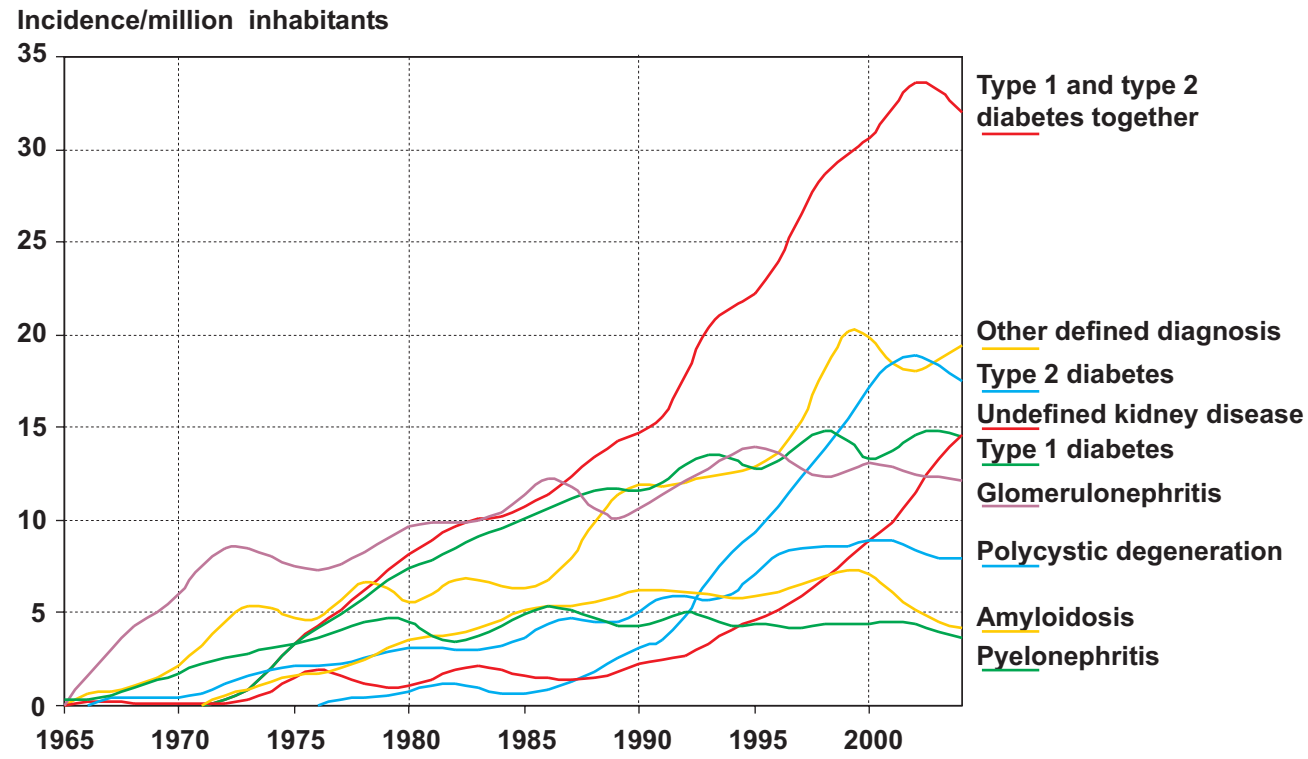
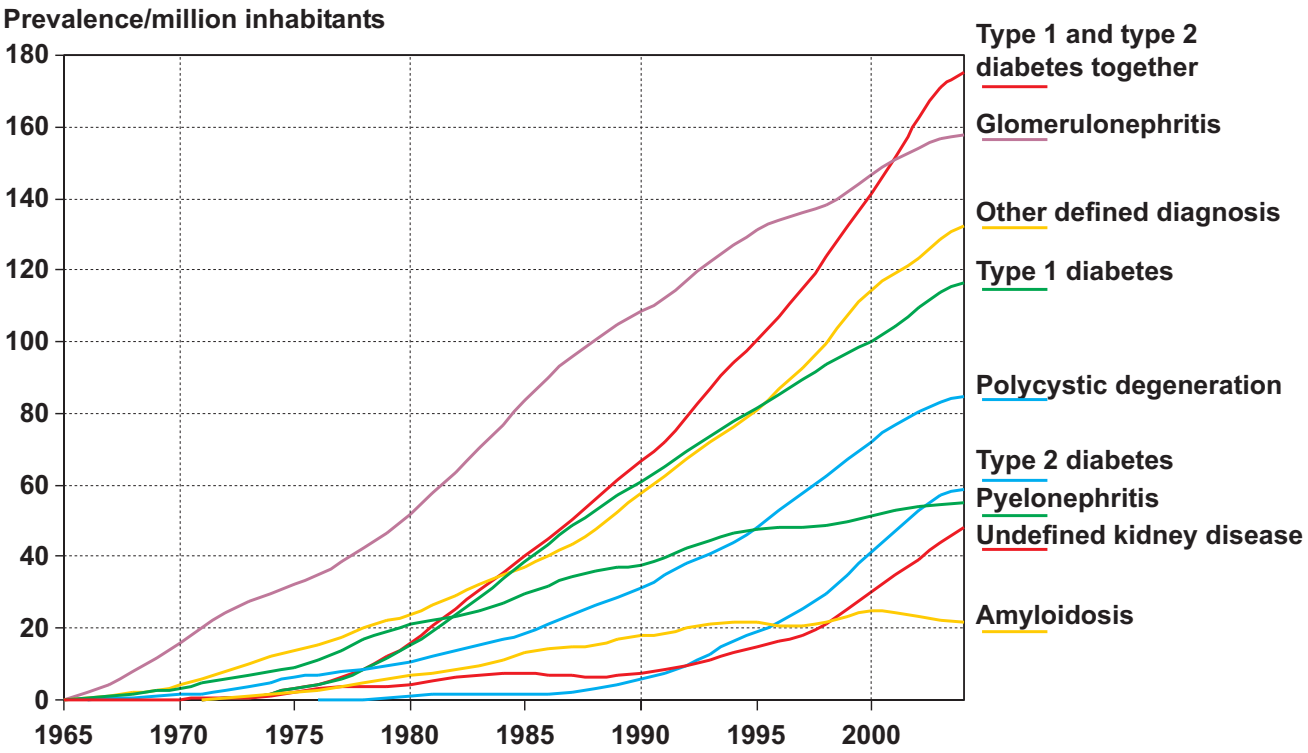
Finnish Registry for Kidney Diseases

Report 2004





Finnish Registry for Kidney Diseases – Report 2004

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Finnish Registry for Kidney Diseases – Report 2004

The Finnish Registry for Kidney Diseases contains data on Finnish dialysis and kidney transplantation patients since 1964. The registry is estimated to cover 97–99% of all Finnish patients on renal replacement therapy (RRT). At the end of 2004, the registry contained data on 9378 patients, 3584 of whom remained alive. Report 2004 gives up-to-date information on the incidence and prevalence of RRT and on the mortality of RRT patients.

The age of patients entering RRT is on the rise. In 1994, only 12 patients older than 75 years entered RRT, but in 2004 the corresponding number was 90 (page 4). On the other hand, the number of new 65–74-year-old RRT patients has not increased, but rather decreased slightly during the past five years. Among new RRT patients, the diagnosis "undefined kidney disease" has become more frequent (page 6). This apparently is a consequence of the new RRT patients being older than previously. The prevalence of RRT (the number of patients at the end of the year) has increased by 40% since 1994. In the age group older than 75 years, the prevalence has shown almost a fivefold increase during the past ten years and in 65–74-year-olds the prevalence has almost doubled (page 9). RRT patients' age-standardized mortality has decreased somewhat since 1994, but during the past five years it has remained unchanged (page 14).

Report 2004 provides special analyses on laboratory variables potentially connected to the quality of nephrological care and how on the distribution of these variables in various healthcare districts. The analyses present the proportion of patients reaching the recommended levels for laboratory variables (albumin, hemoglobin, phosphate, ionized calcium, lipid profile, diabetic patients' glycosylated hemoglobin-A_{1c}). The variable distributions frequently show significant differences between healthcare districts. In these analyses, each healthcare district was given a secret code that was sent only to the chief nephrologist. Identification of healthcare districts was prevented because the intention of the analysis was not to emphasize specific healthcare districts, but rather to facilitate an objective quality analysis.

The Finnish Registry for Kidney Diseases is a national healthcare registry, financed by Finland's Slot Machine Association (RAY). Statistics in this report were updated using data obtained from the Registry for 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 successful cooperation.

Helsinki, 14 October 2005

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Table 1. The Finnish population and its distribution in healthcare districts.
Finnish Registry for Kidney Diseases 1994–2004

Healthcare district (1000 inhabitants)		Year					Change (%) 1994–2004
		1994	1999	2002	2003	2004	
1	Helsinki-Uusimaa	1288	1375	1415	1423	1432	11.2
3	Varsinais-Suomi	438	451	456	458	459	4.7
4	Satakunta	238	232	229	228	228	–4.4
5	Kanta-Häme	165	165	166	167	168	1.6
6	Pirkanmaa	433	446	455	459	463	6.9
7	Päijät-Häme	208	207	207	210	210	1.0
8	Kymenlaakso	189	184	182	181	181	–4.0
9	Etelä-Karjala	132	130	129	129	129	–2.4
10	Etelä-Savo	110	107	105	105	104	–5.7
11	Itä-Savo	71	67	65	63	63	–11.5
12	Pohjois-Karjala	180	174	171	171	170	–5.3
13	Pohjois-Savo	259	254	250	251	251	–3.0
14	Keski-Suomi	261	263	265	266	267	2.5
15	Etelä-Pohjanmaa	202	197	195	194	195	–3.8
16	Vaasa	167	166	166	166	166	–0.5
17	Keski-Pohjanmaa	80	79	77	77	77	–3.5
18	Pohjois-Pohjanmaa	358	367	374	376	379	5.7
19	Kainuu	91	87	83	83	82	–10.0
20	Länsi-Pohja	72	69	67	67	67	–7.5
21	Lappi	130	125	121	120	120	–8.0
22	Åland	25	26	26	26	27	5.5
Region	South	1609	1689	1726	1733	1742	8.3
	Southwest	702	709	711	712	713	1.6
	West	1175	1181	1189	1195	1201	2.2
	East	881	866	857	856	855	–2.9
	North	732	726	723	723	725	–1.0
Entire country		5099	5171	5206	5220	5237	2.7

On 31 December 2004, there were 5.237 million inhabitants in Finland (Table 1, Source: Statistics Finland). During the past ten years the population has increased considerably in the southern region. In the eastern and northern regions, the populations have decreased. Since 1994, the populations have increased in eight healthcare districts and decreased in 13.

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

Figure 1. Healthcare districts and regions in Finland.
Finnish Registry for Kidney Diseases 2004

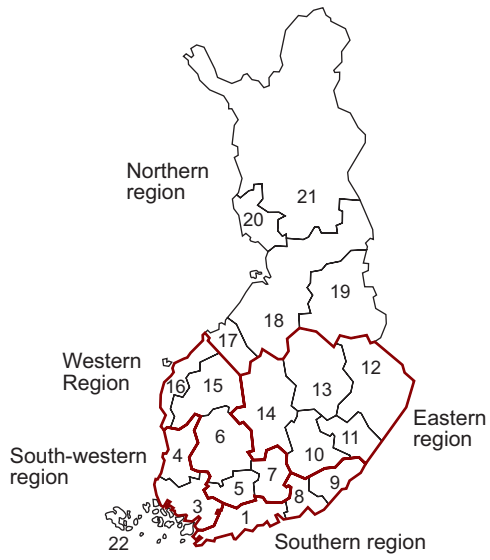


Table 2. The Finnish population according to region, age group, and gender.
Finnish Registry for Kidney Diseases 1994–2004

Region	1994					2004				
	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	202 (26)	500 (65)	46 (6)	23 (3)	772 (100)	207 (25)	545 (65)	57 (7)	33 (4)	842 (100)
Women	193 (23)	516 (62)	69 (8)	59 (7)	837 (100)	200 (22)	558 (62)	72 (8)	70 (8)	900 (100)
Total	395 (25)	1016 (63)	116 (7)	83 (5)	1609 (100)	407 (23)	1102 (63)	130 (7)	103 (6)	1742 (100)
Southwest										
Men	87 (26)	212 (62)	27 (8)	14 (4)	340 (100)	82 (24)	215 (62)	30 (9)	20 (6)	347 (100)
Women	83 (23)	209 (58)	38 (10)	32 (9)	362 (100)	78 (21)	213 (58)	36 (10)	40 (11)	366 (100)
Total	170 (24)	421 (60)	64 (9)	46 (7)	702 (100)	160 (22)	428 (60)	66 (9)	59 (8)	713 (100)
West										
Men	151 (26)	352 (62)	44 (8)	23 (4)	571 (100)	143 (24)	363 (62)	49 (8)	33 (6)	588 (100)
Women	144 (24)	343 (57)	64 (11)	53 (9)	604 (100)	137 (22)	351 (57)	60 (10)	65 (11)	613 (100)
Total	295 (25)	696 (59)	108 (9)	76 (6)	1175 (100)	280 (23)	714 (59)	109 (9)	98 (8)	1201 (100)
East										
Men	115 (27)	268 (62)	34 (8)	17 (4)	433 (100)	100 (24)	259 (61)	38 (9)	24 (6)	421 (100)
Women	110 (25)	253 (56)	48 (11)	37 (8)	448 (100)	96 (22)	245 (57)	45 (10)	47 (11)	434 (100)
Total	225 (26)	520 (59)	82 (9)	53 (6)	881 (100)	196 (23)	504 (59)	84 (10)	71 (8)	855 (100)
North										
Men	109 (30)	221 (60)	25 (7)	11 (3)	366 (100)	97 (27)	220 (61)	29 (8)	17 (5)	364 (100)
Women	105 (29)	205 (56)	33 (9)	23 (6)	366 (100)	93 (26)	204 (57)	33 (9)	31 (9)	361 (100)
Total	215 (29)	426 (58)	57 (8)	34 (5)	732 (100)	189 (26)	425 (59)	62 (9)	49 (7)	725 (100)
Entire country										
Men	664 (27)	1553 (63)	176 (7)	88 (4)	2482 (100)	629 (25)	1602 (63)	204 (8)	127 (5)	2562 (100)
Women	636 (24)	1526 (58)	251 (10)	204 (8)	2617 (100)	603 (23)	1571 (59)	247 (9)	254 (9)	2675 (100)
Total	1300 (25)	3079 (60)	428 (8)	292 (6)	5099 (100)	1233 (24)	3173 (61)	451 (9)	380 (7)	5237 (100)

Table 2 shows the distribution of the Finnish population according to region, age, and gender at the end of 1994 and 2004. The proportion of inhabitants older than 65 years has increased from 14% to 16% percent in the entire country. In the southern region, the proportion of 20–64-year-olds is the largest (63%) and that of inhabitants older than 65 years the smallest (13%). In the other regions, the corresponding proportions are 59–60% and 15–18%.

Table 3. Number of new RRT patients and incidence of RRT by healthcare district and region. Finnish Registry for Kidney Diseases 1994–2004

Healthcare district		Number of new RRT patients						Incidence of RRT/million inhabitants					
		1994	1999	2002	2003	2004	2000–2004 on average	1994	1999	2002	2003	2004	2000–2004 on average
1	Helsinki-Uusimaa	73	114	109	130	106	106	57	83	77	91	74	76
3	Varsinais-Suomi	43	45	41	53	46	46	98	100	90	116	100	101
4	Satakunta	8	19	33	20	27	21	34	82	144	88	119	93
5	Kanta-Häme	8	15	14	16	21	15	48	91	84	96	125	89
6	Pirkanmaa	37	50	42	36	43	42	86	112	92	78	93	92
7	Päijät-Häme	18	19	30	30	24	24	87	92	145	143	114	116
8	Kymenlaakso	16	16	19	19	15	17	85	87	105	105	83	93
9	Etelä-Karjala	5	13	13	20	19	14	38	100	100	155	148	108
10	Etelä-Savo	3	5	7	5	3	5	27	47	67	48	29	43
11	Itä-Savo	6	10	6	8	4	7	85	148	92	127	64	103
12	Pohjois-Karjala	9	15	24	11	21	16	50	86	140	64	123	93
13	Pohjois-Savo	28	28	29	24	20	26	108	110	116	95	80	102
14	Keski-Suomi	16	27	26	18	26	23	61	103	98	68	97	85
15	Etelä-Pohjanmaa	9	18	27	19	12	17	44	91	139	98	62	87
16	Vaasa	8	9	12	18	20	13	48	54	72	109	120	81
17	Keski-Pohjanmaa	3	8	3	8	11	7	37	102	39	103	142	85
18	Pohjois-Pohjanmaa	9	34	29	27	38	27	25	93	78	72	100	74
19	Kainuu	8	12	11	9	18	12	88	138	132	109	219	137
20	Länsi-Pohja	5	7	6	8	4	6	69	101	89	120	60	88
21	Lappi	5	7	7	13	12	9	38	56	58	108	100	72
22	Åland	1	1	1	2	0	1	40	39	38	76	0	39
Region	South	94	143	141	169	140	137	58	85	82	98	80	81
	Southwest	52	65	75	75	73	68	74	92	105	105	102	96
	West	80	111	125	119	120	111	68	94	105	100	100	93
	East	62	85	92	66	74	76	70	98	107	77	87	88
	North	30	68	56	65	83	60	41	94	77	90	115	83
Entire country		318	472	489	494	490	453	62	91	94	95	94	87
	Children < 15 y	11	17	8	9	7	10	11	18	9	10	8	11

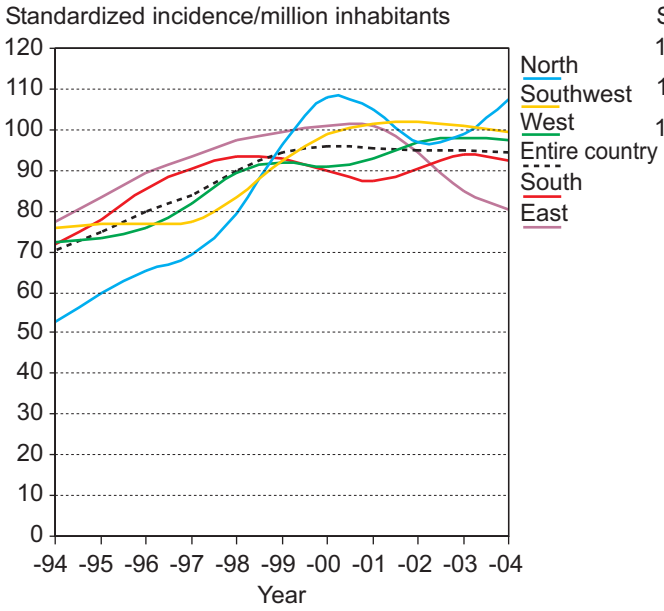
The number of new RRT patients and the incidence of RRT are presented according to healthcare district and region in Table 3. In the entire country, the incidence has increased 3% during the past five years and 50% during the past ten years. In 2000–2004, the average incidence was largest in the southwestern region and smallest in the southern region. In the southwestern, western, and northern regions, the incidence was 6–22% greater in 2004 than in 1999. During the same time period the incidence had decreased by 5% in the southern region and by 12% in the eastern region. In the healthcare districts, the five-year average incidence was 39–137 new RRT patients/million inhabitants.

Table 4. Incidence of RRT by age group and gender.
Finnish Registry for Kidney Diseases 1994–2004

Year		Number of new RRT patients						Incidence/million inhabitants					
		0–19 y	20–44 y	45–64 y	65–74 y	≥ 75 y	Total	0–19 y	20–44 y	45–64 y	65–74 y	≥ 75 y	Total
1994	Men	10	37	82	43	6	178	15	39	134	244	68	72
	Women	1	40	50	43	6	140	2	44	80	171	29	53
	Total	11	77	132	86	12	318	8	42	107	201	41	62
1999	Men	14	52	121	79	30	296	22	58	177	415	293	117
	Women	6	31	54	64	21	176	10	36	78	261	92	66
	Total	20	83	175	143	51	472	16	47	128	328	154	91
2002	Men	6	50	149	75	30	310	9	57	208	381	260	122
	Women	4	31	72	44	28	179	7	37	100	180	116	67
	Total	10	81	221	119	58	489	8	47	154	270	162	94
2003	Men	9	53	118	89	62	331	14	61	163	445	512	130
	Women	4	18	55	50	36	163	7	21	76	204	146	61
	Total	13	71	173	139	98	494	10	41	119	312	266	95
2004	Men	9	63	109	61	57	299	14	72	149	299	450	117
	Women	6	24	78	50	33	191	10	29	106	203	130	71
	Total	15	87	187	111	90	490	12	51	128	246	237	94

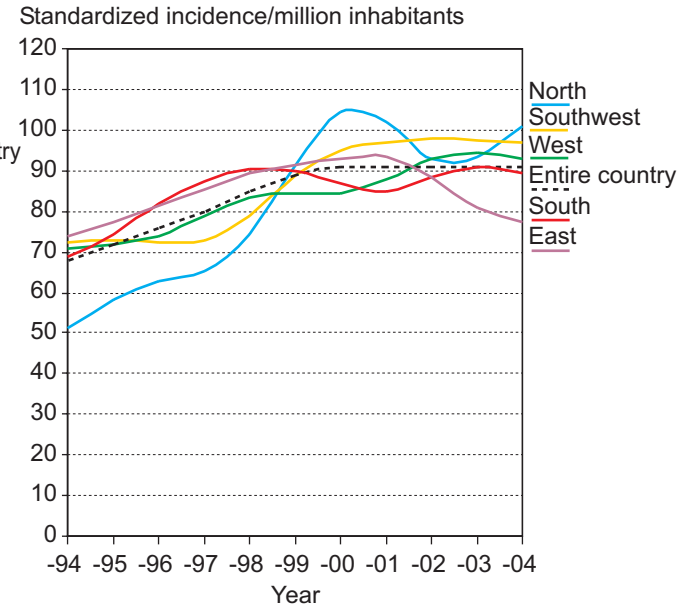
Table 4 shows the number of new RRT patients and the incidence of RRT according to age group and gender in 1994 to 2004. During the past ten years the incidence has increased 50% overall. In inhabitants older than 75 years, the incidence in 2004 was almost sixfold that in 1994. During the same period the incidence increased 22% in 65–74-year-olds and 20% in 45–64-year-olds.

Figure 2. Standardized incidence of RRT in regions. Finnish Registry for Kidney Diseases 1994–2004



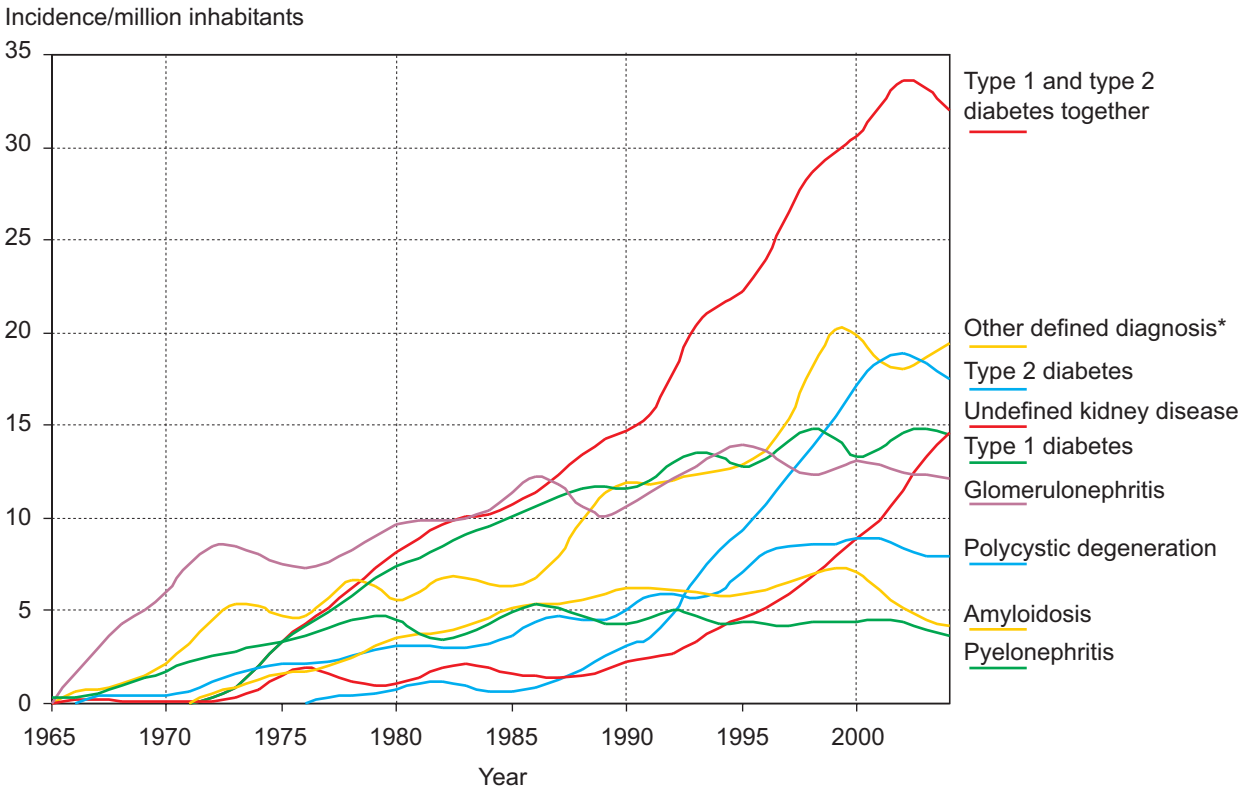
In Figure 2, the incidence of RRT (i.e. dialysis and kidney transplantation) in 1994–2004 is shown regionally as smoothed averages. The incidence rates are age- and gender-standardized using the Finnish population on 31 December 2004 as the reference population. Population changes in 1994–2004 have been considered. Standardization removes the effect of age and gender on the regional differences in incidence rates. In the entire country, the incidence has remained virtually unchanged since 1998.

Figure 3. Standardized incidence of RRT in regions 90 days after the start of RRT. Finnish Registry for Kidney Diseases 1994–2004



In Figure 3, the age- and gender-standardized incidence of RRT 90 days after the start of RRT is shown regionally as smoothed averages. The Finnish Registry for Kidney Diseases does not store data on patients who have regained renal function before 90 days after the start of RRT. In the figure, data on patients who have died or moved abroad within 90 days after the start of RRT have also been excluded.

Figure 4. Incidence of RRT according to diagnosis.
Finnish Registry for Kidney Diseases 1965–2004



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

Table 5. Proportion of new RRT patients with the diagnosis “undefined kidney disease”.
Finnish Registry for Kidney Diseases 1994–2004

Year	Proportion of “undefined kidney disease” diagnosis out of all new diagnoses (%)					
	0–19 y	20–44 y	45–64 y	65–74 y	≥ 75 y (%)	Total
1994	0/11 (0)	2/77 (3)	10/132 (8)	13/86 (15)	4/12 (33)	29/318 (9)
1999	2/20 (10)	4/83 (5)	8/175 (5)	14/143 (10)	11/51 (22)	39/472 (8)
2002	1/10 (10)	5/81 (6)	20/221 (9)	17/119 (14)	12/58 (21)	55/489 (11)
2003	0/13 (0)	3/71 (4)	12/173 (7)	30/139 (22)	29/98 (30)	74/494 (15)
2004	3/15 (20)	9/87 (10)	14/187 (7)	21/111 (19)	33/90 (37)	80/490 (16)

The incidence of RRT according to diagnosis is shown as smoothed averages in Figure 4. Type 1 and type 2 diabetes are the most common diseases causing chronic uremia. Glomerulonephritis is the third most common diagnosis among new RRT patients, and its incidence has remained almost unchanged for more than ten years. The diagnosis “undefined kidney disease” has increased the most in recent years; in 2004, it was almost threefold more frequent than ten years earlier.

Table 5 shows that the proportion of patients with “undefined kidney disease” is largest in patients older than 75 years. The proportion of undefined diagnoses has not increased markedly in separate age groups, but among all patients it has increased, particularly because the number of patients older than 75 years has risen considerably.

Figure 5. International comparison of incidence of RRT in 2003.
Finnish Registry for Kidney Diseases 2003

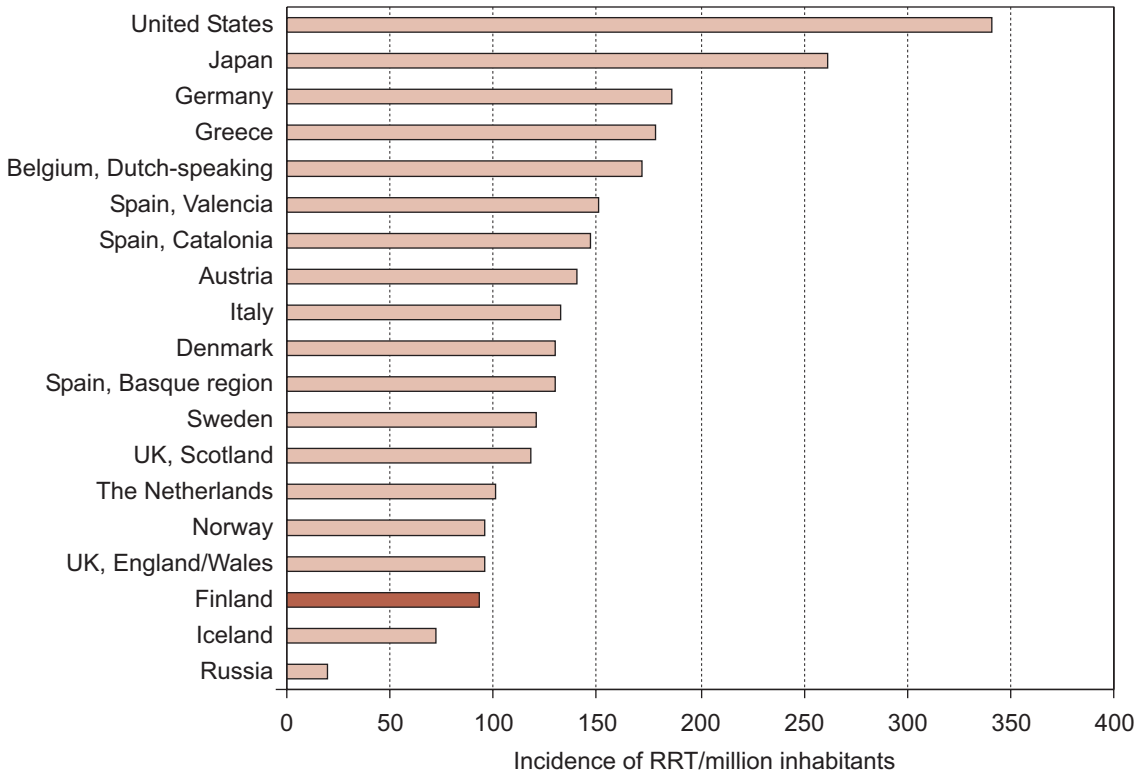


Figure 5 shows the incidence of RRT in 2003 in countries reporting to the ERA-EDTA Registry (http://www.era-edta-reg.org) and in Japan and the United States (The 2005 USRDS Annual Data Report Atlas, http://www.usrds.org). The incidence of RRT in Finland was the third lowest. The incidence in Norway was similar to that in Finland. In Sweden, the incidence was 30% greater, and in Denmark 40% greater than in Finland.

Table 6. Patients in RRT at the end of the year according to healthcare district and region. Finnish Registry for Kidney Diseases 1994–2004

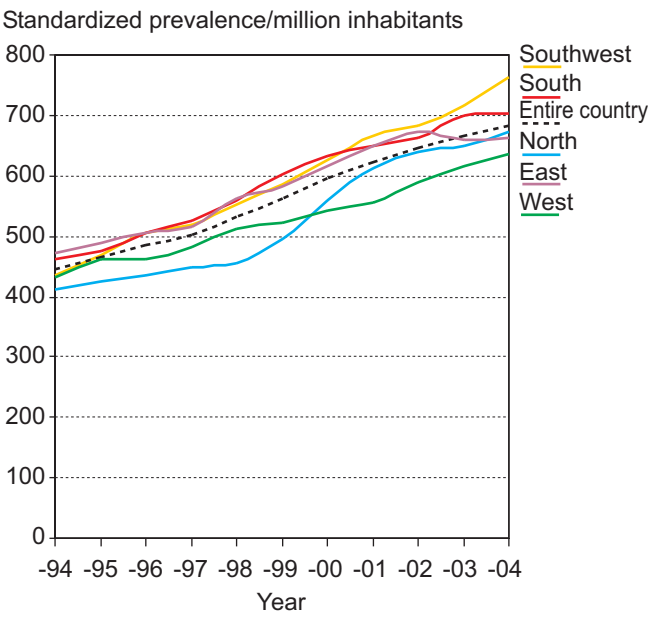
Healthcare district		Number of RRT patients					Prevalence of RRT/million inhabitants				
		1994	1999	2002	2003	2004	1994	1999	2002	2003	2004
1	Helsinki-Uusimaa	587	794	890	942	959	456	578	629	662	669
3	Varsinais-Suomi	188	265	295	316	344	429	587	646	690	749
4	Satakunta	95	133	181	188	201	399	572	791	824	883
5	Kanta-Häme	57	66	88	96	109	346	400	530	576	650
6	Pirkanmaa	204	278	311	321	332	471	624	683	700	717
7	Päijät-Häme	96	102	119	130	138	461	493	574	620	657
8	Kymenlaakso	69	95	106	115	105	366	516	583	634	580
9	Etelä-Karjala	45	68	90	98	112	341	524	696	759	870
10	Etelä-Savo	35	47	62	63	63	317	438	590	602	605
11	Itä-Savo	37	42	43	45	47	522	622	658	712	749
12	Pohjois-Karjala	76	92	118	112	118	422	528	688	656	693
13	Pohjois-Savo	150	199	229	224	219	580	784	915	891	872
14	Keski-Suomi	106	124	139	141	145	406	471	524	530	543
15	Etelä-Pohjanmaa	74	88	104	104	100	366	446	535	535	514
16	Vaasa	61	74	81	92	99	365	445	489	555	596
17	Keski-Pohjanmaa	19	31	31	36	44	237	395	400	465	569
18	Pohjois-Pohjanmaa	132	168	237	237	245	368	458	634	631	647
19	Kainuu	33	50	62	59	62	361	575	743	713	754
20	Länsi-Pohja	31	31	47	48	46	430	448	700	717	691
21	Lappi	59	61	68	76	80	453	488	564	633	668
22	Åland	13	16	18	18	16	517	622	686	683	603
Region	South	701	957	1086	1155	1176	436	567	629	666	675
	Southwest	296	414	494	522	561	422	584	694	733	787
	West	492	608	703	743	778	419	515	591	622	648
	East	404	504	591	585	592	459	582	689	683	692
	North	274	341	445	456	477	374	469	616	631	658
Entire country		2167	2824	3319	3461	3584	425	546	637	663	684

The number of RRT patients and the prevalence of RRT on 31 December 1994–2004 are presented in Table 6. In the entire country, the prevalence has increased by 61% since 1994, and by 25% since 1999. In the healthcare districts, the prevalence has increased by 16–155% during the past ten years. On 31 December 2004, the prevalence was higher in the southwestern region than in the other regions. Since 1994, the prevalence has increased the most in the southwestern region (85%) and the least in the western region (51%).

Table 7. Patients in RRT according to region, age group, and gender.
Finnish Registry for Kidney Diseases 1994–2004

Year		Number of RRT patients						Prevalence of RRT/million inhabitants					
		0–19 y	20–44 y	45–64 y	65–74 y	≥ 75 y	Total	0–19 y	20–44 y	45–64 y	65–74 y	≥ 75 y	Total
1994	Men	54	402	547	176	34	1213	81	428	891	997	387	489
	Women	24	333	395	173	29	954	38	369	633	689	142	365
	Total	78	735	942	349	63	2167	60	399	761	816	216	425
1999	Men	74	411	816	286	89	1676	114	459	1195	1502	870	664
	Women	36	322	486	224	80	1148	58	374	706	913	349	433
	Total	110	733	1302	510	169	2824	86	417	949	1170	510	546
2002	Men	79	423	970	362	129	1963	124	483	1351	1840	1116	771
	Women	43	320	584	285	124	1356	70	380	810	1169	512	510
	Total	122	743	1554	647	253	3319	98	432	1080	1468	707	637
2003	Men	81	437	989	401	182	2090	128	500	1366	2003	1504	819
	Women	46	304	591	300	130	1371	76	362	812	1225	526	514
	Total	127	741	1580	701	312	3461	102	432	1088	1575	847	663
2004	Men	84	455	1009	397	220	2165	133	522	1380	1946	1737	845
	Women	51	292	625	290	161	1419	85	349	851	1176	635	531
	Total	135	747	1634	687	381	3584	110	438	1115	1525	1002	684

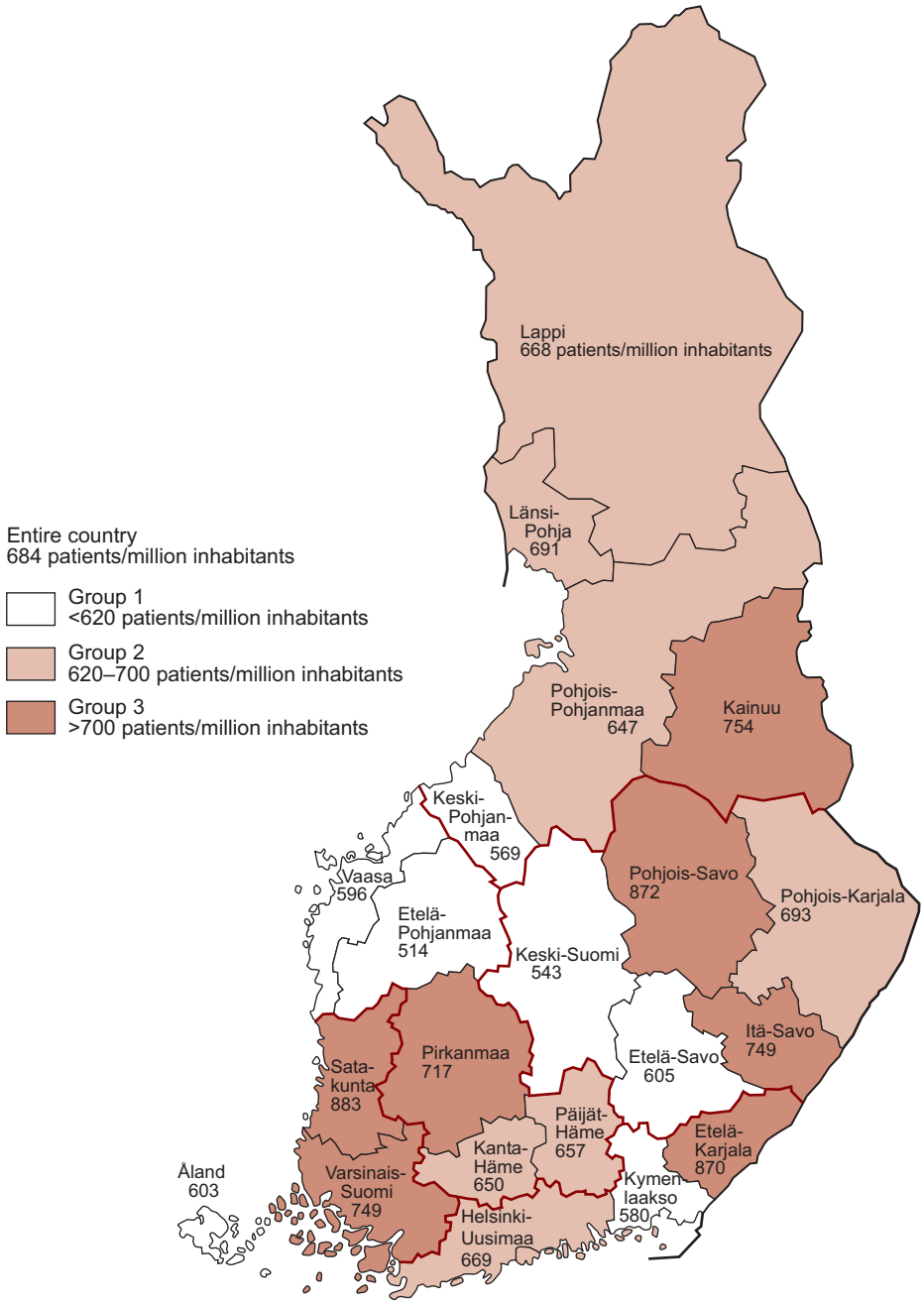
Figure 6. Standardized prevalence of RRT in regions.
Finnish Registry for Kidney Diseases 1994–2004



In Table 7, the number of RRT patients on 31 December 1994–2004 is shown according to age group and gender. In the age group of 75 years and older, the prevalence of RRT has increased almost fivefold during the past ten years, and in 65–74-year-olds it has almost doubled. The prevalence has also increased in younger age groups but more slowly.

In Figure 6, the prevalence rates for 1994–2004 are age- and gender-standardized using the Finnish population on 31 December 2004 as the reference population. Population changes during this period have been considered. Standardization removes the effect of age and gender on regional differences in prevalence rates.

Figure 7. Prevalence of RRT in healthcare districts on 31 December 2004.
Finnish Registry for Kidney Diseases 2004



The healthcare districts shown on the map are grouped according to the prevalence of RRT at the end of 2004 (Figure 7). The prevalence was <620 in seven districts, 620–700 in seven districts, and >700 patients/million inhabitants in seven districts. The borders of the regions are indicated with thick lines.

Figure 8. Prevalence of RRT at the end of the year according to type of treatment.
Finnish Registry for Kidney Diseases 1965–2004

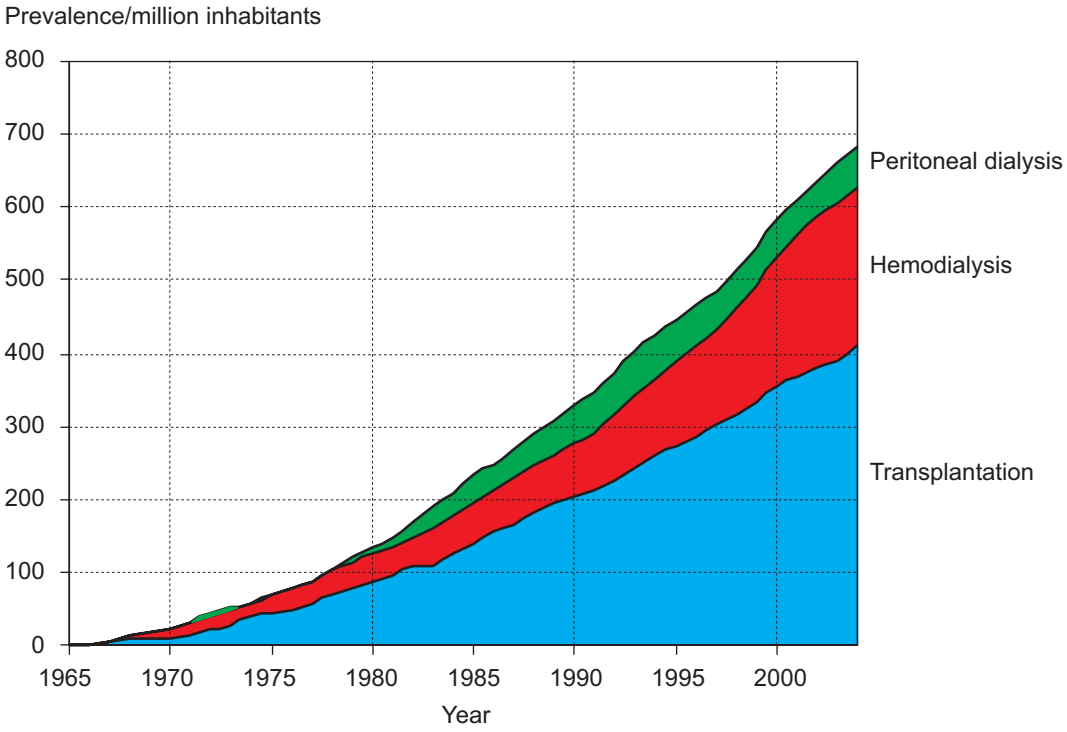
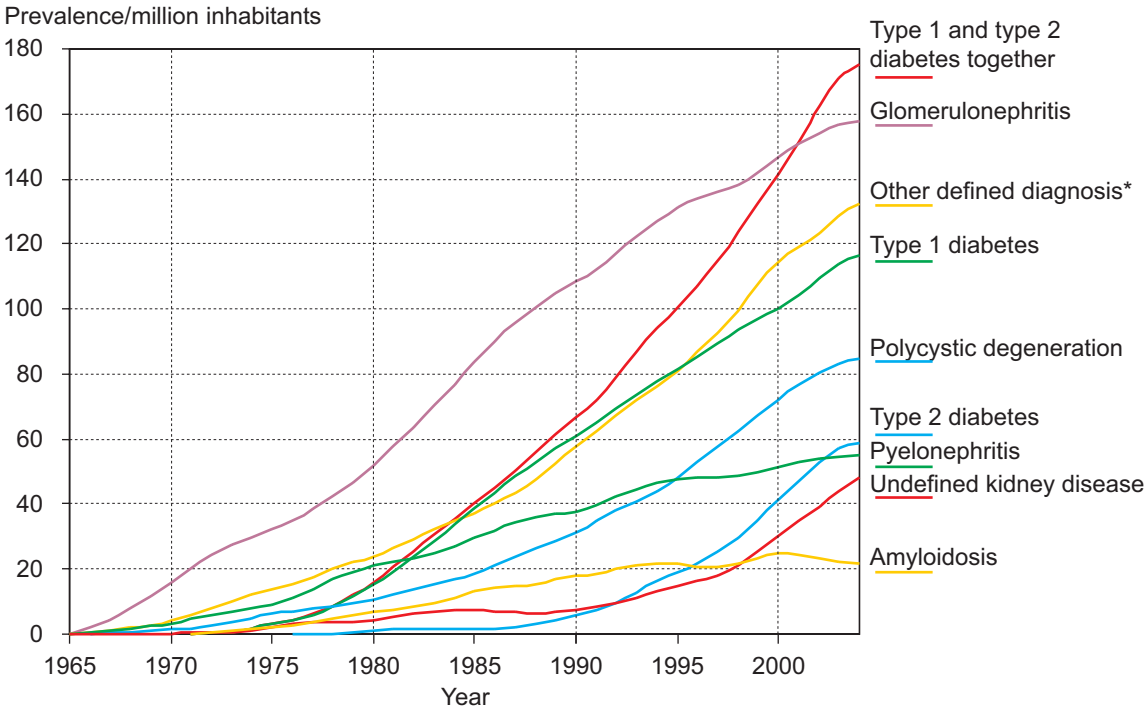


Figure 9. Prevalence of RRT at the end of the year according to diagnosis
Finnish Registry for Kidney Diseases 1965–2004



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

Figure 8 displays the prevalence of RRT according to type of treatment. During the past 15 years the numbers of hemodialysis patients and patients with a kidney transplant have increased more rapidly than the number of peritoneal dialysis patients.

The prevalence of RRT according to diagnosis is shown as smoothed averages in Figure 9. At the end of 2004, the most common kidney diagnosis of RRT patients was diabetes (prevalence rate 177/million inhabitants), with 26% of all RRT patients having diabetes. Glomerulonephritis was the second most common diagnosis (prevalence rate 159/million inhabitants).

Figure 10. International comparison of prevalence of RRT on 31 December 2003.
Finnish Registry for Kidney Diseases 2003

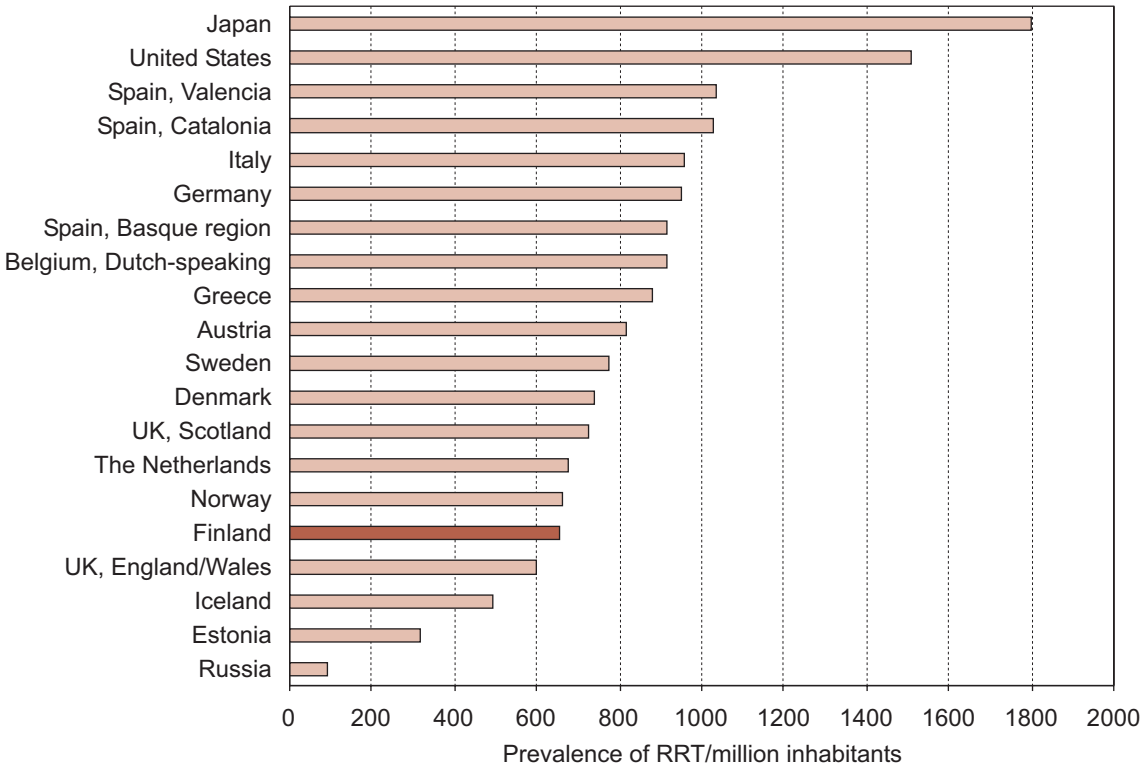
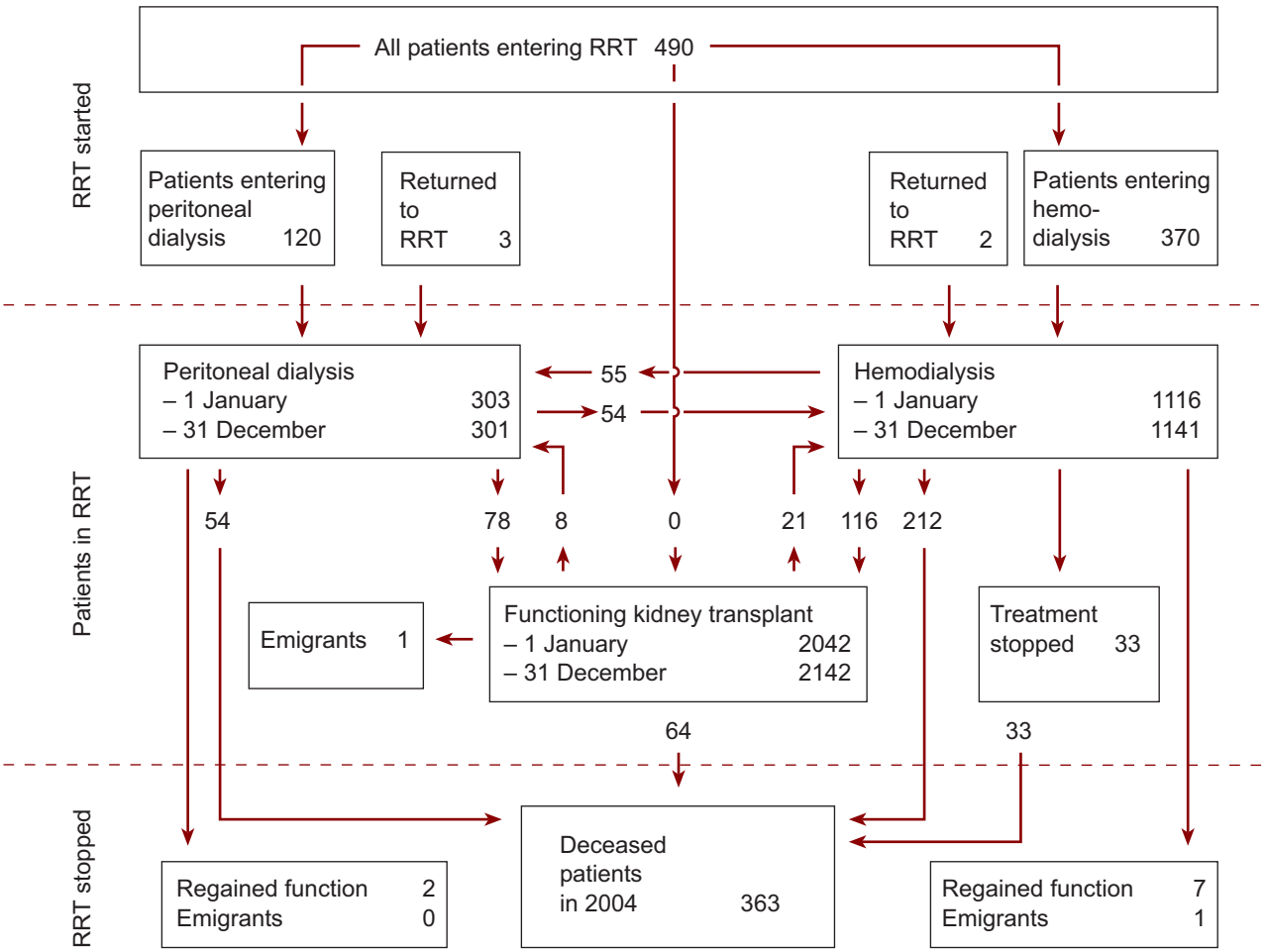


Figure 10 displays the prevalence of RRT on 31 December 2003 in countries reporting to the ERA-EDTA Registry (http://www.era-edta-reg.org), in Japan (only dialysis patients), and in the United States (The 2005 USRDS Annual Data Report Atlas, http://www.usrds.org). The prevalence rate in Finland was the fifth lowest. In Norway, the prevalence rate was similar to that in Finland. In Sweden, the prevalence rate was 18% higher and in Denmark 12% higher than the Finnish rate. The prevalence rates differed less between the Scandinavian countries than did the incidence rates. International incidence rates are shown in Figure 5.

Figure 11. Net changes in type of treatment.
Finnish Registry for Kidney Diseases 2004



During 2004, 490 new patients entered RRT (Figure 11). In addition, five patients returned to RRT. In all, 3462 patients were receiving RRT at the beginning of the year. Altogether 363 patients died and dialysis for nine patients was discontinued because the patients' own kidney function resumed. Of those who died, 64 had a functioning transplant, 54 were receiving peritoneal dialysis, and 212 were on hemodialysis. The RRT of 33 uremic patients was discontinued. A kidney transplant was received by 197 patients; two received combined liver and kidney transplantations (source: Kidney Transplantation Unit of Helsinki University Central Hospital).

Table 8. Mortality of RRT patients by region.
Finnish Registry for Kidney Diseases 1994–2004

Region	Deaths/1000 patient-years						Deaths/1000 patient-years[1)]					
	1994	1999	2002	2003	2004	2000–2004	1994	1999	2002	2003	2004	2000–2004
South	80	78	95	89	103	91	77	73	93	86	99	88
Southwest	83	95	119	89	68	92	80	90	109	85	65	85
West	105	155	118	106	113	115	105	132	114	99	105	107
East	84	117	114	115	112	113	79	100	107	110	109	104
North	90	124	90	128	120	104	86	106	86	117	111	98
Entire country	88	110	106	102	104	102	85	97	101	97	98	96

[1)]patients who died before 90 days after the start of RRT were excluded

Figure 12. Standardized mortality of RRT patients in regions.
Finnish Registry for Kidney Diseases 1994–2004

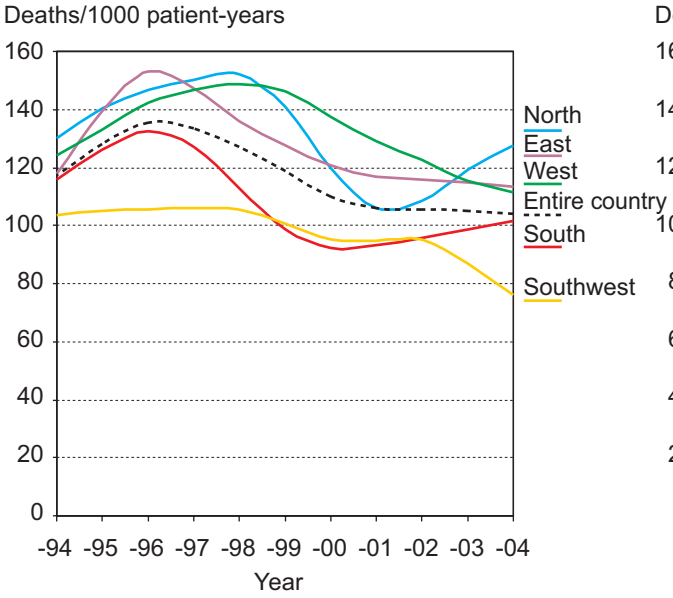
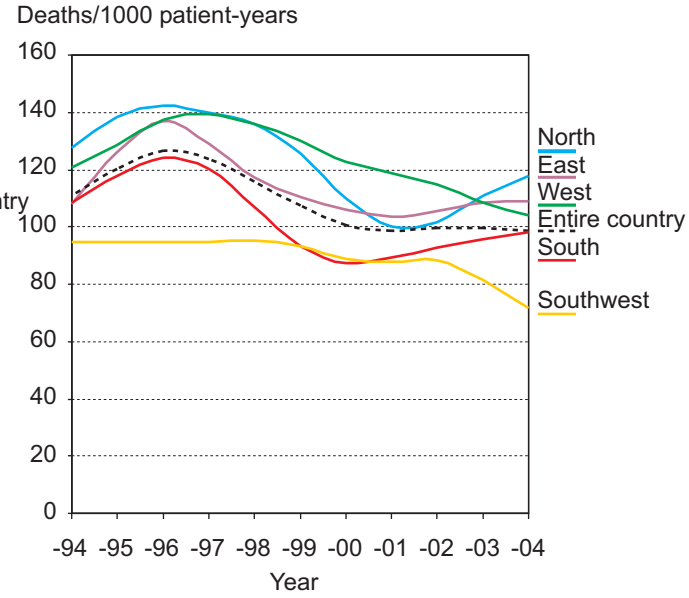


Figure 13. Standardized mortality of RRT patients in regions (patients who died before 90 days after start of RRT were excluded).
Finnish Registry for Kidney Diseases 1994–2004



RRT patients' mortality according to region in 1994–2004 is presented in Table 8. The mortality of patients who have been in RRT for at least 90 days is shown separately. The average mortality in 2000–2004 was highest in the western region and lowest in the southern region.

In Figures 12 and 13, mortality in the regions is shown as smoothed averages. The regional mortality rates for 1994–2004 have been age- and gender-standardized using all patient-years in 2004 as the reference population. Changes in age and gender distribution during this ten-year period have been considered. Patients who died within 90 days of the start of RRT were excluded from Figure 13. In the entire country, the standardized mortality rate has remained virtually unchanged during the past five years.

Table 9. Number of patient-years of all RRT patients according to diagnosis. Finnish Registry for Kidney Diseases 1994–2004

Diagnosis	Patient-years (%)					Change (%) 1994–2004
	1994	1999	2002	2003	2004	
Glomerulonephritis	632 (30.1)	724 (26.3)	800 (24.5)	811 (24.0)	823 (23.4)	30
Type 1 diabetes	390 (18.6)	502 (18.3)	561 (17.2)	589 (17.4)	612 (17.4)	57
Polycystic degeneration	215 (10.2)	336 (12.2)	417 (12.8)	428 (12.7)	441 (12.6)	106
Type 2 diabetes	78 (3.7)	157 (5.7)	260 (7.9)	293 (8.7)	302 (8.6)	290
Pyelonephritis	232 (11.0)	255 (9.3)	284 (8.7)	286 (8.5)	284 (8.1)	22
Undefined kidney disease	63 (3.0)	120 (4.4)	191 (5.8)	202 (6.0)	243 (6.9)	287
Nephrosclerosis	64 (3.1)	117 (4.2)	128 (3.9)	127 (3.8)	136 (3.9)	111
Amyloidosis	115 (5.5)	115 (4.2)	126 (3.9)	121 (3.6)	118 (3.4)	2
Urinary tract obstruction	68 (3.2)	94 (3.4)	111 (3.4)	115 (3.4)	121 (3.5)	79
Other systemic diseases	63 (3.0)	85 (3.1)	99 (3.0)	108 (3.2)	117 (3.3)	87
Congenital diseases	66 (3.1)	87 (3.2)	101 (3.1)	104 (3.1)	106 (3.0)	62
Congenital nephrosis, Finnish type	38 (1.8)	49 (1.8)	55 (1.7)	58 (1.7)	60 (1.7)	58
Other kidney diseases	8 (0.4)	29 (1.1)	54 (1.7)	54 (1.6)	55 (1.6)	627
Tubulointerstitial nephritis	54 (2.6)	50 (1.8)	47 (1.4)	49 (1.4)	50 (1.4)	–8
Malignancies	8 (0.4)	19 (0.7)	20 (0.6)	23 (0.7)	30 (0.9)	265
Metabolic diseases	10 (0.5)	9 (0.3)	13 (0.4)	14 (0.4)	15 (0.4)	53
All	2103 (100)	2748 (100)	3265 (100)	3380 (100)	3515 (100)	67

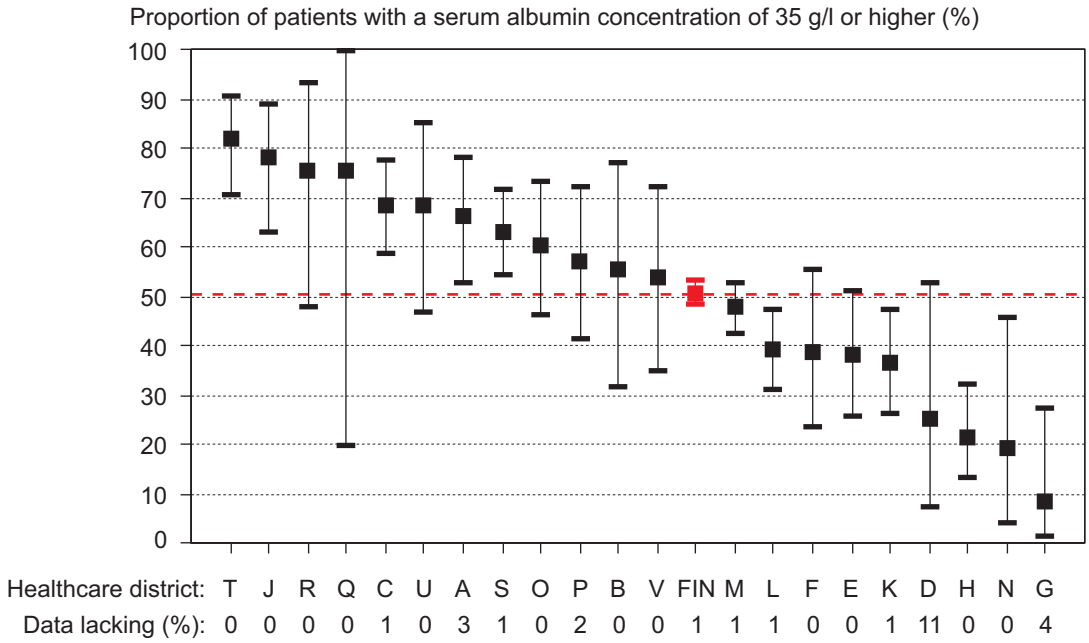
Table 10. Number of patient-years of all RRT patients according to diagnosis and type of treatment. Finnish Registry for Kidney Diseases 1994–2004

Diagnosis	Patient-years in 1994 (%)				Patient-years in 2004 (%)			
	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total
Glomerulonephritis	71 (23.1)	111 (21.6)	450 (35.2)	632 (30.1)	56 (18.7)	175 (15.5)	592 (28.4)	823 (23.4)
Type 1 diabetes	81 (26.2)	65 (12.5)	245 (19.2)	390 (18.6)	90 (30.1)	115 (10.2)	407 (19.5)	612 (17.4)
Polycystic degeneration	20 (6.4)	62 (12)	133 (10.4)	215 (10.2)	11 (3.8)	106 (9.4)	324 (15.5)	441 (12.6)
Type 2 diabetes	25 (8.2)	46 (8.9)	6 (0.5)	78 (3.7)	37 (12.4)	228 (20.2)	37 (1.8)	302 (8.6)
Pyelonephritis	26 (8.6)	41 (8.0)	164 (12.9)	232 (11)	18 (6.2)	68 (6.0)	198 (9.5)	284 (8.1)
Undefined kidney disease	17 (5.7)	26 (5.0)	19 (1.5)	63 (3.0)	25 (8.3)	141 (12.5)	77 (3.7)	243 (6.9)
Nephrosclerosis	14 (4.4)	27 (5.2)	24 (1.9)	64 (3.1)	20 (6.7)	64 (5.7)	51 (2.5)	136 (3.9)
Urinary tract obstruction	11 (3.4)	11 (2.1)	46 (3.6)	68 (3.2)	9 (3.0)	30 (2.7)	82 (3.9)	121 (3.5)
Amyloidosis	11 (3.7)	67 (12.9)	37 (2.9)	115 (5.5)	4 (1.4)	67 (6.0)	46 (2.2)	118 (3.4)
Other systemic diseases	9 (2.8)	21 (4.1)	33 (2.6)	63 (3.0)	10 (3.5)	51 (4.5)	56 (2.7)	117 (3.3)
Congenital diseases	10 (3.1)	7 (1.4)	49 (3.8)	66 (3.1)	2 (0.5)	15 (1.3)	89 (4.3)	106 (3.0)
Congenital nephrosis, Finnish type	7 (2.2)	0 (0)	31 (2.4)	38 (1.8)	5 (1.5)	2 (0.2)	53 (2.6)	60 (1.7)
Other kidney diseases	1 (0.2)	4 (0.8)	3 (0.2)	8 (0.4)	5 (1.7)	22 (2.0)	28 (1.3)	55 (1.6)
Tubulointerstitial nephritis	6 (1.9)	19 (3.7)	29 (2.3)	54 (2.6)	2 (0.7)	15 (1.3)	33 (1.6)	50 (1.4)
Malignancies	0 (0.1)	7 (1.3)	1 (0.1)	8 (0.4)	3 (1.1)	23 (2.0)	4 (0.2)	30 (0.9)
Metabolic diseases	0 (0)	2 (0.4)	8 (0.6)	10 (0.5)	1 (0.3)	5 (0.4)	9 (0.4)	15 (0.4)
All	308 (100)	516 (100)	1279 (100)	2103 (100)	300 (100)	1127 (100)	2088 (100)	3515 (100)

The number of patient-years of all RRT patients in 1994–2004 according to the diagnosis of different kidney diseases is shown in Table 9. The number of patient-years indicates patients' time in RRT during the year. Overall, the number of patient-years has increased by 67% since 1994 and by 28% since 1999. Glomerulonephritis is the most common diagnosis when type 1 and type 2 diabetes are considered separately. The proportion of glomerulonephritis has consistently decreased, being 23% in 2004. Type 1 diabetes is the second most common diagnosis, and its proportion of patient-years has remained unchanged since 1994. The proportions of patient-years due to type 2 diabetes and "undefined kidney disease" have increased considerably.

Table 10 shows the number of patient-years according to diagnosis and type of treatment in 1994 and 2004. In both years, the most common diagnosis among peritoneal dialysis patients was type 1 diabetes. Among hemodialysis patients, the most common diagnosis was glomerulonephritis in 1994, but in 2004 it was type 2 diabetes, which has become considerably more common in this group of patients. Glomerulonephritis remained the most common diagnosis among kidney transplantation patients.

Figure 14. Proportion of dialysis patients with a serum albumin concentration of 35 g/l or higher. Finnish Registry for Kidney Diseases 2004

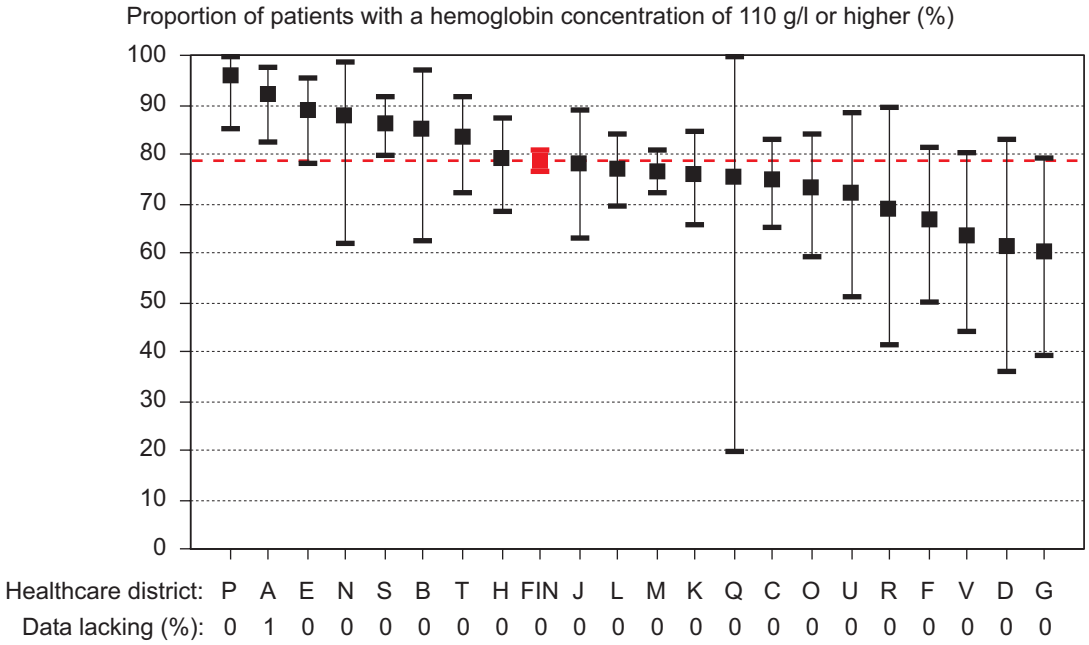


The next pages provide information on variables potentially connected to the quality of nephrological care in the various healthcare districts. The figures present the proportions of patients reaching the standard or target range of the variables. Confidence intervals of the proportions were estimated using binomial distribution. The healthcare districts were randomly and blindly given letter codes; the code FIN denotes the entire country. For each healthcare district, the proportion of lacking data, i.e. the percentage of patients for whom data has not been reported, is given.

The recommended level of serum albumin is generally 35 g/l or higher. Figure 14 shows the proportion of dialysis patients with a serum albumin concentration of 35 g/l or higher in the various healthcare districts at the end of 2004. In the entire country, this proportion was 50%, but significant ($p<0.001$) variation is present between healthcare districts.

Albumin concentration was reported for 81% of the kidney transplantation patients; 82% of these patients had a concentration of 35 g/l or higher.

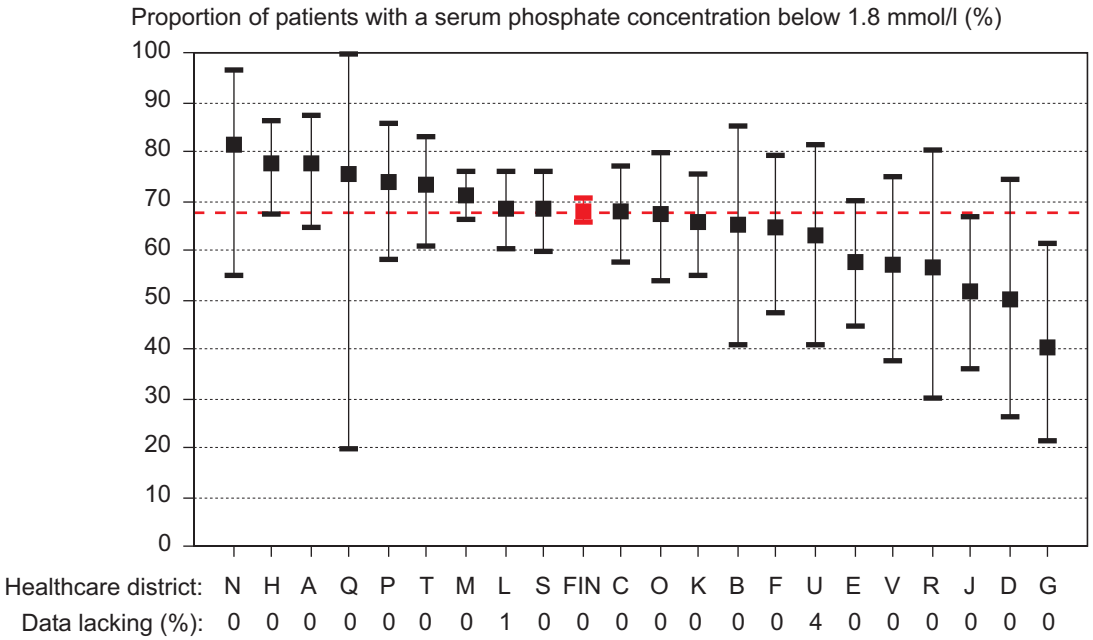
Figure 15. Proportion of dialysis patients with a hemoglobin concentration of 110 g/l or higher. Finnish Registry for Kidney Diseases 2004



The general recommendation for kidney patients' hemoglobin concentration is 110 g/l or higher (Nephrol Dial Transplant 2004;19 (Suppl 2):ii6-ii15). Figure 15 shows the proportion of dialysis patients with a serum hemoglobin concentration of 110 g/l or higher in the various healthcare districts at the end of 2004. In the entire country, this proportion was 78%, but significant (p=0.001) variation between healthcare districts is present.

Hemoglobin concentration was reported for 100% of kidney transplantation patients; 92% had a hemoglobin concentration of 110 g/l or higher. The proportion did not differ significantly (p=0.139) between healthcare districts.

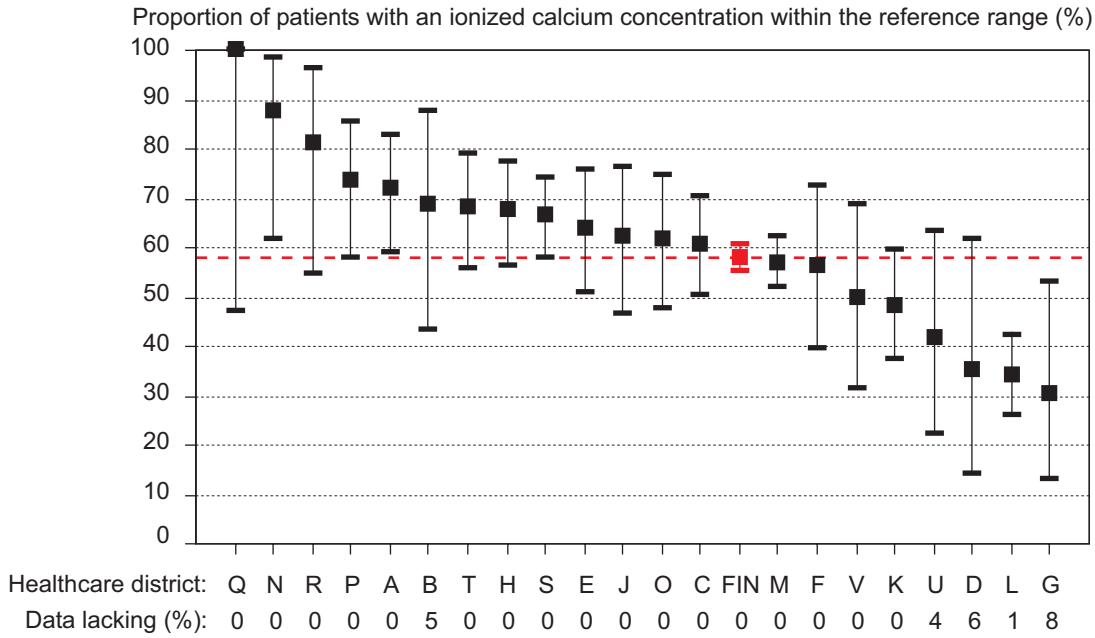
Figure 16. Proportion of dialysis patients with a serum phosphate concentration below 1.8 mmol/l. Finnish Registry for Kidney Diseases 2004



The target level of serum phosphate in dialysis patients is generally defined as below 1.8 mmol/l. Figure 16 shows the proportion of dialysis patients with a serum phosphate concentration below 1.8 mmol/l in the various healthcare districts at the end of 2004. In the entire country, this proportion was 68%. Proportions differed significantly (p=0.025) between healthcare districts.

Phosphate concentration was reported for 93% of kidney transplantation patients. Of these, 99% had a serum phosphate concentration below 1.8 mmol/l, and the proportion did not differ significantly (p=0.558) between healthcare districts.

Figure 17. Proportion of dialysis patients with an ionized calcium concentration within the reference range. Finnish Registry for Kidney Diseases 2004



The reference range for ionized calcium in plasma is 1.16–1.30 mmol/l (Helsinki University Central Hospital Laboratory, http://www.huslab.fi). Figure 17 shows the proportion of dialysis patients with a plasma concentration of ionized calcium in the reference range in the various healthcare districts at the end of 2004. In the entire country, this proportion was 58%. Of the values, 32% were below the lower reference limit and 10% above the higher reference limit. The proportion of dialysis patients with ionized calcium in the reference range differed significantly ($p<0.001$) between healthcare districts.

Of kidney transplantation patients, 7% had values below the lower limit and 22% had values above the higher limit.

Figure 18. Proportion of dialysis patients with a serum cholesterol concentration below 5 mmol/l. Finnish Registry for Kidney Diseases 2004

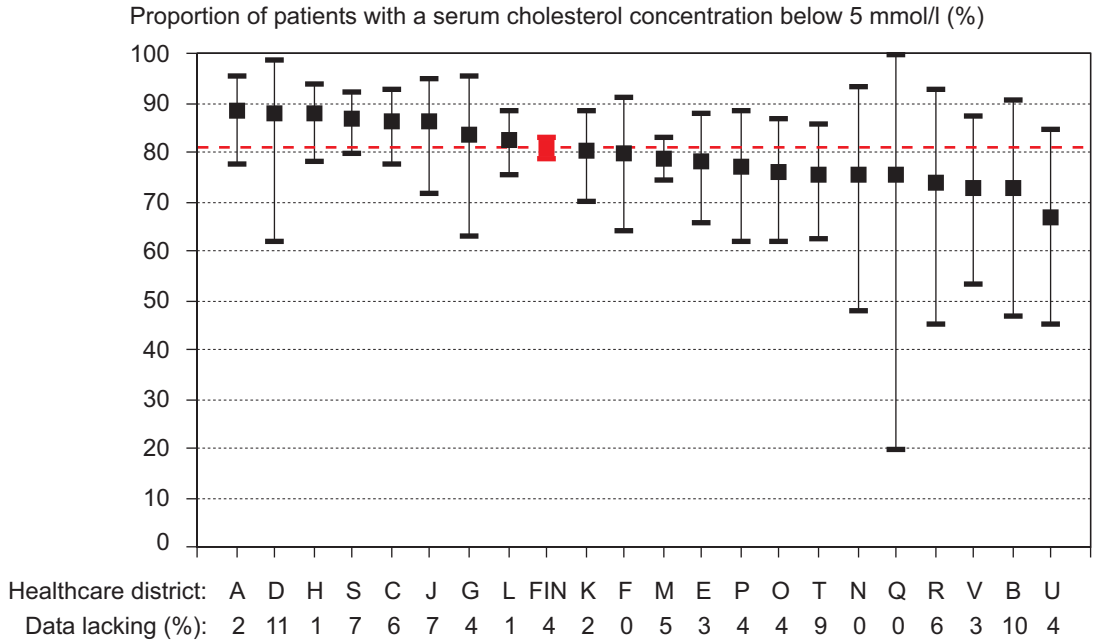
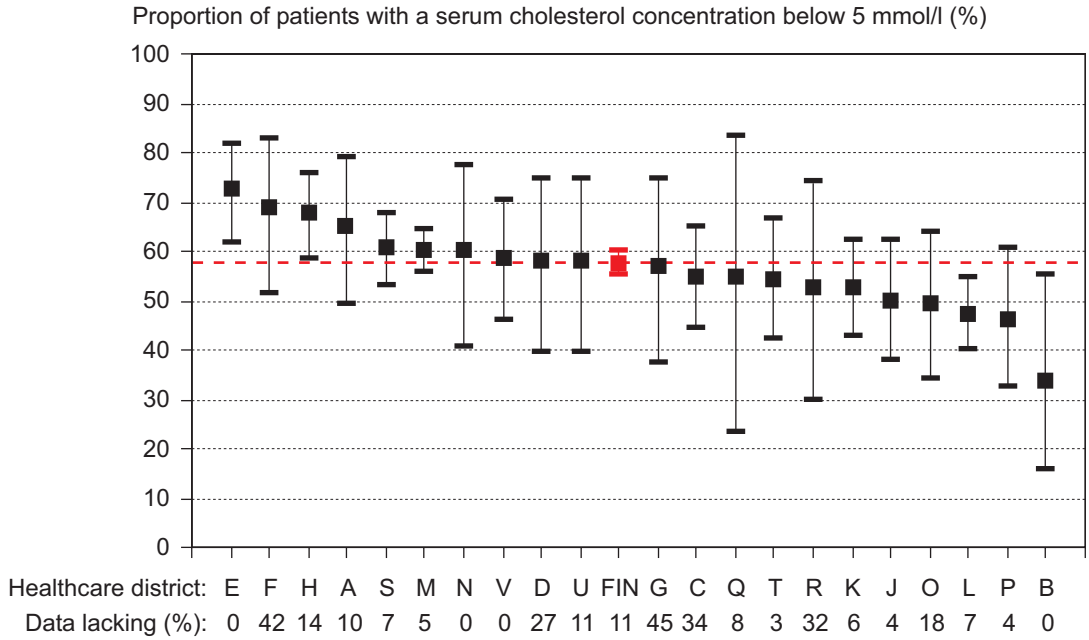


Figure 19. Proportion of kidney transplantation patients with a serum cholesterol concentration below 5 mmol/l. Finnish Registry for Kidney Diseases 2004



The general target level of serum cholesterol is below 5 mmol/l. Figures 18 and 19 show the proportions of dialysis and kidney transplantation patients with a serum cholesterol concentration below 5 mmol/l in the various healthcare districts at the end of 2004. In dialysis patients, this proportion was 81%, and in transplantation patients 58%. The proportions differed significantly between healthcare districts among kidney transplantation patients (p=0.005), but not among dialysis patients (p=0.417).

Figure 20. Proportion of dialysis patients with a serum LDL cholesterol concentration below 3 mmol/l. Finnish Registry for Kidney Diseases 2004

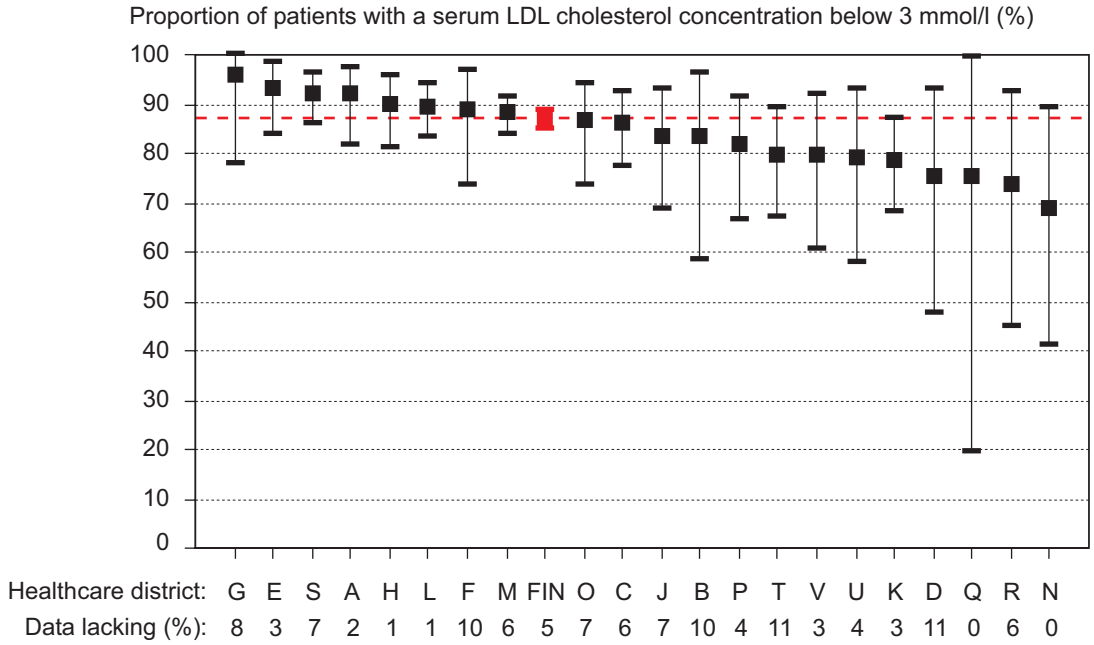
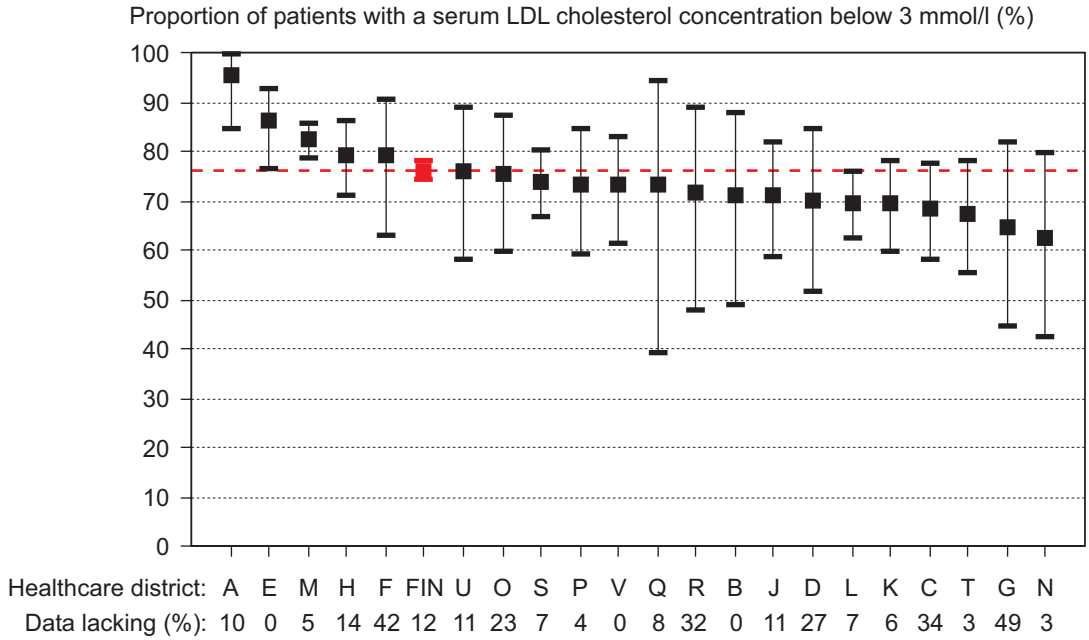


Figure 21. Proportion of kidney transplantation patients with a serum LDL cholesterol concentration below 3 mmol/l. Finnish Registry for Kidney Diseases 2004



The general target level of serum LDL cholesterol is below 3 mmol/l. Figures 20 and 21 present the proportions of dialysis and kidney transplantation patients with a serum LDL cholesterol concentration below 3 mmol/l in the various healthcare districts at the end of 2004. Among dialysis patients, this proportion was 87%, and among transplantation patients 76%. The proportion differed significantly between healthcare districts among kidney transplantation patients ($p=0.001$), but not among dialysis patients ($p=0.054$).

Figure 22. Proportion of dialysis patients with a serum HDL cholesterol concentration above 1 mmol/l. Finnish Registry for Kidney Diseases 2004

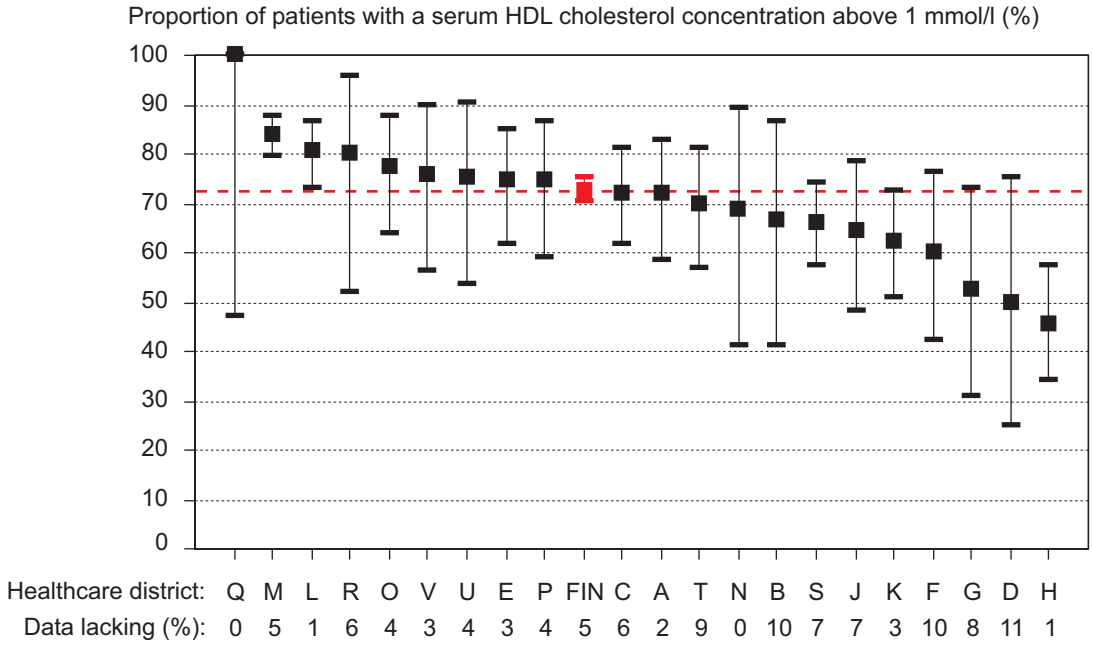
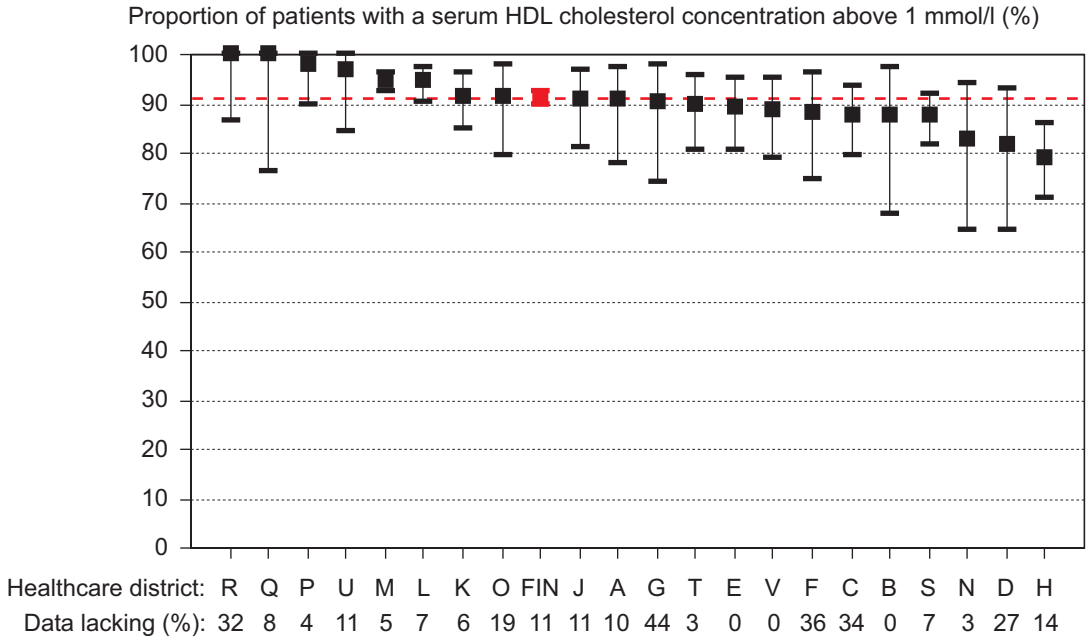


Figure 23. Proportion of kidney transplantation patients with a serum HDL cholesterol concentration above 1 mmol/l. Finnish Registry for Kidney Diseases 2004



The general target level of serum HDL cholesterol is above 1 mmol/l. Figures 22 and 23 show the proportions of dialysis and kidney transplantation patients with a serum HDL cholesterol concentration above 1 mmol/l in the various healthcare districts at the end of 2004. Among dialysis patients, this proportion was 73%, and among transplantation patients 91%. The proportion differed significantly between healthcare districts both among dialysis patients ($p<0.001$) and kidney transplantation patients ($p<0.001$).

Figure 24. Proportion of dialysis patients with a serum triglyceride concentration below 2 mmol/l. Finnish Registry for Kidney Diseases 2004

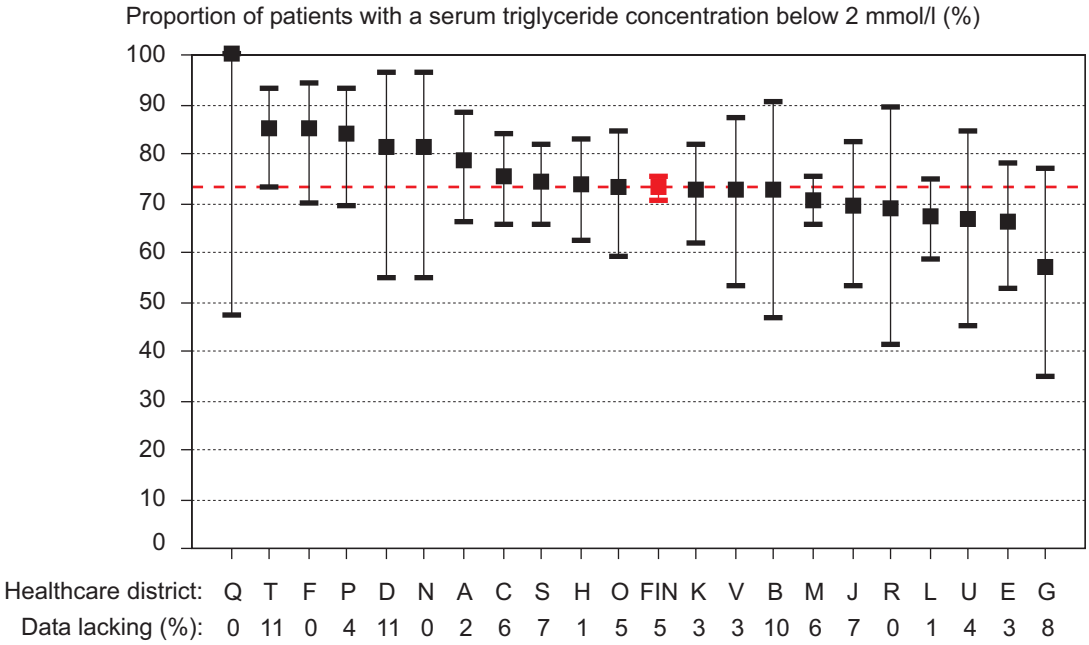
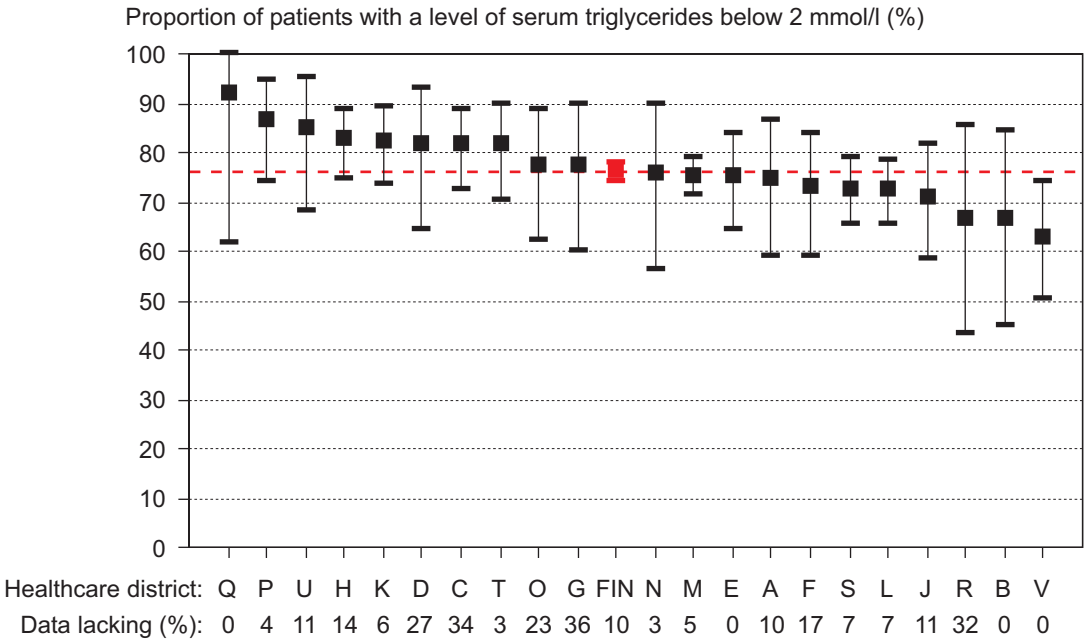


Figure 25. Proportion of kidney transplantation patients with a serum triglyceride concentration below 2 mmol/l. Finnish Registry for Kidney Diseases 2004



The general target level of serum triglycerides is below 2 mmol/l. Figures 24 and 25 show the proportions of dialysis and kidney transplantation patients with a serum triglyceride concentration below 2 mmol/l in the various healthcare districts at the end of 2004. Among dialysis patients, this proportion was 73%, and among transplantation patients 76%. The proportion did not differ significantly between healthcare districts among either dialysis patients (p=0.326) or kidney transplantation patients (p=0.118).

Figure 26. Proportion of diabetic dialysis patients with a serum HbA_{1c} level below 7%.
Finnish Registry for Kidney Diseases 2004

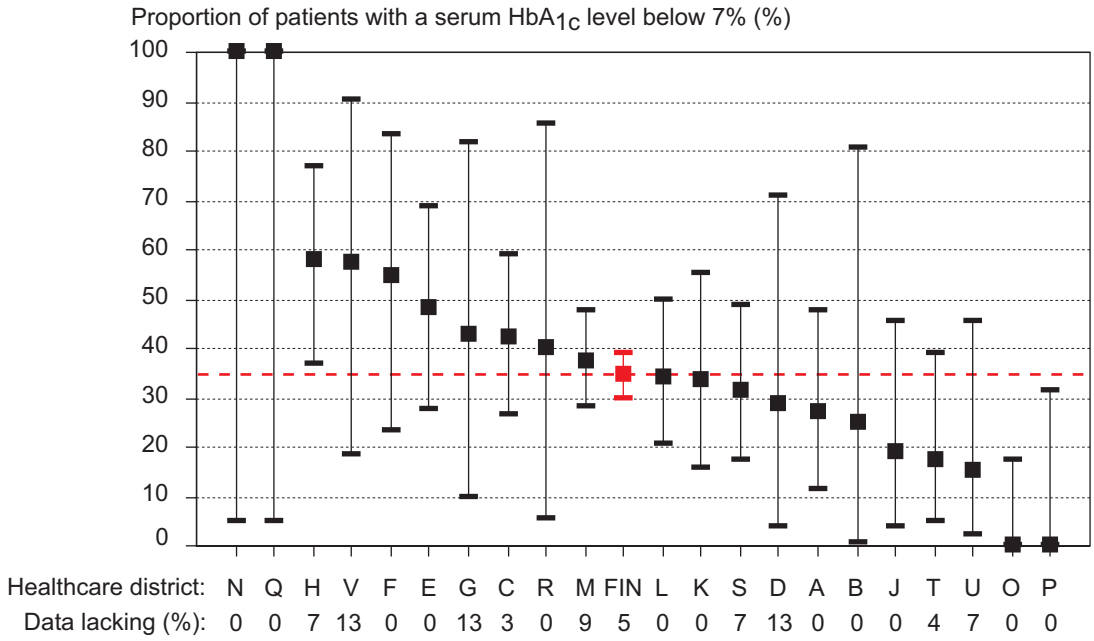
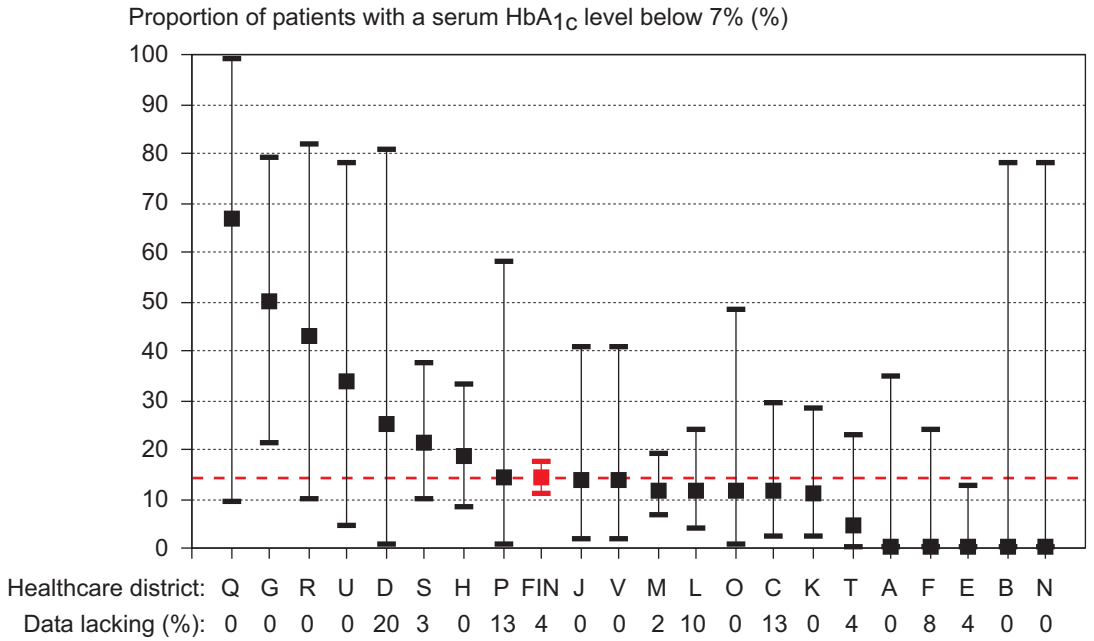


Figure 27. Proportion of diabetic kidney transplantation patients with a serum HbA_{1c} level below 7%.
Finnish Registry for Kidney Diseases 2004



The recommended level of glycosylated hemoglobin-A_{1c} (HbA_{1c}) is below 7%. Figures 26 and 27 show the proportions of diabetic dialysis and kidney transplantation patients with HbA_{1c} concentrations lower than 7% in the various healthcare districts at the end of 2004. Among diabetic dialysis patients, this proportion was 34%, and among diabetic transplantation patients 14%. The level of HbA_{1c} differed significantly between healthcare districts among both dialysis patients (p=0.009) and kidney transplantation patients (p=0.005).

Figure 28. Proportion of dialysis patients with blood pressure below 130/85 mmHg. Finnish Registry for Kidney Diseases 2004

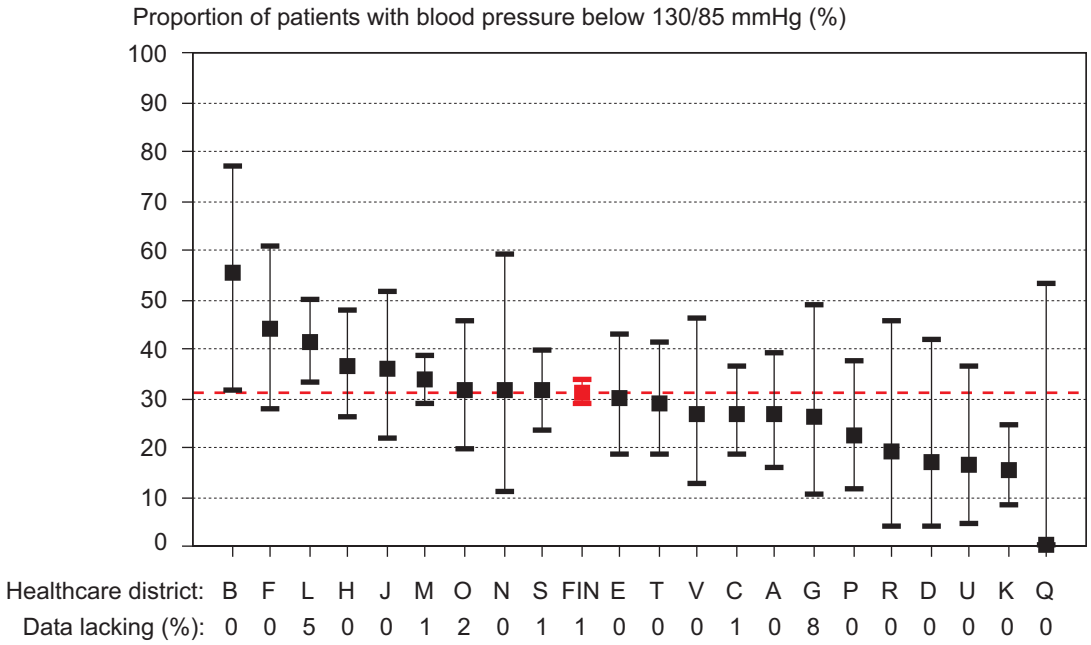
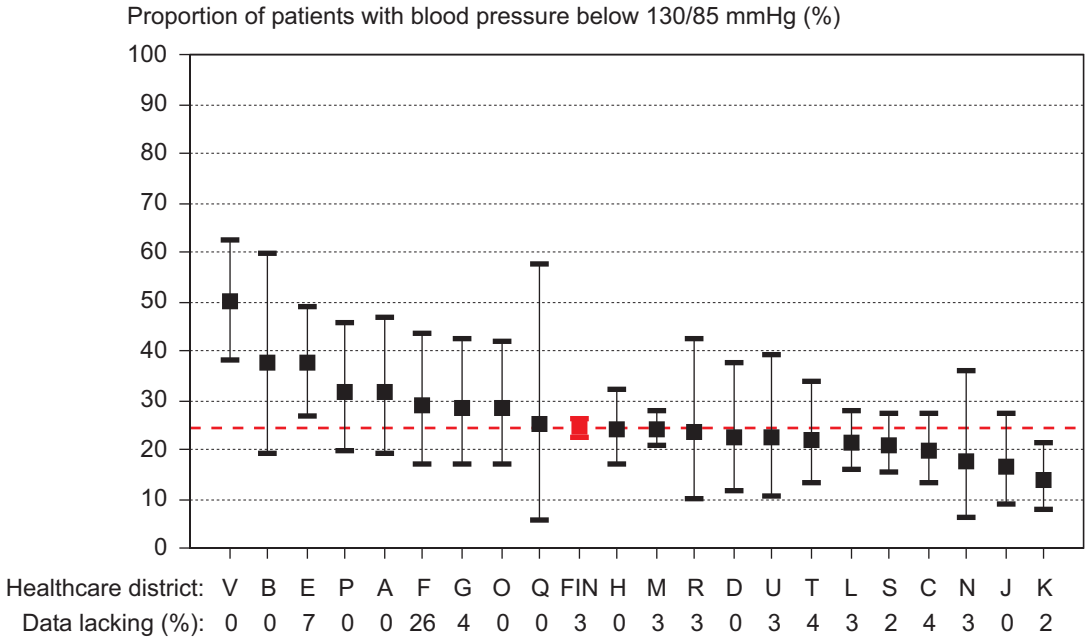


Figure 29. Proportion of kidney transplantation patients with blood pressure below 130/85 mmHg. Finnish Registry for Kidney Diseases 2004



The recommended blood pressure level for kidney patients is below 130/85 mmHg. Figures 28 and 29 display the proportions of dialysis and kidney transplantation patients with blood pressure at the recommended level in the various healthcare districts at the end of 2004. Among dialysis patients, this proportion was 31%, and among transplantation patients 24%. The proportion differed significantly between healthcare districts among both dialysis patients ($p=0.006$) and kidney transplantation patients ($p<0.001$).

Figure 30. Proportion of dialysis patients receiving treatment for high blood pressure.
Finnish Registry for Kidney Diseases 2004

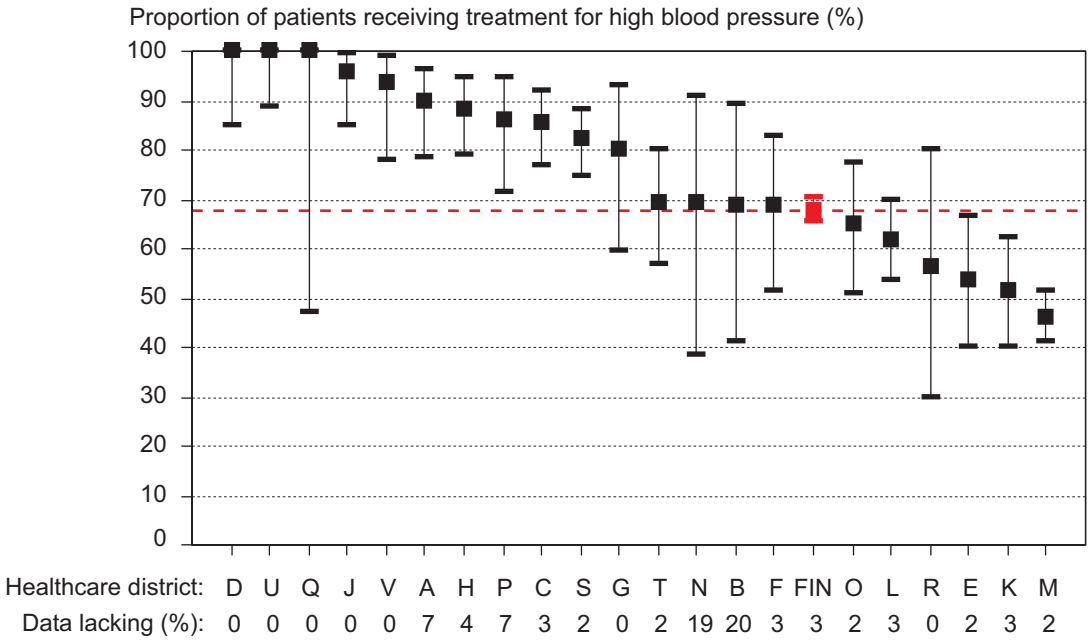
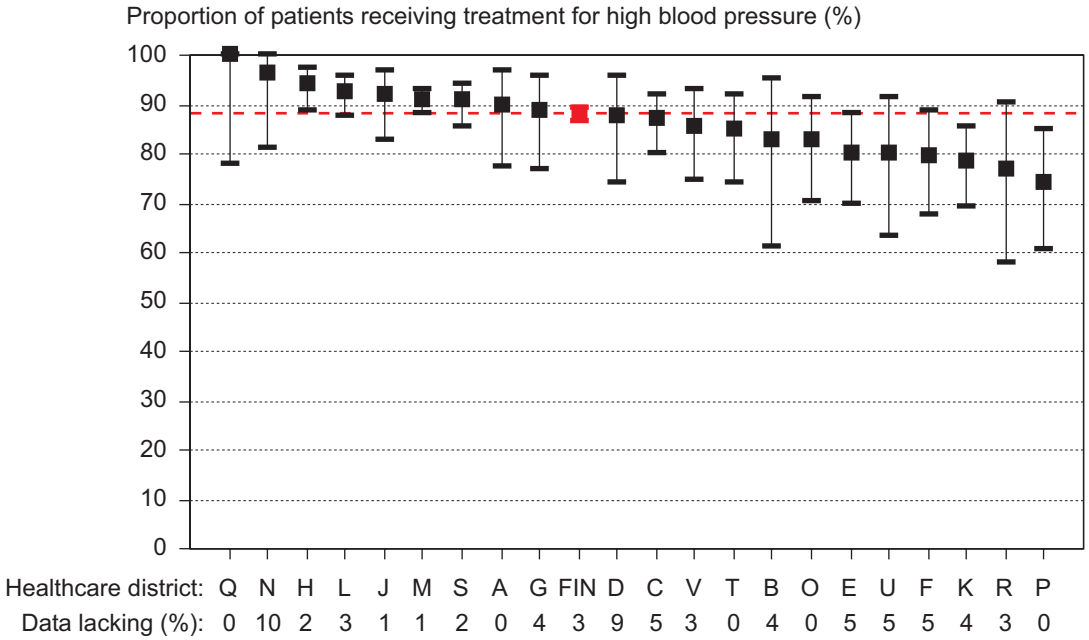


Figure 31. Proportion of kidney transplantation patients receiving treatment for high blood pressure.
Finnish Registry for Kidney Diseases 2004



Figures 30 and 31 show the proportions of dialysis and kidney transplantation patients receiving treatment for high blood pressure at the end of 2004. Among dialysis patients, the proportion was 68%, and among kidney transplantation patients it was 88%. The proportion of patients receiving treatment for high blood pressure varied between healthcare districts among both dialysis patients ($p<0.001$) and kidney transplantation patients ($p<0.001$).

Table 11. Summed rank of the healthcare districts based on the comparisons in Figures 14–29. Finnish Registry for Kidney Diseases 1994–2004

Code of healthcare district	Summed rank
33.	119
57.	120
51.	132
71.	141
37.	145
41.	152
59.	154
63.	167
31.	176
47.	177
43.	181
55.	186
49.	187
67.	188
53.	197
69.	197
65.	199
35.	203
39.	215
45.	222
61.	226

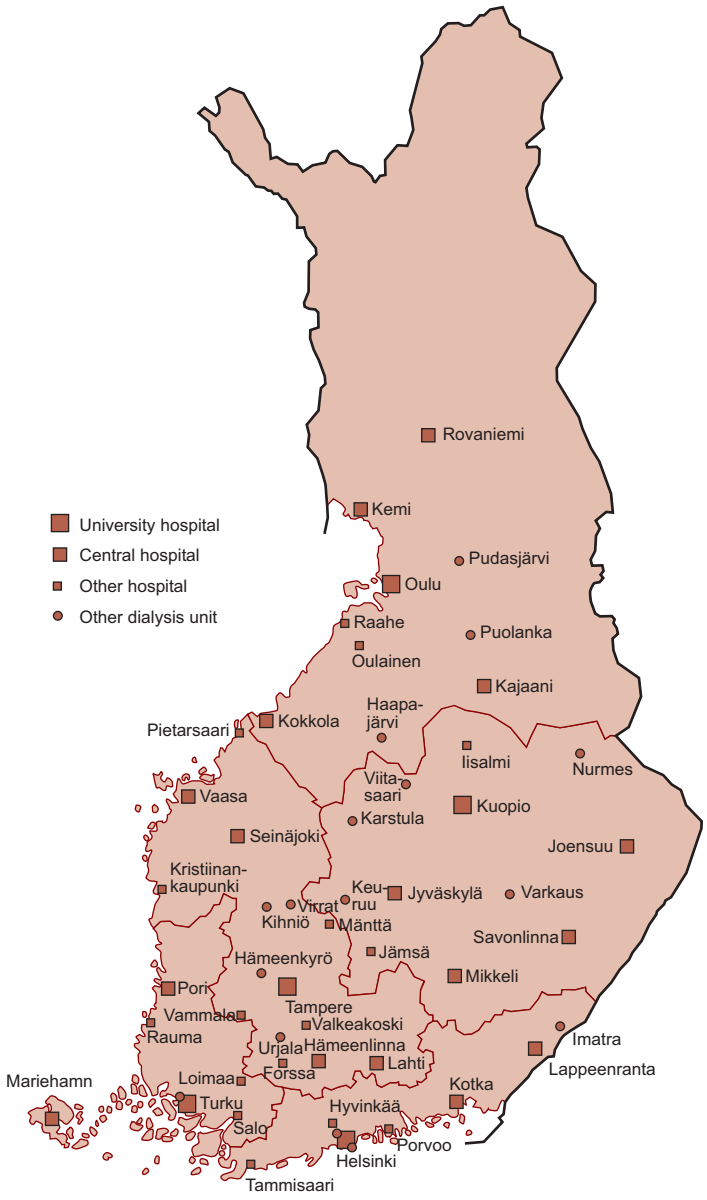
Table 11 summarizes the ranks of the healthcare districts of Figures 14–29. The healthcare district with the highest proportion of patients achieving the target level was ranked as number 1, while the healthcare district with the lowest proportion of patients reaching the target level was ranked as number 21. The ranks of the healthcare districts in all 16 analyses were summed. If the summed rank is small, the patients in the healthcare district have reached the target levels of various laboratory tests fairly well. In Table 11, the healthcare districts were given a new secret code (not the same as in Figures 14–31; the code was sent only to the chief nephrologist in the healthcare district. It should be borne in mind that many circumstances may affect the summed rank in Table 11, e.g. the prevalence of RRT, the age distribution of RRT patients, and the distribution of treatment modes.

Age
at end of year 1999:10, 2000:11, 2001:7, 2002:7
effect on survival 2002:14–16
of new RRT patients 1998:8, 2000:9,12, 2001:4
of new RRT patients with glomerulonephritis 1998:8
Body-mass index 1999:12, 2002:15
Causes of death
type of treatment 2000:18
Changes in type of treatment 1998:5, 1999:6, 2000:6, 2001:11, 2002:11, 2003:11, 2004:13
Cockroft–Gault formula 1998:10
Comorbidity
according to kidney disease diagnosis 1998:7
amputation 2001:20
angina pectoris 2001:18
arterial disease other than coronary disease 2001:20
cerebrovascular hemorrhage or infarction 2001:21
coronary disease 2001:18
heart failure 2001:19
high blood pressure 1998:10, 1999:17, 2000:14–15, 2001:21, 2002:15,19, 2004:25
hyperlipidemia 2001:21
left ventricular hypertrophy 2001:19
myocardial infarction 2001:18–19
Cox regression 1998:10, 2002:15–16
Erythropoietin treatment 1999:16
Finnish population
age groups 1998:1, 1999:2, 2000:2, 2001:2, 2002:2, 2003:1–2, 2004:1–2
gender 2001:2, 2002:2, 2003:2, 2004:2
in healthcare districts 1998:1, 1999:1, 2000:1, 2001:1, 2002:1, 2003:1, 2004:1
in regions 1998:1, 1999:1, 2000:1, 2001:1–2, 2002:1–2, 2003:1–2, 2004:1–2
Glomerulus filtration 1998:10
Graft survival
calendar time period 2003:16
diagnosis 2003:17
High blood pressure, see comorbidity
High blood pressure, treatment 1999:17, 2000:14–15, 2001:21, 2004:26
Immunosuppressive treatment 1998:10, 2000:12–13, 2003:18
Incidence of RRT
90 days after start of RRT 2002:2–3, 2003:2–3, 2004:5
age groups 2004:4
children 1998:4, 1999:5, 2000:5, 2001:3, 2002:3, 2003:3, 2004:3
diagnosis 1998:9, 2000:9, 2001:4, 2002:4, 2003:4, 2004:6
gender 2004:4
in healthcare districts 1998:4, 1999:5, 2000:5, 2001:3, 2002:3, 2003:3, 2004:3
in regions 1998:4, 1999:5, 2000:5, 2001:2–3, 2002:2–3, 2003:2–3, 2004:3,5
international 2001:5, 2002:5, 2003:5, 2004:7
standardized 2001:3, 2002:2–3, 2003:2–3, 2004:5
type of treatment 1998:5, 1999:6, 2000:6, 2001:11, 2002:11, 2003:11
Kidney biopsy 2003:20
Kidney transplantation
donor 2001:16
probability 1999:18
proportion receiving 2001:16
time from start of dialysis 2001:17
Kt/V 1999:11, 2002:17
Laboratory tests
albumin 1998:10, 1999:11–12, 2002:15,16,18, 2004:16
cholesterol, total 1999:13–14, 2002:20, 2004:20
creatinine 1998:10, 2002:15–17
CRP 1999:11, 2002:15,22
glycosylated hemoglobin A_{1c} 2002;15, 2004:24
HDL cholesterol 1999:13, 2002:15,21, 2004:22
hematocrit 1999:16, 2002:15
hemoglobin 2002:15, 2004:17
ionized calcium 1998:10, 1999:15, 2002:15,18, 2004:19
LDL cholesterol 2002:15,20, 2004:21
phosphate 1999:15, 2002:15,16,18, 2004:18
triglycerides 1999:13, 2002:15,21, 2004:23
urea 1998:10, 2002:15
Length 2002:15
Mortality
90 days after start of RRT 2002:12, 2003:12, 2004:14
diagnosis 2000:17
earlier than 90 days after start of RRT 2001:12
in regions 2001:12, 2002:12, 2003:12, 2004:14
standardized 2001:13, 2002:12, 2003:12, 2004:14
transplantation patients' 2000:17
type of treatment 1998:5, 1999:6, 2000:6,16, 2001:11, 2002:11, 2003:11
Patient-years
age groups 1998:6–7, 1999:8, 2000:10, 2001:14
definition 1998:6, 1999:7, 2003:13, 2004:15
diagnosis 1998:6–7, 1999:7–8, 2000:8, 2001:15, 2002:13, 2003:13–14, 2004:15
type of treatment 1998:6, 1999:7, 2000:7,10, 2001:14, 2003:14, 2004:15
Peritonitis 1998:10, 2003:18

Prevalence of RRT
age groups 1998:2, 1999:3, 2000:3, 2001:7, 2002:7, 2003:7, 2004:9
diagnosis 1999:9, 2000:8, 2001:9, 2002:9, 2003:9, 2004:11
gender 2001:7, 2002:7, 2003:7, 2004:9
in healthcare districts 1998:2–3, 1999:2,4, 2000:2,4, 2001:6,8, 2002:6,8, 2003:6,8, 2004:8,10
in regions 1998:2, 1999:2–3, 2000:2–3, 2001:6–7, 2002:6–7, 2003:6–7, 2004:8–9
international 2001:10, 2002:10, 2003:10, 2004:12
prognosis 2003:15
standardized 2001:7, 2002:7, 2003:7, 2004:9
type of treatment 1998:5, 1999:6,10, 2000:6–7, 2001:9,11, 2002:9,11, 2003:9,11: 2004:11,13
Pulse pressure 2002:15,19
Regions 2004:1
Satellite dialysis unit 2003:19
Survival
by age group 1998:11, 2002:14
by diagnosis 1998:12
by start period of RRT 2002:14
by type of treatment 1998:11
effect of various variables 1998:10, 2002:15–16
multivariate model 2002:16
Tobacco smoking 2001:21
Treatment standards
in healthcare districts 2004:16–25, 27
Undefined kidney disease 2004:6
Vascular access types 2003:19
Vitamin D treatment 1999:14–15
Weight 2002:15

Finnish Registry for Kidney Diseases

Report 2004



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