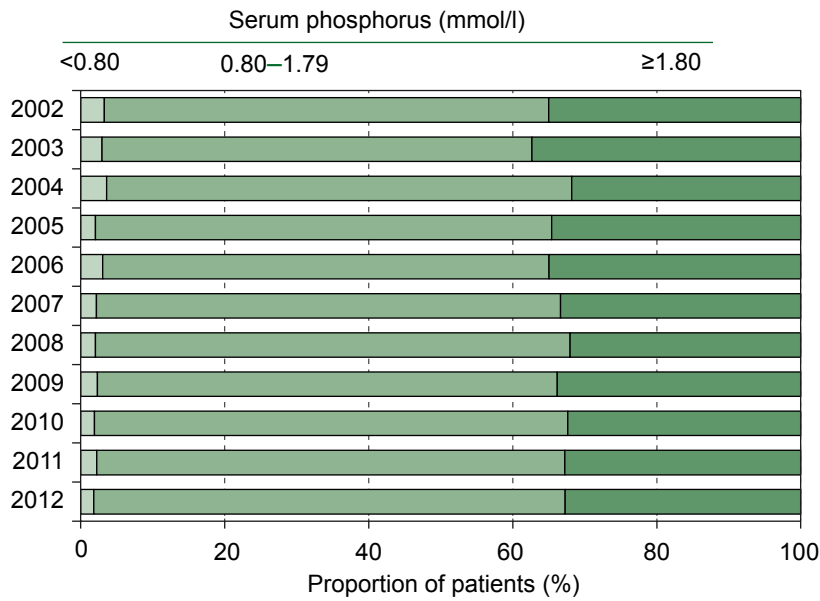
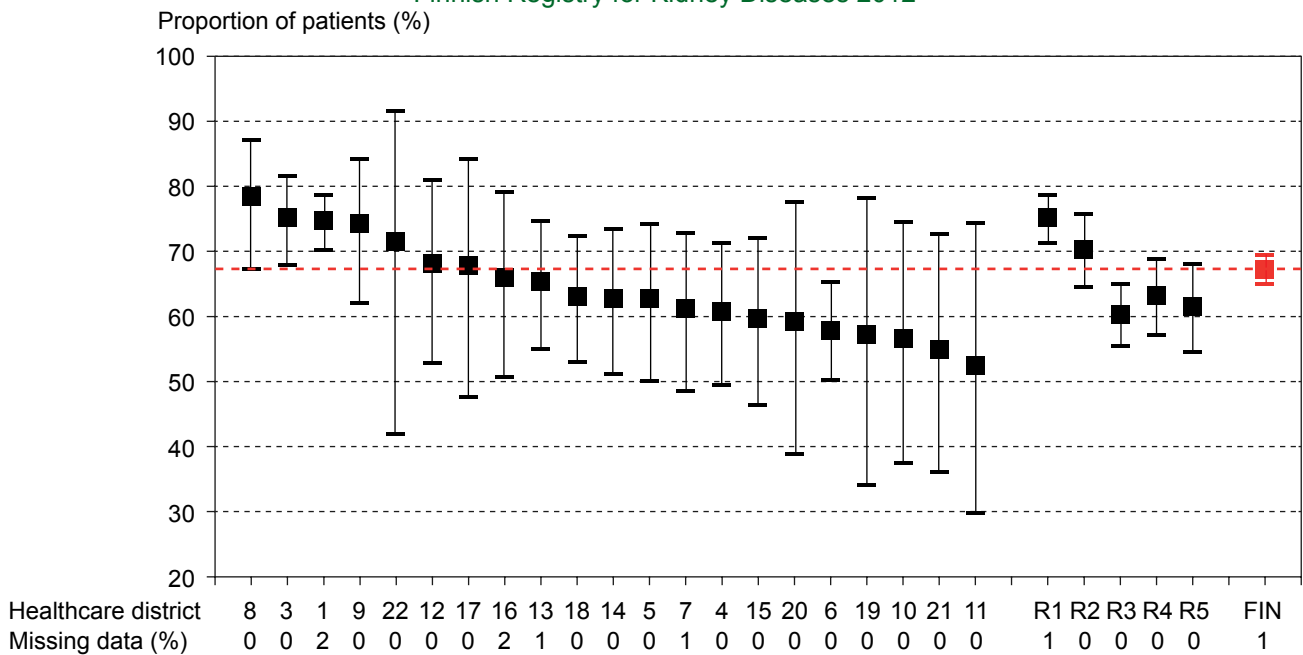


Figure 17. Proportion of dialysis patients older than 20 years with serum phosphorus lower than 1.8 mmol/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012

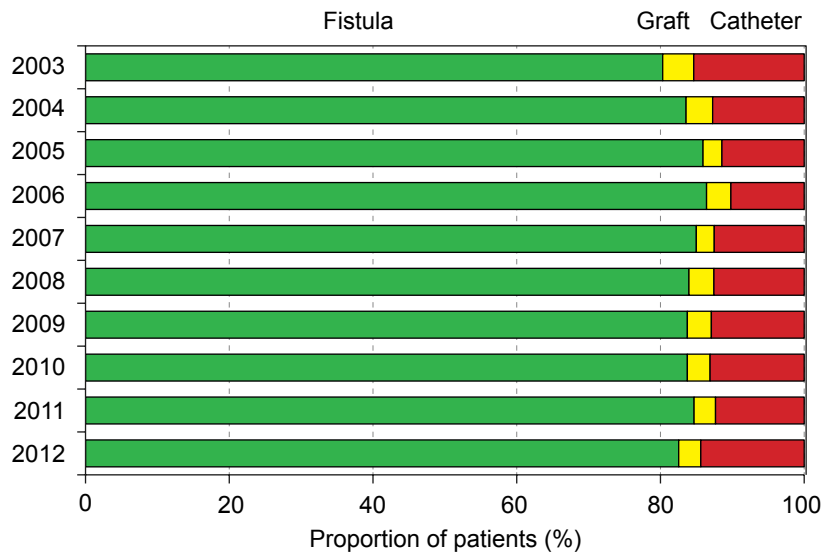


Hyperphosphatemia among patients with kidney disease is associated with vascular calcification and increased mortality. KDIGO suggests that elevated serum phosphorus of dialysis patients should be lowered toward the normal range with diet, intensified dialysis treatment, and phosphate binders if needed.

At the end of 2012, 67% of hemodialysis and peritoneal dialysis patients had concentrations of serum phosphorus

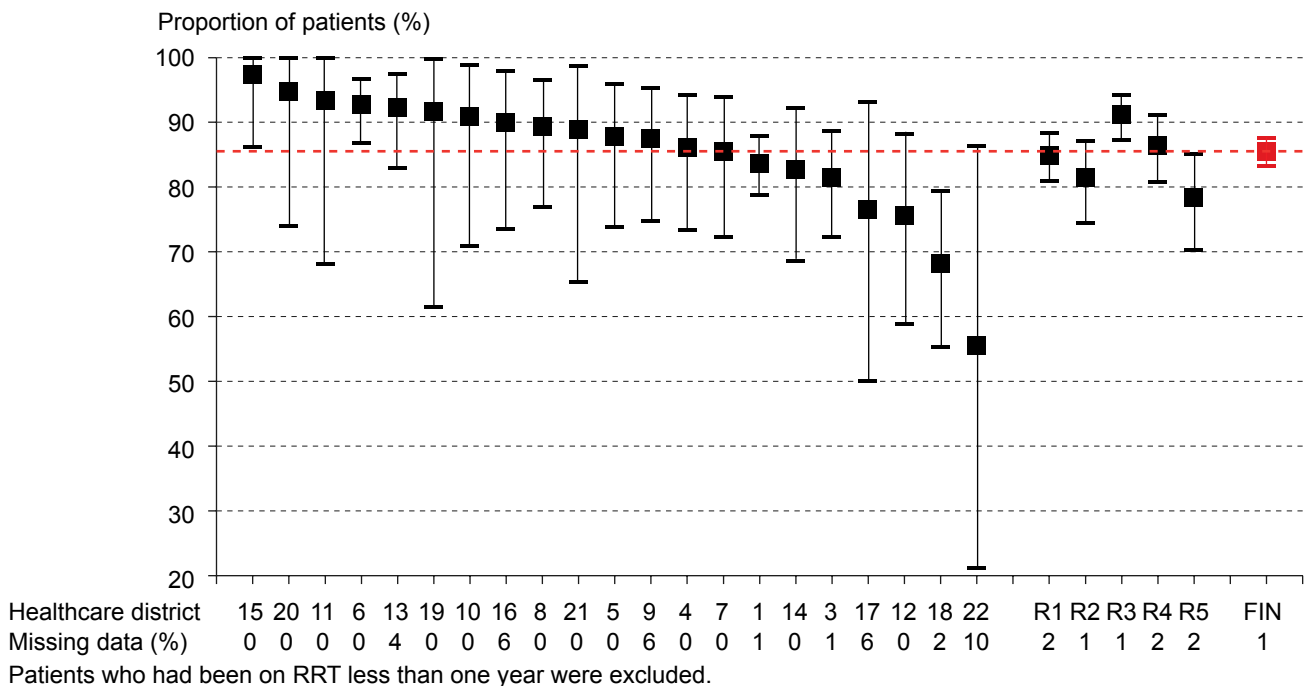
lower than 1.8 mmol/l; this proportion has remained virtually unchanged during the past ten years (Figure 16). Only 2% of the dialysis patients had excessively low concentration of serum phosphorus (<0.8 mmol/l). The proportion of patients reaching the treatment target (serum phosphorus <1.8 mmol/l) varied between 52% and 78% in the healthcare districts (P=0.002) and between 60% and 75% in the regions (P<0.001) (Figure 17).

Figure 18. Vascular access of hemodialysis patients older than 20 years at end of year
Finnish Registry for Kidney Diseases 2003–2012



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

Figure 19. Proportion of hemodialysis patients older than 20 years with a fistula or graft in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012

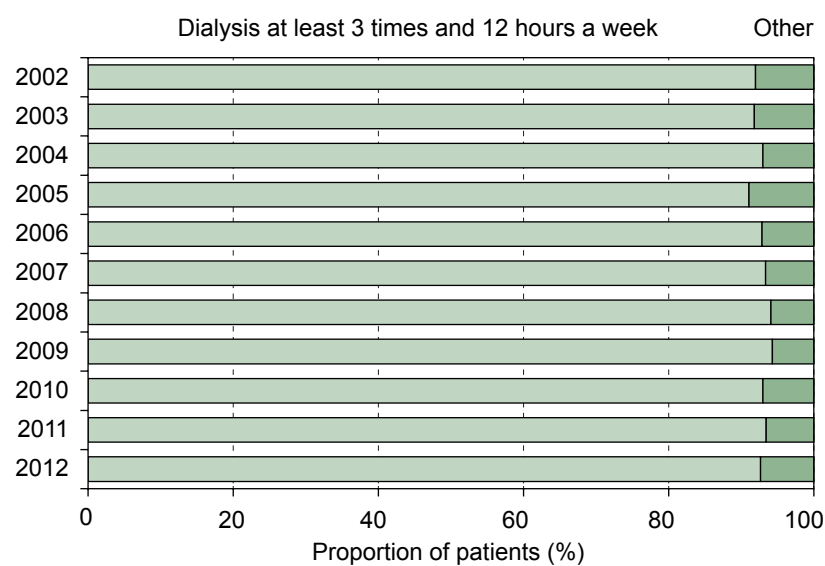


Patients who had been on RRT less than one year were excluded.

Vascular access is one of the most important quality measures in hemodialysis. Use of a central venous catheter is associated with complications, and the target 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 has decreased slightly, to 85%, in 2012 (Figure 18).

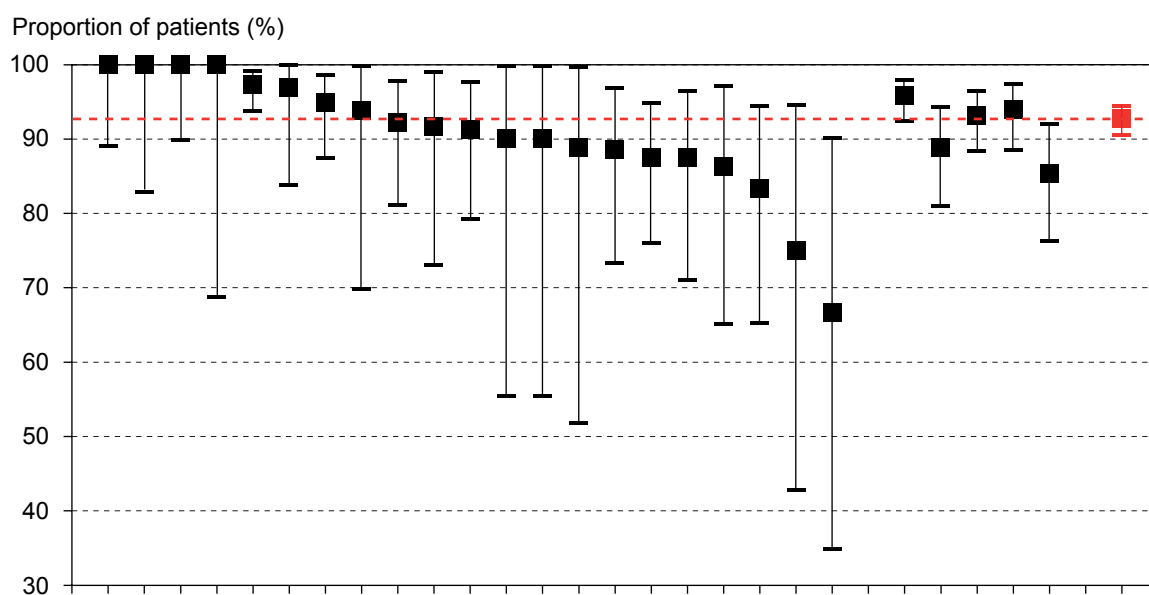
At the end of 2012, the proportion of patients with a fistula or graft varied between 56% and 97% in healthcare districts ($P=0.001$) and between 78% and 91% in regions ($P=0.005$) (Figure 19). Standardization for age and gender did not change the results of significance tests. At the end of 2012, female hemodialysis patients less frequently than male patients had a fistula or graft (80% vs. 89%, $P<0.001$).

Figure 20. Sufficiency of dialysis time among 20–74-year-old hemodialysis patients
Finnish Registry for Kidney Diseases 2002–2012



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

Figure 21. Proportion of 20–74-year-old hemodialysis patients with sufficient dialysis time in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012



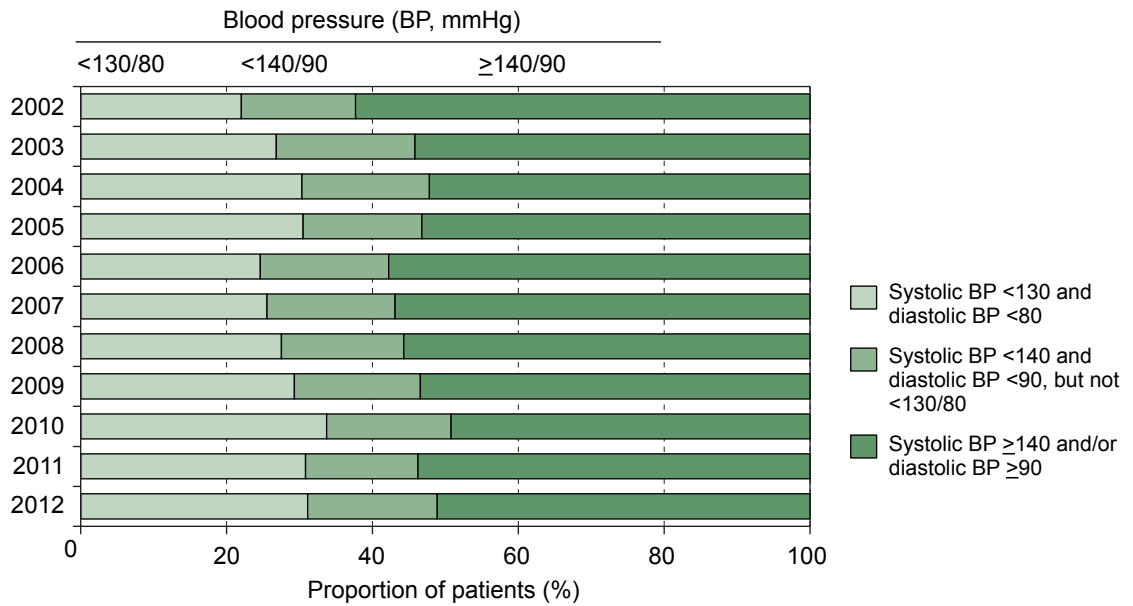
Healthcare district	9	10	15	22	1	14	6	16	13	12	18	11	19	20	4	3	7	5	8	17	21	R1	R2	R3	R4	R5	FIN
Missing data (%)	0	0	0	0	1	3	3	11	2	4	0	0	0	0	5	0	0	0	3	8	0	1	2	2	2	1	2

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

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 93%, of 20–74-year-old in-center hemodialysis patients re-

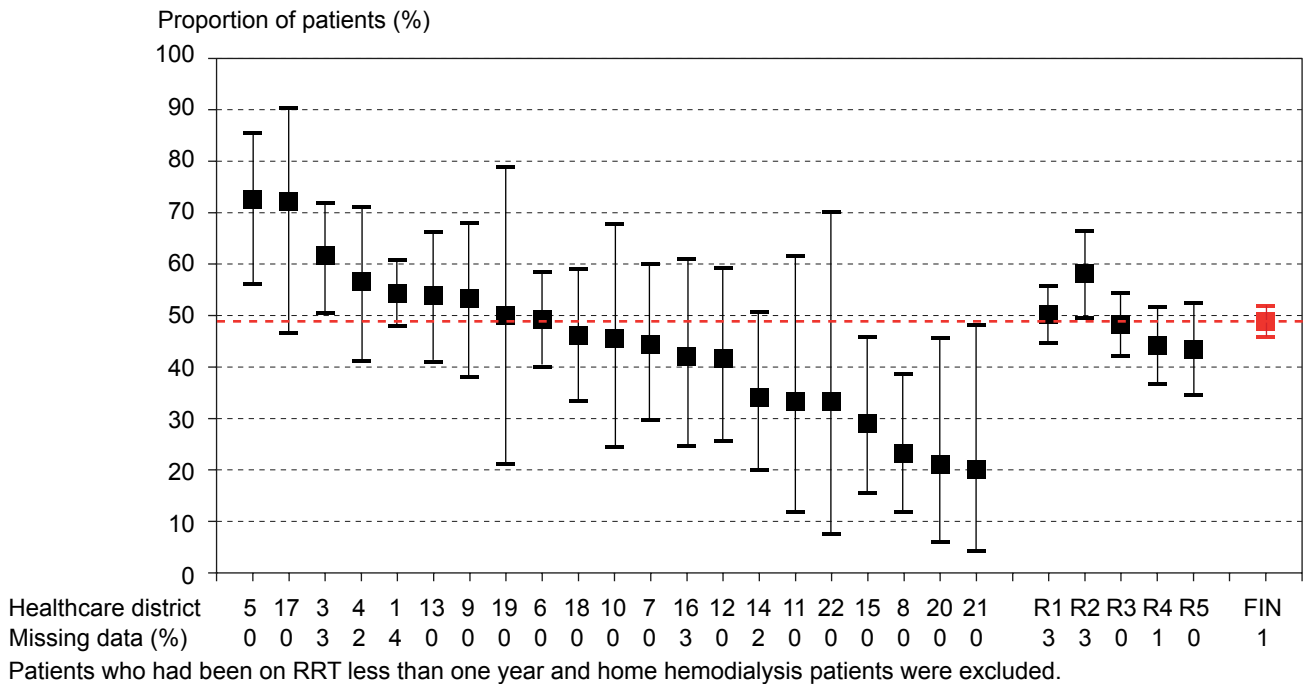
ceived sufficient hemodialysis time at the end of 2012. This proportion has remained stable since 2002 (Figure 20). At the end of 2012, the proportion varied between 67% and 100% in healthcare districts ($P<0.004$) and between 85% and 96% in regions ($P=0.012$) (Figure 21).

Figure 22. Distribution of predialytic blood pressure among hemodialysis patients older than 20 years
Finnish Registry for Kidney Diseases 2002–2012



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

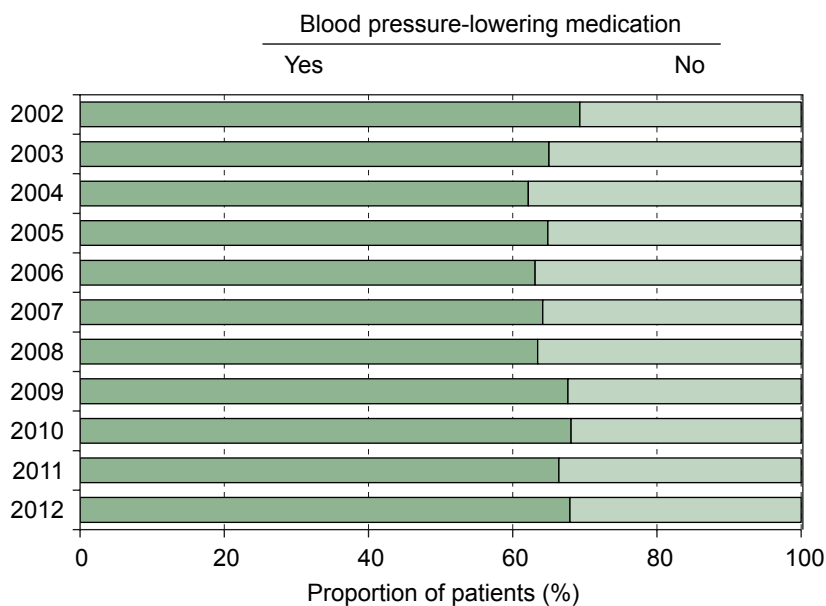
Figure 23. Proportion of hemodialysis patients older than 20 years with predialytic blood pressure lower than 140/90 mmHg in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012



According to the KDOQI guidelines, hemodialysis patients' target for predialytic blood pressure is lower than 140/90 mmHg. At the end of 2012, 49% of hemodialysis patients reached this target (Figure 22). The proportion of patients

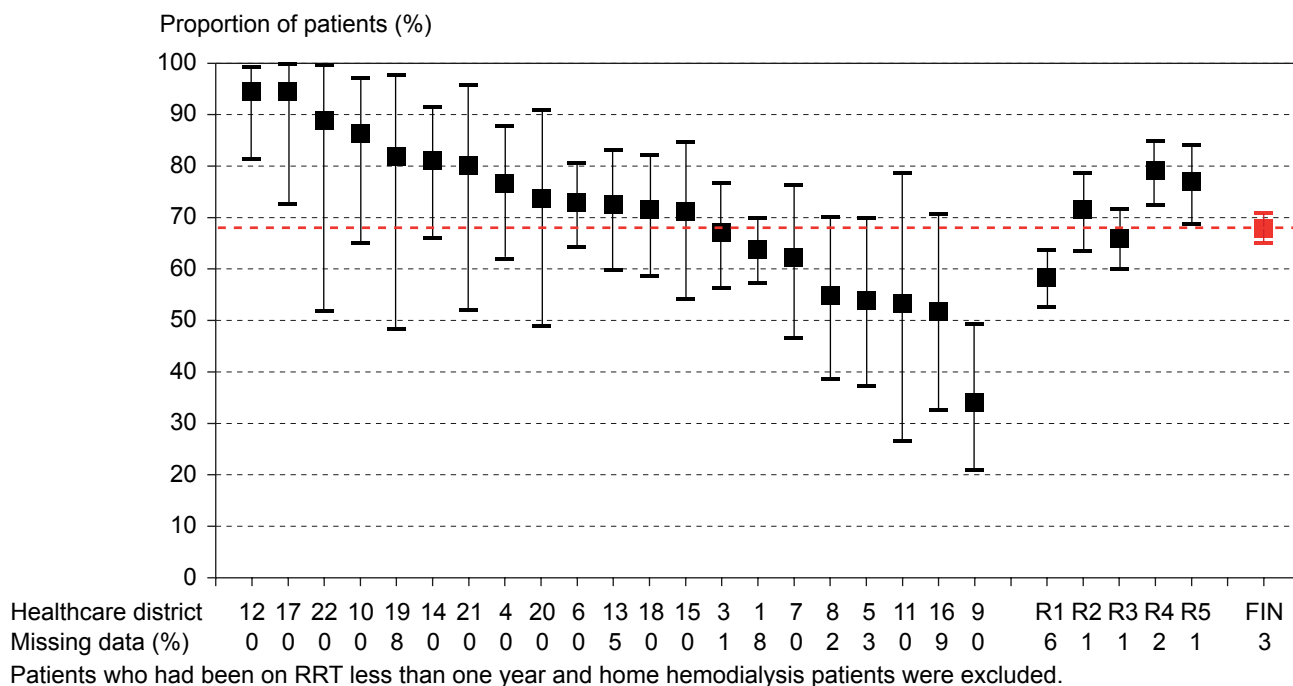
reaching this target varied between 20% and 72% in healthcare districts ($P < 0.001$) and between 43% and 58% in regions ($P = 0.081$) (Figure 23). Males less frequently than females reached the target (46% vs. 54%, $P = 0.013$).

Figure 24. Use of blood pressure-lowering medication among hemodialysis patients older than 20 years
Finnish Registry for Kidney Diseases 2002–2012



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 using blood pressure-lowering medication in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012



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

Of the hemodialysis patients, 68% used blood pressure-lowering medication at the end of 2012; this proportion has remained virtually unchanged since 2002 (Figure 24). At the end of 2012, the proportion of hemodialysis patients using blood pressure-lowering medication varied be-

tween 58% and 79% in healthcare districts ($P < 0.001$) and between 58% and 79% in regions ($P < 0.001$) (Figure 25). Males were less frequent users of blood pressure-lowering medication than females (70% vs. 64%, $P = 0.030$).

Figure 26. Estimated GFR among kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2002–2012

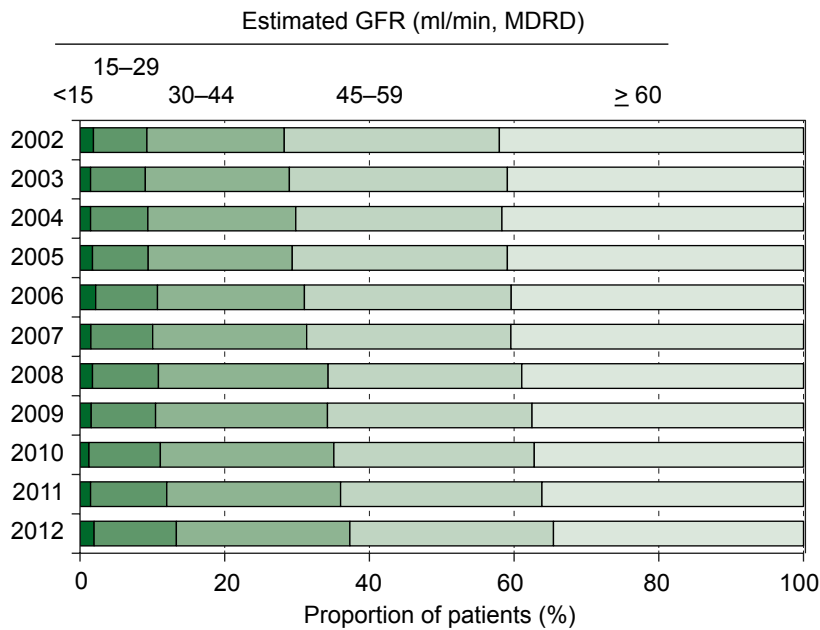


Figure 27. Proportion of kidney transplantation patients older than 20 years with an estimated GFR of 30 ml/min or higher in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012

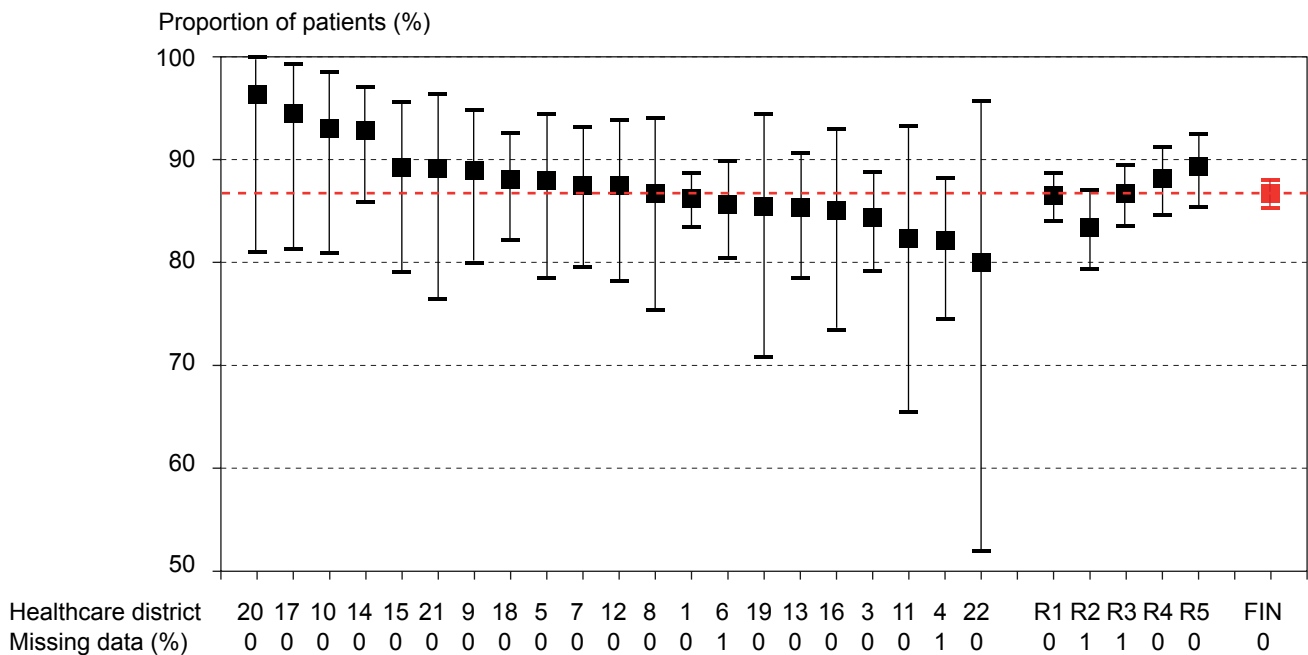


Figure 26 presents the distribution of estimated glomerular filtration rate (GFR, as estimated with the MDRD equation) among kidney transplantation patients at the end of the years 2002–2012. During this period median GFR declined from 56 to 51 ml/min, while patients' median age increased from 53 to 58 years.

At the end of 2012, 87% of kidney transplantation pa-

tients had an estimated GFR of 30 ml/min or higher, and the proportion varied between 80% and 96% in healthcare districts ($P=0.734$) and between 83% and 89% in regions ($P=0.180$). Female transplantation patients less frequently than male patients had an estimated GFR of higher than 30 ml/min (82% vs. 90%, $P<0.001$).

Figure 28. Distribution of blood pressure of kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2002–2012

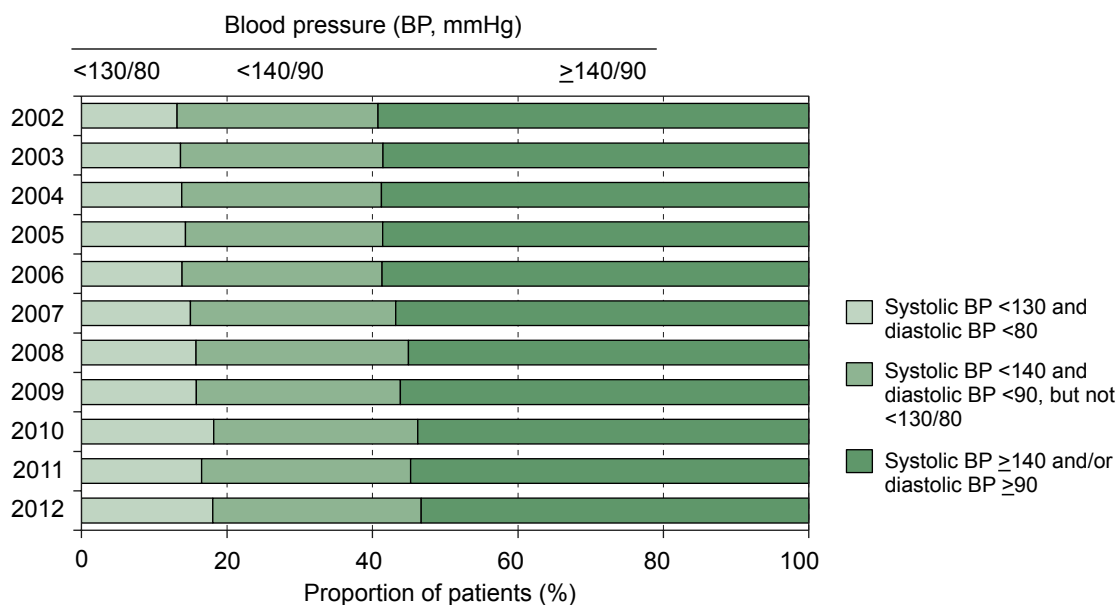
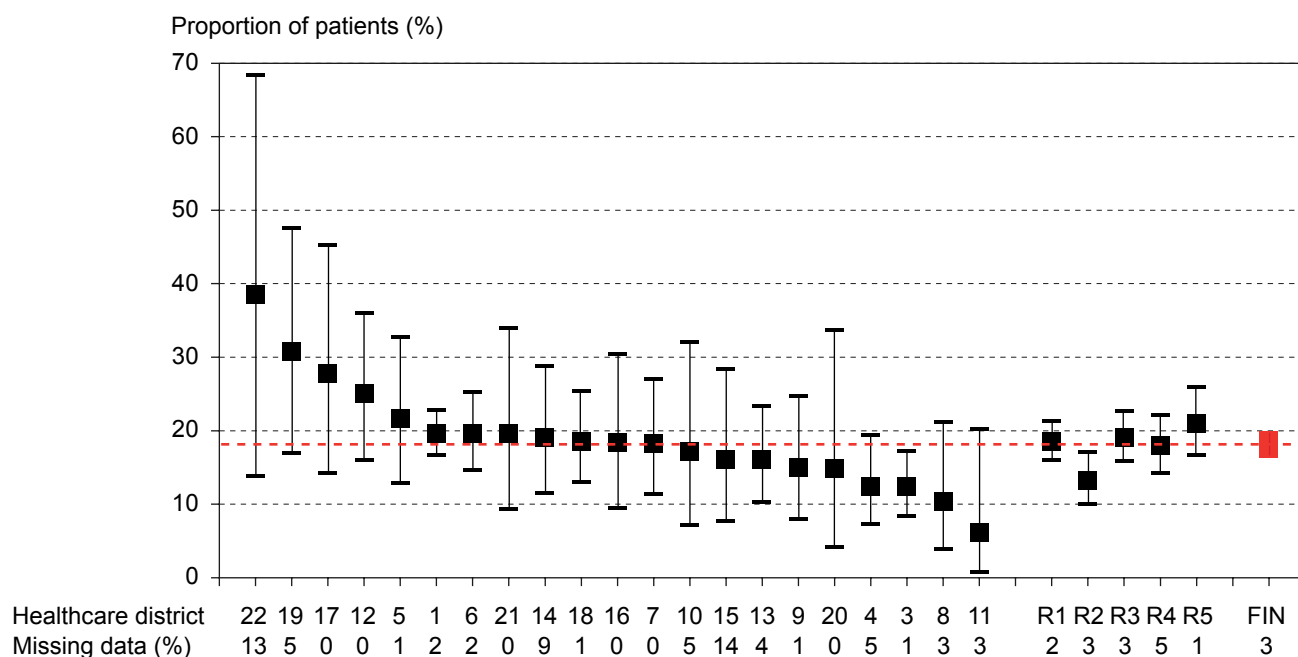


Figure 29. Proportion of kidney transplantation patients older than 20 years with blood pressure lower than 130/80 mmHg in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012



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 2002–2012. The proportion of patients reaching the target (<130/80 mmHg) was 13% in 2002 and

18% in 2012.

At the end of 2012, the proportion of kidney transplantation patients reaching the blood pressure target varied between 6% and 38% in healthcare districts ($P=0.071$) and between 13% and 21% in regions ($P=0.086$) (Figure 29). No significant difference was observed between the genders ($P=0.759$).

Figure 30. Use of blood pressure-lowering medication among kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2002–2012

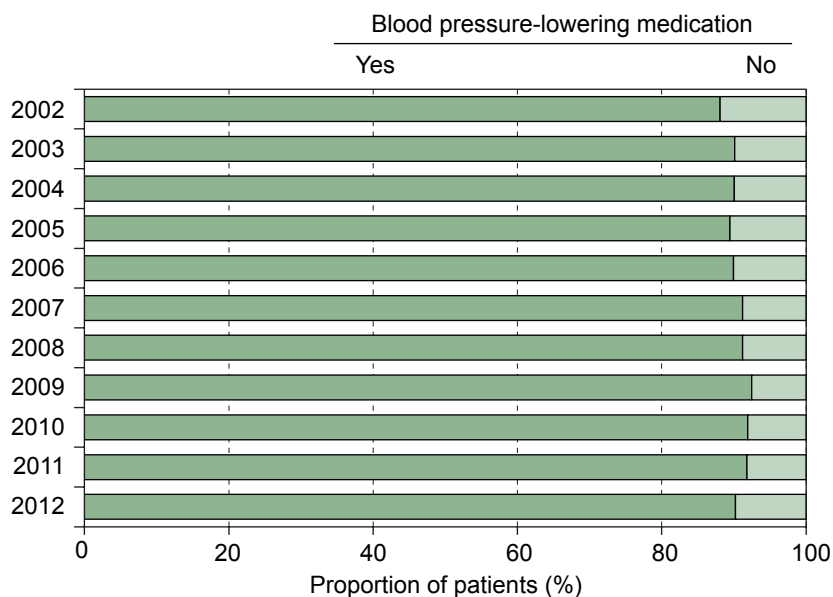
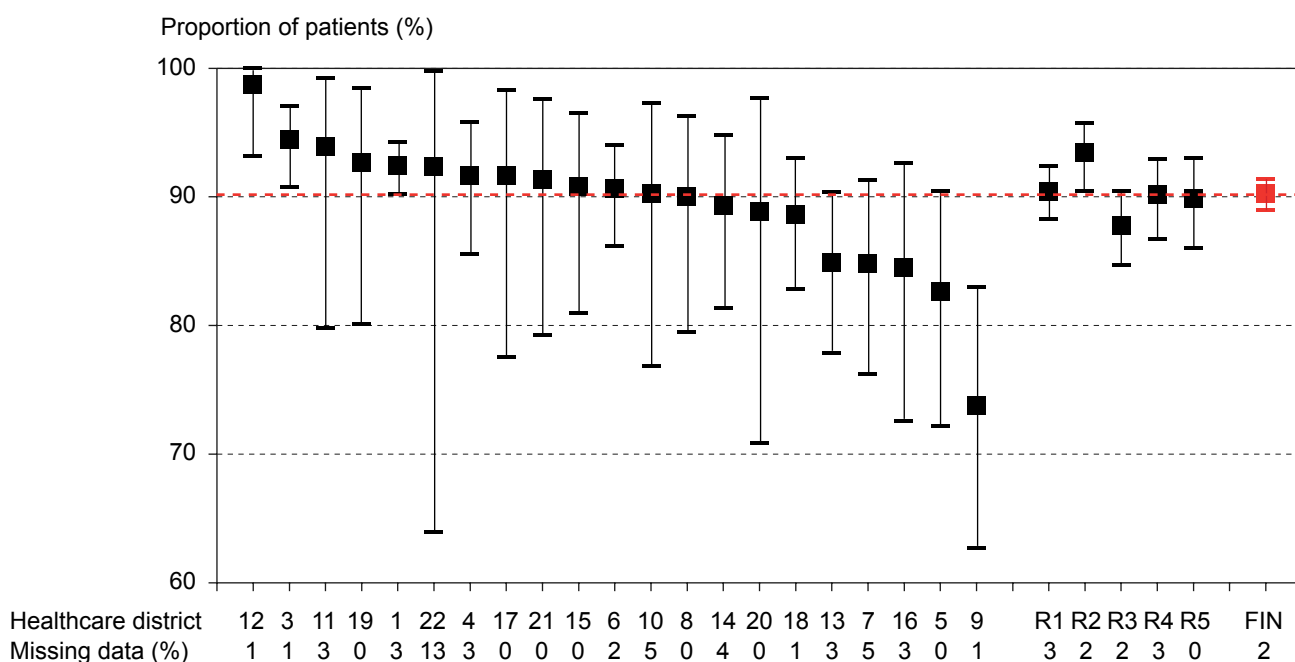


Figure 31. Proportion of kidney transplantation patients older than 20 years using blood pressure-lowering medication in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012



Of the kidney transplantation patients, 90% used blood pressure-lowering medication in 2012; this proportion has remained virtually unchanged since 2002 (Figure 30). The proportion of kidney transplantation patients using blood pressure-lowering drugs varied between 74% and 99% in healthcare districts ($P < 0.001$) and between 88% and 93% in regions ($P = 0.089$) (Figure 31).

Figure 32. Distribution of serum LDL cholesterol among kidney transplantation patients older than 20 years
Finnish Registry for Kidney Diseases 2002–2012

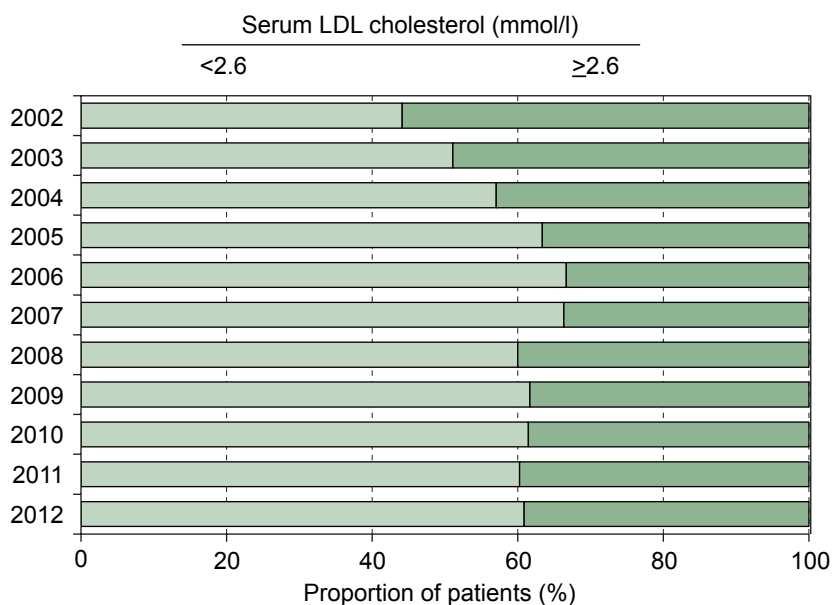
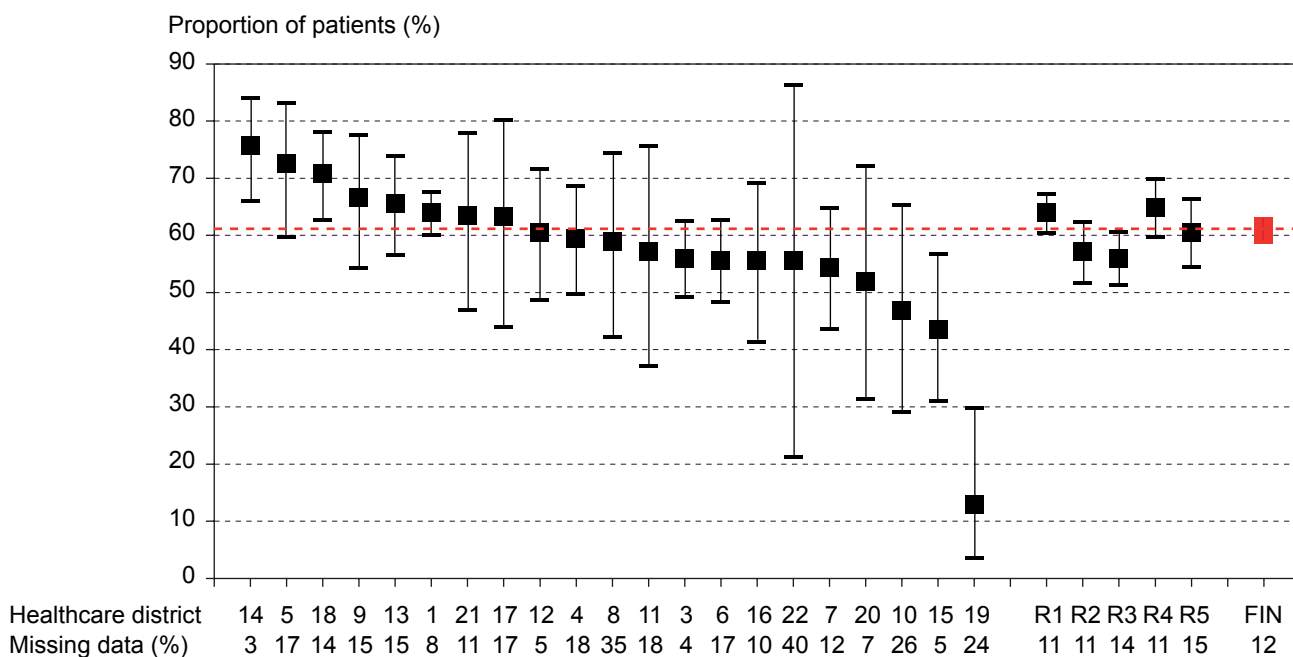


Figure 33. Proportion of kidney transplantation patients older than 20 years with a serum LDL cholesterol lower than 2.6 mmol/l in healthcare districts and regions
Finnish Registry for Kidney Diseases 2012



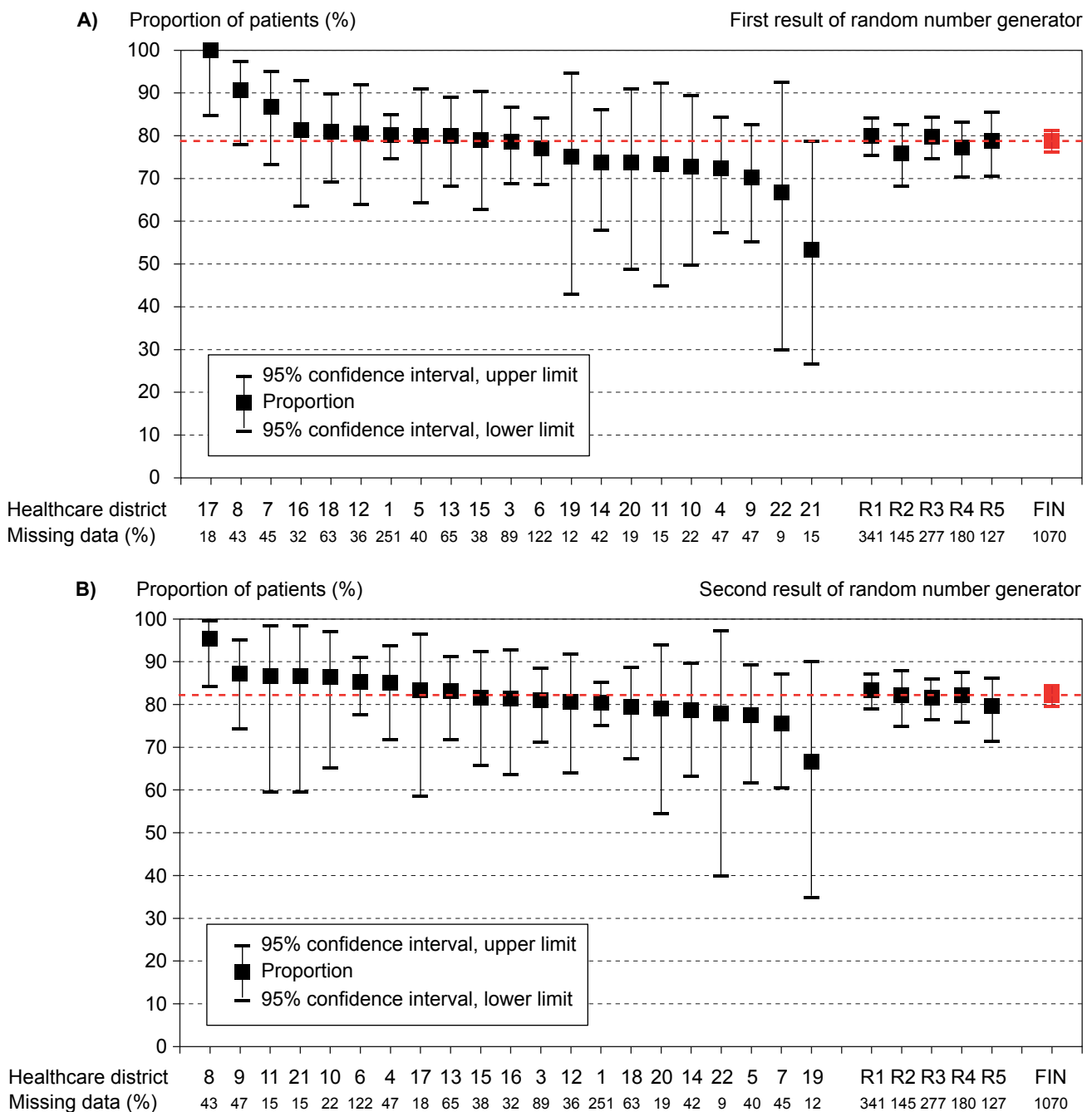
According to the KDIGO, and KDOQI guidelines, kidney transplantation patients' concentration of serum low-density lipoprotein (LDL) cholesterol should be lower than 2.6 mmol/l. In 2002, 44% of the kidney transplantation patients reached this target, and in 2012 this proportion had increased to 61% (Figure 32).

The proportion of kidney transplantation patients reaching the treatment target for LDL cholesterol varied between

13% and 76% in healthcare districts ($P < 0.001$) and between 56% and 65% in regions (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 this, patients with a concentration of triglycerides higher than 4.5 mmol/l were excluded (1% of patients).

Figure 34. Methodology: proportion of patients reaching treatment target and the role of chance
Finnish Registry for Kidney Diseases 2012



In the treatment quality analyses, this report presents proportions of patients reaching specific treatment targets in healthcare districts and regions. Observed differences between districts may indicate differences in treatment practice, but the differences may also be caused by various types of errors such as random variation, confounding, and selection bias. The patients in the healthcare districts might differ from each other with regard to known or unknown confounding factors. Known confounders (e.g., age and gender) can be controlled by statistical adjustment.

In healthcare districts with small numbers of patients, random variation is large and the observed proportions of patients reaching treatment targets are often extreme, either low or high. In Figure 34 A a random number generator was employed to assign whether the hemodialysis patient reached the treatment target (80% probability) or not (20%

probability). The same procedure was repeated in Figure 34 B. In the figures, the observed differences between the healthcare districts are due to chance alone, i.e., they are not due to confounding, selection, or differences in treatment practice.

P values are used to estimate the probability that the observed differences are due to chance. In addition, this report presents 95% confidence intervals of the proportions of patients reaching the targets. The confidence intervals describe the uncertainty regarding the proportions and are wider when the number of patients is small.

The P values are mainly presented without adjustment for confounders. However, each statistical test has also been performed with adjustment for age and gender, and the adjusted result is presented if it differs from the unadjusted one.

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Finnish Registry for Kidney Diseases

Report 2012



Finnish Registry for Kidney Diseases
Kumpulantie 1 A, 6th floor
FIN-00520 Helsinki
Finland
Phone: +358-40-8363375
Fax: +358-9-45410075
Email: Rauni.Jukkara@musili.fi
Patrik.Finne@helsinki.fi
www.musili.fi/smtr/english

Suomen munuaistautirekisteri
Kumpulantie 1 A, 6. krs
FIN-00520 Helsinki
Suomi
Puh +358-40-8363375
Faksi +358-9-45410075
Sähköposti Rauni.Jukkara@musili.fi
Patrik.Finne@helsinki.fi
www.musili.fi/smtr