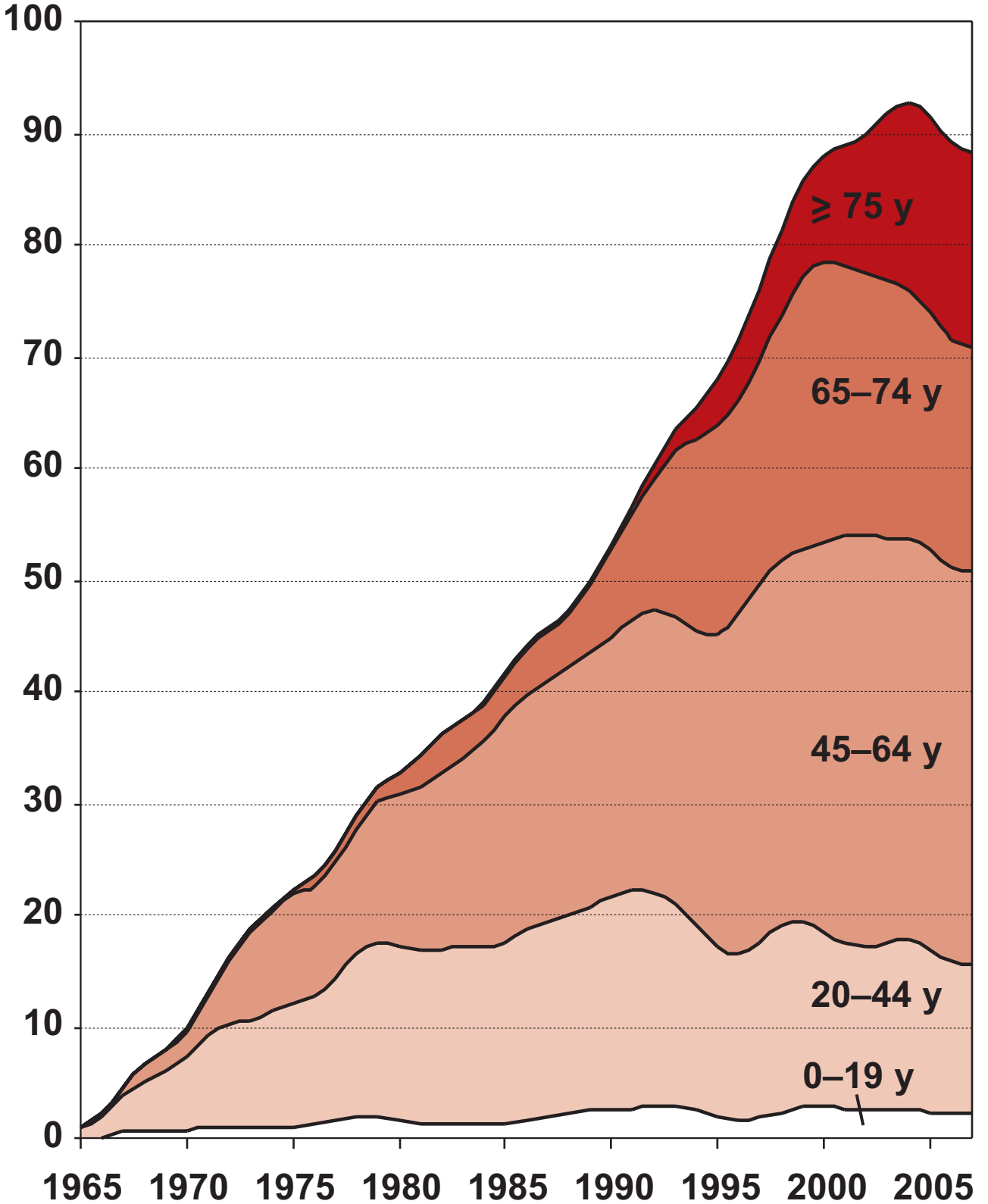


# Report 2007

Incidence/million inhabitants



# Finnish Registry for Kidney Diseases – Report 2007

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## *Finnish Registry for Kidney Diseases – Report 2007*

Report 2007 is the 16<sup>th</sup> annual report of the Finnish Registry for Kidney Diseases. Each year the report gives the newest data on incidence and prevalence of renal replacement therapy (RRT), i.e. dialysis and kidney transplantation. RRT patients' mortality has been reported since 2002. In addition to epidemiological trends, the reports have presented various special analyses about death causes, laboratory tests, comorbidity, variables affecting survival prognosis, treatment standards, immunosuppressive treatment, and function of kidney grafts, among others. The Finnish Registry for Kidney Diseases is estimated to cover 97–99% of all Finnish patients receiving RRT since 1964. At the end of 2007, the registry contained data on 10 846 patients, 3943 of whom were still alive.

The cover page shows the incidence of RRT, i.e. the annual number of new RRT patients per million inhabitants. After the year 2000, the incidence has no longer increased. The number of new RRT patients older than 75 years is still on the rise, while the number of new patients younger than 75 years has decreased during the past ten years. In the best of cases, this indicates that treatment of mild to moderate chronic kidney disease has improved and that the disease progresses to the end-stage more slowly. On the other hand, it has been speculated that the increased incidence of RRT among older patients is due to higher acceptance of patients with poor prognosis to RRT. This is not supported by the special analysis about comorbidities given in this report; patients older than 75 years who entered RRT in 2004–2007 did not have more comorbidities than those entering RRT in 2000–2003. The growing number of elderly RRT patients is partially caused by increased age of the Finnish population.

The prevalence of RRT has increased each year, and the increase will continue as long as the number of deaths among RRT patients is lower than the number of patients entering RRT. Aging of the patients is also reflected in the prevalence figures for different age groups; at the end of 2007, 13% of patients were 75 years or older, whereas at end of 1997 only 4% belonged to the oldest age group. This report presents the distribution of kidney disease diagnoses in 1965–2007 separately for dialysis patients and kidney transplantation patients (Page 18). The most common diagnosis of dialysis patients is type 2 diabetes, while glomerulonephritis is most common among kidney transplantation patients.

RRT patients' mortality has dropped during recent years. With age standardization, the decreased mortality is even more evident. On page 23, mortality is presented according to age groups in 1997–2002 and 2003–2007. In each of the age groups, mortality has decreased by 15–30%, but in the whole population the decrease is smaller, 8%. This is explained by the number of patient-years increasing the most in the age group with the highest mortality, in those aged 75 years or older.

Since 2000, the Finnish Registry of Kidney Diseases has collected data on the most important comorbidities, treatment of high blood pressure and hyperlipidemia, and tobacco smoking of new RRT patients using a “tick the correct box” system. On pages 24–35, these data are presented according to age group and gender separately for patients entering RRT in 2000–2003 and 2004–2007. Generally, the frequency of comorbidities has not decreased in recent years. Patients entering RRT have more often had a history of a coronary bypass or angioplasty. The frequency of chronic cardiac failure has dropped among patients aged 75 years and older. Most patients receive drug treatment for high blood pressure, and the treatment frequency has increased. Drug treatment for hyperlipidemia has also increased, and in 2004–2007, every second new RRT patient received medication for hyperlipidemia. Of concern is that smoking was more common among women entering RRT in 2004–2007 than among those entering in 2000–2003. On the other hand, smoking among men, especially 20–44-year-old men, has decreased.

The Finnish Registry for Kidney Diseases is a national healthcare registry that is maintained by the Finnish Kidney and Liver Association and 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 excellent cooperation.

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Table 1. The Finnish population and its distribution in healthcare districts.  
Finnish Registry for Kidney Diseases 1997–2007

Healthcare district (1000 inhabitants)	Year					Change (%) 1997–2007
	1997	2002	2005	2006	2007	
1 Helsinki-Uusimaa	1338	1413	1445	1460	1477	10.4
3 Varsinais-Suomi	446	456	461	463	464	4.2
4 Satakunta	235	229	227	226	225	-4.1
5 Kanta-Häme	165	166	168	170	171	3.9
6 Pirkanmaa	439	454	465	470	475	8.2
7 Päijät-Häme	209	209	210	211	211	1.0
8 Kymenlaakso	186	182	181	180	179	-3.6
9 Etelä-Karjala	131	129	129	128	128	-2.4
10 Etelä-Savo	109	105	104	103	102	-6.0
11 Itä-Savo	64	61	60	59	58	-9.4
12 Pohjois-Karjala	180	174	173	172	171	-5.0
13 Pohjois-Savo	258	252	250	249	249	-3.7
14 Keski-Suomi	265	267	270	270	271	2.3
15 Etelä-Pohjanmaa	199	195	194	194	194	-2.2
16 Vaasa	167	166	166	167	168	0.4
17 Keski-Pohjanmaa	79	77	77	77	78	-2.0
18 Pohjois-Pohjanmaa	364	374	382	384	387	6.3
19 Kainuu	89	83	82	81	80	-9.8
20 Länsi-Pohja	71	67	67	66	66	-7.0
21 Lappi	128	121	119	119	119	-7.6
22 Åland	25	26	27	27	27	6.9
Region South	1655	1724	1755	1769	1784	7.8
Southwest	706	711	714	716	717	1.5
West	1179	1189	1204	1212	1219	3.4
East	876	859	856	853	851	-2.9
North	731	723	727	727	729	-0.3
Entire country	5147	5206	5256	5277	5300	3.0

On 31 December 2007, there were 5.300 million inhabitants in Finland (Table 1, Source: Statistics Finland). During the past ten years the population for the country overall has increased by 3%. The fastest increase has occurred in the southern region. In the eastern region, the population has decreased, and in the northern region it has remained virtually unchanged. Since 1997, the populations have increased in nine healthcare districts and decreased in twelve. The decrease has been especially fast, almost 10%, in the healthcare districts of Kainuu and Itä-Savo. The population has increased the most in the healthcare district of Helsinki-Uusimaa.

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 2007

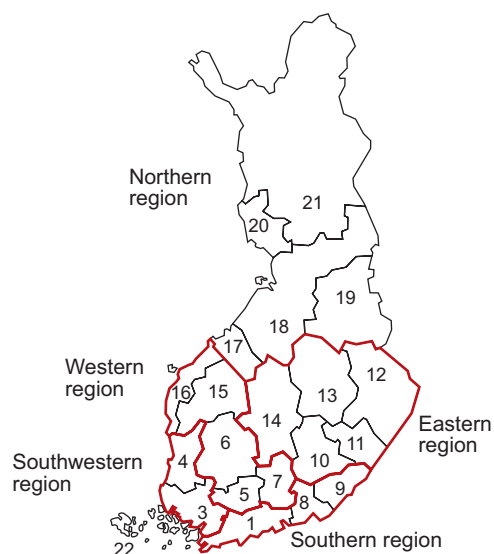


Table 2. The Finnish population according to region, age group, and gender.  
Finnish Registry for Kidney Diseases 1997–2007

Region	1997					2007				
	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	205 (26)	515 (65)	50 (6)	25 (3)	796 (100)	209 (24)	555 (64)	62 (7)	38 (4)	864 (100)
Women	197 (23)	530 (62)	70 (8)	62 (7)	859 (100)	202 (22)	567 (62)	76 (8)	75 (8)	920 (100)
Total	402 (24)	1045 (63)	120 (7)	88 (5)	1655 (100)	412 (23)	1122 (63)	138 (8)	113 (6)	1784 (100)
Southwest										
Men	86 (25)	213 (62)	28 (8)	15 (4)	342 (100)	81 (23)	215 (62)	31 (9)	22 (6)	349 (100)
Women	82 (23)	210 (58)	37 (10)	34 (9)	364 (100)	77 (21)	213 (58)	36 (10)	42 (11)	368 (100)
Total	168 (24)	423 (60)	65 (9)	50 (7)	706 (100)	158 (22)	428 (60)	67 (9)	64 (9)	717 (100)
West										
Men	149 (26)	354 (62)	46 (8)	25 (4)	574 (100)	144 (24)	367 (61)	51 (9)	36 (6)	598 (100)
Women	142 (24)	343 (57)	62 (10)	57 (9)	605 (100)	137 (22)	355 (57)	60 (10)	69 (11)	621 (100)
Total	291 (25)	697 (59)	109 (9)	82 (7)	1179 (100)	281 (23)	722 (59)	111 (9)	105 (9)	1219 (100)
East										
Men	112 (26)	265 (62)	37 (8)	18 (4)	431 (100)	97 (23)	257 (61)	39 (9)	27 (6)	420 (100)
Women	107 (24)	251 (56)	48 (11)	40 (9)	445 (100)	93 (22)	243 (56)	45 (10)	50 (12)	431 (100)
Total	218 (25)	516 (59)	85 (10)	58 (7)	876 (100)	189 (22)	501 (59)	84 (10)	77 (9)	851 (100)
North										
Men	106 (29)	221 (60)	27 (7)	12 (3)	366 (100)	96 (26)	220 (60)	30 (8)	20 (5)	366 (100)
Women	102 (28)	205 (56)	33 (9)	26 (7)	365 (100)	91 (25)	205 (56)	33 (9)	34 (9)	364 (100)
Total	209 (29)	425 (58)	60 (8)	38 (5)	731 (100)	187 (26)	426 (58)	63 (9)	54 (7)	729 (100)
Entire country										
Men	658 (26)	1568 (62)	188 (7)	95 (4)	2509 (100)	626 (24)	1615 (62)	213 (8)	143 (6)	2597 (100)
Women	631 (24)	1539 (58)	250 (9)	219 (8)	2638 (100)	600 (22)	1584 (59)	250 (9)	270 (10)	2704 (100)
Total	1288 (25)	3107 (60)	438 (9)	314 (6)	5147 (100)	1227 (23)	3199 (60)	463 (9)	413 (8)	5300 (100)

Table 2 shows the distribution of the Finnish population according to region, age, and gender at the end of 1997 and 2007. The proportion of inhabitants older than 65 years in the entire country has increased from 15% to 17%. In the southern region, the proportion of inhabitants older than 65 years is the smallest (14%) and the proportion of 20–64-year-olds is the largest (63%). In the northern region, the proportion of 0–19-year-olds is the largest (29%).

The age of the Finnish population has increased considerably during the past ten years. The number of inhabitants younger than 20 years has decreased by 5%, whereas the number of inhabitants older than 75 years has increased by 31%, or by 98 171 persons.

Table 3. Number of new RRT patients and incidence of RRT by healthcare district and region.  
Finnish Registry for Kidney Diseases 1997–2007

Healthcare district	Number of new RRT patients						Incidence of RRT/million inhabitants						
	1997	2002	2005	2006	2007	2003–2007 on average	1997	2002	2005	2006	2007	2003–2007 on average	
1	Helsinki-Uusimaa	109	109	111	90	97	108	81	77	77	62	66	74
3	Varsinais-Suomi	31	39	39	47	44	45	70	85	85	102	95	99
4	Satakunta	12	33	20	22	30	23	51	144	88	97	133	103
5	Kanta-Häme	9	14	20	8	14	16	55	84	119	47	82	94
6	Pirkanmaa	38	43	39	57	61	48	87	95	84	121	129	102
7	Päijät-Häme	17	32	35	20	21	27	81	153	166	95	99	129
8	Kymenlaakso	13	20	27	22	28	22	70	110	149	122	156	124
9	Etelä-Karjala	12	12	23	12	15	18	92	93	179	94	117	138
10	Etelä-Savo	4	7	8	9	9	7	37	67	77	87	88	68
11	Itä-Savo	10	6	7	11	5	7	155	98	117	186	86	121
12	Pohjois-Karjala	12	24	18	14	17	17	67	138	104	82	99	97
13	Pohjois-Savo	21	29	21	22	28	24	81	115	84	88	113	94
14	Keski-Suomi	23	27	23	22	23	23	87	101	85	82	85	85
15	Etelä-Pohjanmaa	11	25	18	19	17	17	55	129	93	98	87	86
16	Vaasa	16	12	13	7	16	15	96	72	78	42	95	90
17	Keski-Pohjanmaa	5	3	7	10	3	8	63	39	90	129	39	101
18	Pohjois-Pohjanmaa	17	28	43	30	31	35	47	75	113	78	80	91
19	Kainuu	9	12	15	14	10	13	101	144	184	173	125	162
20	Länsi-Pohja	2	6	10	11	7	8	28	89	150	166	106	120
21	Lappi	11	7	9	9	7	10	86	58	75	76	59	82
22	Åland	1	1	2	1	2	2	39	38	75	37	74	65
Region	South	134	141	161	124	140	148	81	82	92	70	78	84
	Southwest	44	73	61	70	76	70	62	103	85	98	106	98
	West	91	126	125	111	129	122	77	106	104	92	106	102
	East	70	93	77	78	82	77	80	108	90	91	96	91
	North	44	56	84	74	58	73	60	77	116	102	80	101
Entire country		383	489	508	457	485	491	74	94	97	87	92	93
	Children <15 y	6	8	10	7	11	9	6	9	11	8	12	10

The number of new RRT patients and the incidence of RRT are presented according to healthcare district and region in Table 3. In 2007, the incidence was 6% higher than in 2006, when the incidence was unusually low. Since 1997, the incidence has increased by 23%. In 2003–2007, the average

incidence was largest in the western region and smallest in the southern region. In the healthcare districts, the average incidence in 2003–2007 was 65–162 new RRT patients/million inhabitants, which implies rather large regional differences.

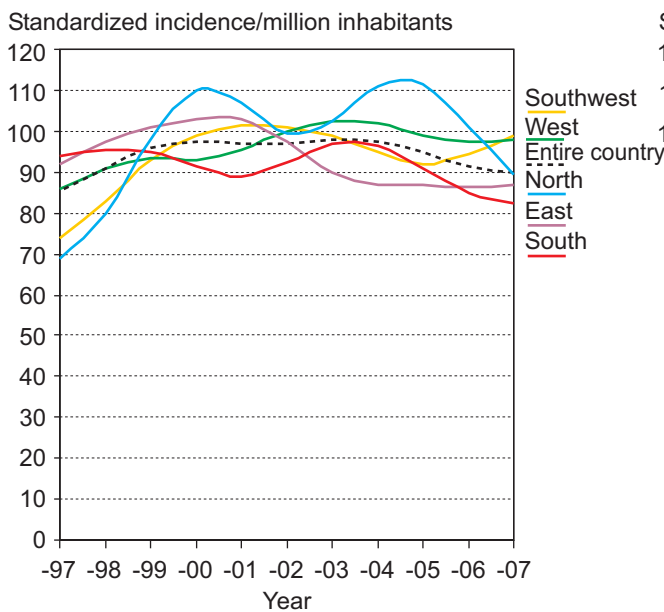
Table 4. Incidence of RRT by age group and gender.  
Finnish Registry for Kidney Diseases 1997–2007

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
1997	Men	4	44	118	59	13	238	6	48	180	314	136	95
	Women	3	31	58	37	16	145	5	35	88	148	73	55
	Total	7	75	176	96	29	383	5	42	134	219	92	74
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
2005	Men	8	41	151	62	68	330	13	47	204	304	513	128
	Women	5	32	54	49	38	178	8	38	72	201	146	66
	Total	13	73	205	111	106	508	11	43	138	248	270	97
2006	Men	2	44	109	81	58	294	3	51	147	380	420	114
	Women	7	29	54	38	35	163	12	35	72	151	132	61
	Total	9	73	163	119	93	457	7	43	109	256	230	87
2007	Men	7	45	135	72	63	322	11	52	179	339	441	124
	Women	7	23	64	35	34	163	12	28	84	140	126	60
	Total	14	68	199	107	97	485	11	40	131	231	235	92

Table 4 shows the number of new RRT patients and the incidence of RRT according to age group and gender in 1997–2007. In 2007, the incidence was 23% higher than in 1997 and 3% lower than in 2002. In inhabitants older than 75 years, the incidence in 2007 was 2.5-fold that in 1997 and 45% higher than in 2002. In the age groups younger than 75 years, the incidences in 2007 were not markedly different from those in 1997.

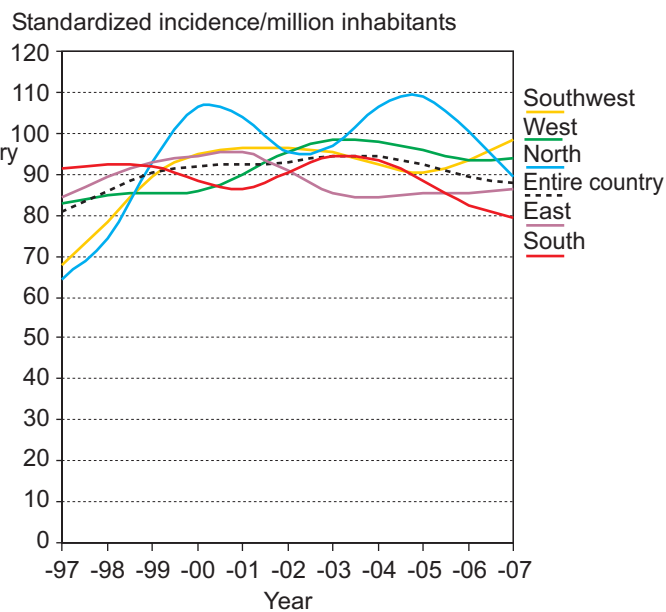


Figure 2. Standardized incidence of RRT in regions. Finnish Registry for Kidney Diseases 1997–2007



In Figure 2, the incidence of RRT (i.e. dialysis and kidney transplantation) in 1997–2007 is shown regionally as smoothed averages. The incidence rates are age- and gender-standardized using the Finnish population on 31 December 2007 as the reference population. Population changes in 1997–2007 have been considered. Standardization removes the effect of age and gender on regional differences in incidence rates. In the entire country, the incidence remained virtually unchanged during 1998–2005. In 2006–2007, the incidence showed a slight decrease. In

Figure 3. Standardized incidence of RRT in regions 90 days after the start of RRT. Finnish Registry for Kidney Diseases 1997–2007



recent years, the incidence has decreased the most in the northern and southern regions.

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 within 90 days after the start of RRT. In the figure, data on patients who died or moved abroad within 90 days of the start of RRT were also excluded.

Figure 4. Incidence of RRT in regions 90 days after the start of RRT according to age group.  
Finnish Registry for Kidney Diseases 1965–2007

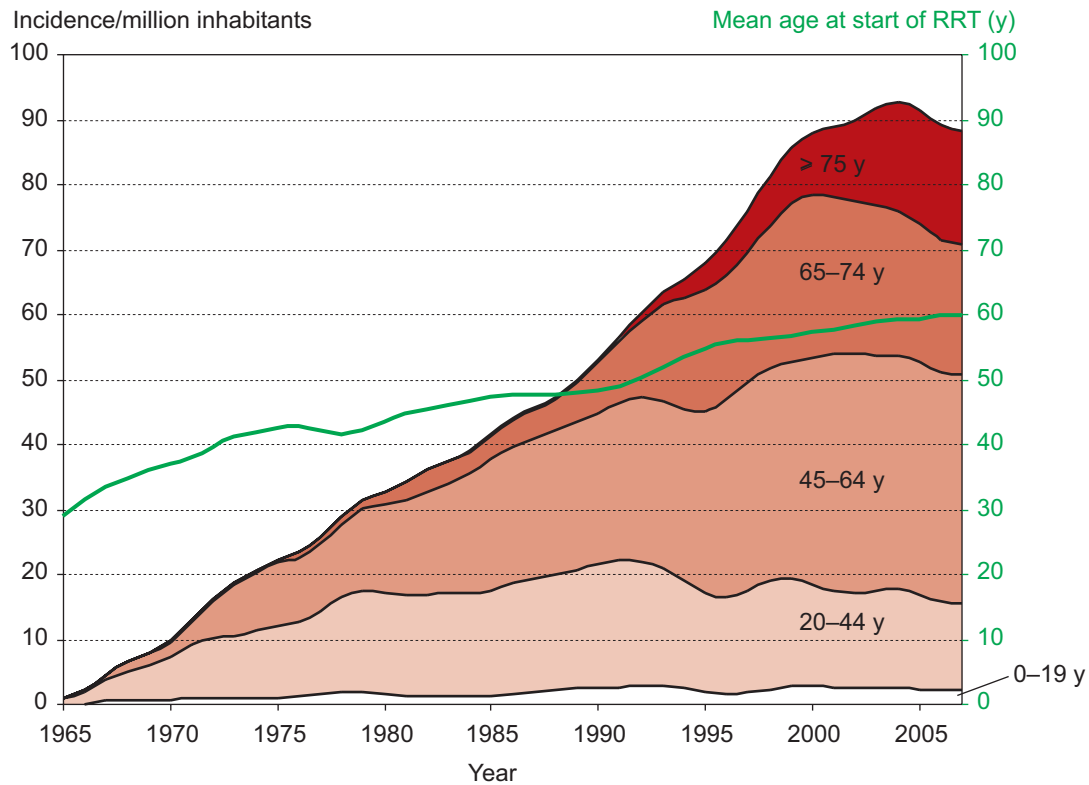
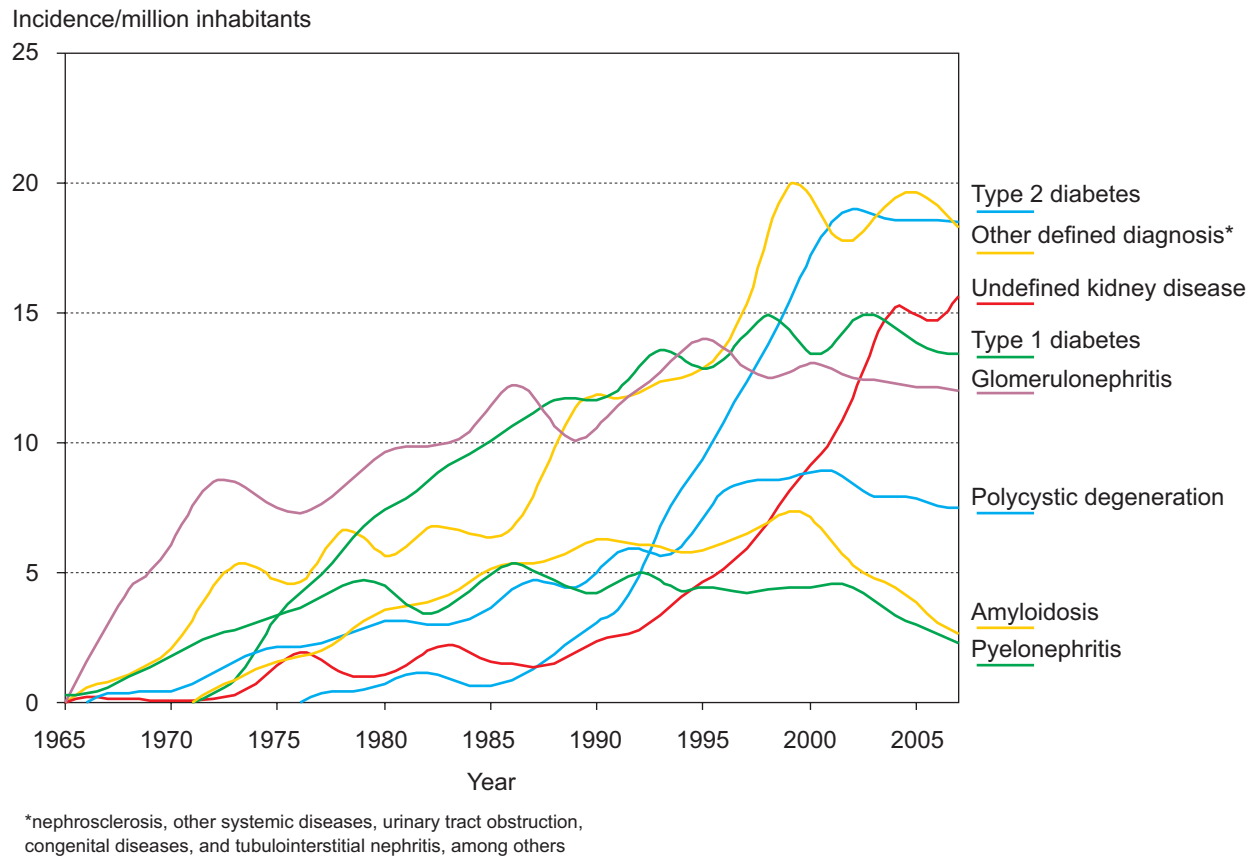


Figure 4 shows the incidence of RRT 90 days after the start of RRT as smoothed averages according to age group. The green curve denotes average age at start of RRT. The incidence of RRT in the age groups younger than 45 years has remained virtually unchanged since the end of the

1970s. The incidence of RRT in 45–74-year-olds increased strongly in the 1980s and 1990s. Before 1990, RRT was rare among inhabitants older than 75 years, but thereafter the incidence has increased rapidly in this age group.

Figure 5. Incidence of RRT according to diagnosis.  
Finnish Registry for Kidney Diseases 1965–2007



The incidence of RRT according to diagnosis is shown as smoothed averages in Figure 5. Type 1 and type 2 diabetes as well as glomerulonephritis are the most common diseases causing chronic uremia. The number of patients entering RRT due to type 2 diabetes increased rapidly during the 1990s, but in the 2000s the increase has stopped. In the

group “other defined diagnosis”, the most usual diagnosis in 2007 was nephrosclerosis, with an incidence of 6 new cases/million inhabitants. The numbers of amyloidosis and pyelonephritis patients entering RRT have clearly decreased since 2000.

Figure 6. International comparison of incidence of RRT in 2006.  
Finnish Registry for Kidney Diseases 2006

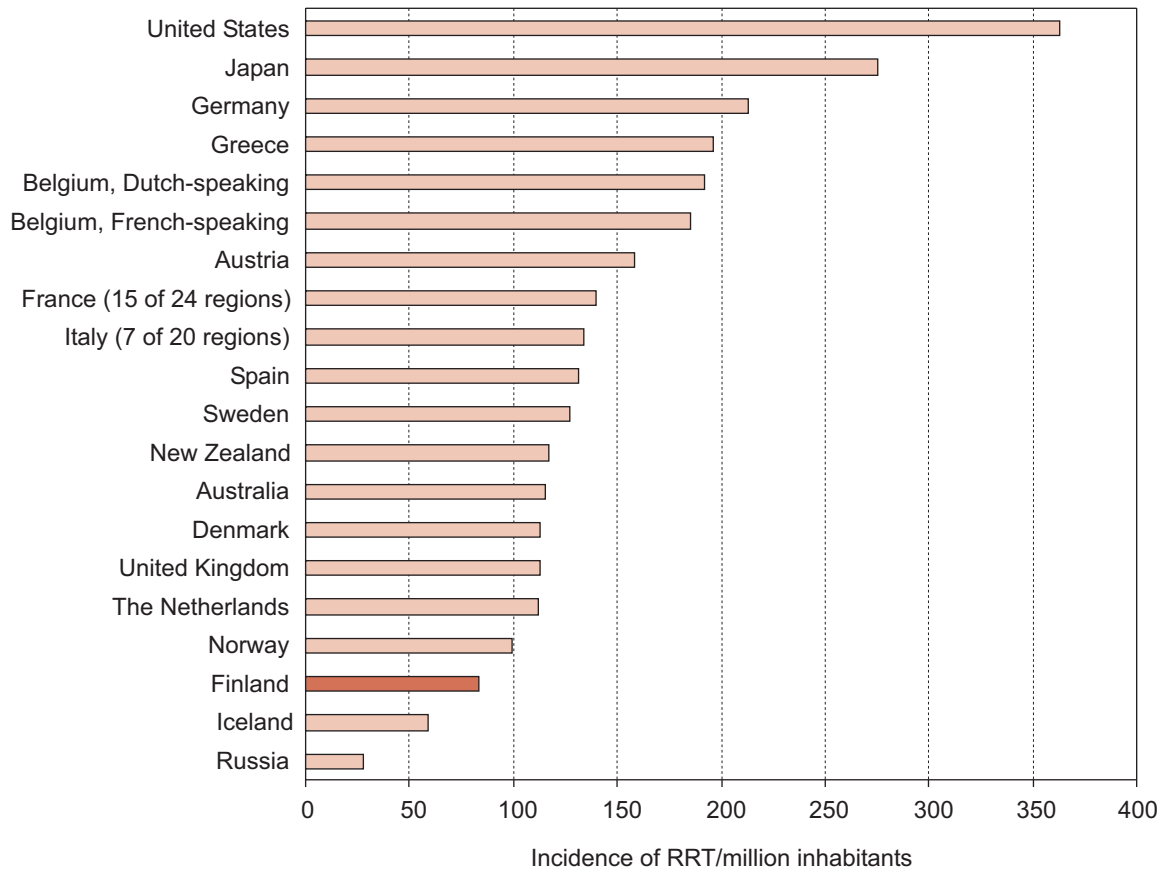


Figure 6 shows the incidence of RRT in 2006 in countries reporting to the ERA-EDTA Registry (Annual Report 2006, <http://www.era-edta-reg.org>) and in the United States, Australia, New Zealand, and Japan (The 2008 USRDS Annual Data Report Atlas, <http://www.usrds.org>). In 2006,

the incidence of RRT in Finland was unusually low, the third lowest in this comparison. In Sweden, the incidence was 52% greater, in Norway 19% greater, and in Denmark 34% greater than in Finland.

Table 5. Patients in RRT at end of year according to healthcare district and region.  
Finnish Registry for Kidney Diseases 1997–2007

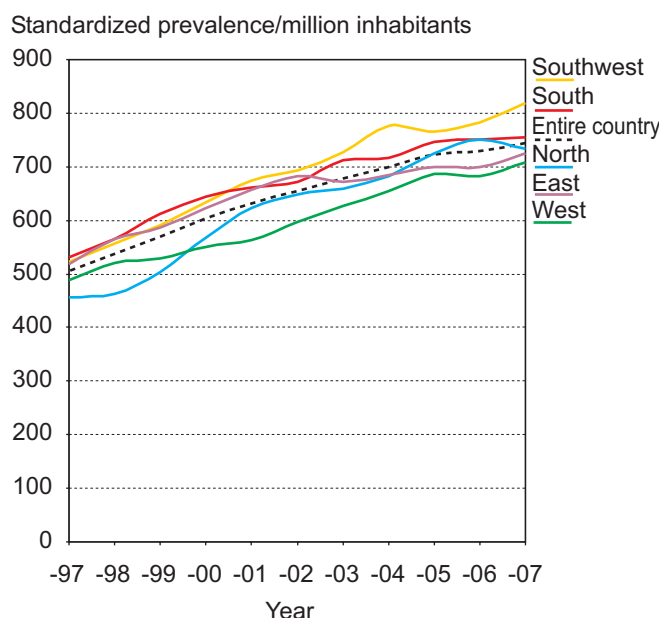
Healthcare district		Number of RRT patients					Prevalence of RRT/million inhabitants				
		1997	2002	2005	2006	2007	1997	2002	2005	2006	2007
1	Helsinki-Uusimaa	670	885	999	1012	1026	501	626	691	693	695
3	Varsinais-Suomi	228	296	344	352	368	512	649	747	760	793
4	Satakunta	116	181	198	207	220	494	791	872	914	976
5	Kanta-Häme	59	88	118	112	117	358	530	701	659	682
6	Pirkanmaa	242	312	341	350	380	552	688	733	745	801
7	Päijät-Häme	101	121	160	164	164	483	578	761	779	776
8	Kymenlaakso	87	107	116	122	134	468	589	641	678	747
9	Etelä-Karjala	59	90	120	127	126	451	696	933	990	986
10	Etelä-Savo	40	62	69	71	76	368	590	666	689	743
11	Itä-Savo	36	43	51	56	56	559	705	856	947	960
12	Pohjois-Karjala	91	118	127	128	135	506	677	736	745	790
13	Pohjois-Savo	168	231	222	215	218	650	917	888	862	876
14	Keski-Suomi	110	140	151	155	165	416	525	560	575	610
15	Etelä-Pohjanmaa	81	101	106	111	112	407	519	545	572	576
16	Vaasa	76	82	107	97	104	455	495	644	581	620
17	Keski-Pohjanmaa	27	31	48	51	48	341	400	619	659	618
18	Pohjois-Pohjanmaa	149	237	266	272	268	409	634	697	708	693
19	Kainuu	40	62	69	73	73	450	743	846	904	910
20	Länsi-Pohja	32	47	49	57	59	452	700	736	860	896
21	Lappi	62	69	78	79	78	483	572	654	666	658
22	Åland	16	17	14	15	16	630	647	523	557	589
Region	South	816	1082	1235	1261	1286	493	628	704	713	721
	Southwest	360	494	556	574	604	510	694	778	801	842
	West	559	704	832	834	877	474	592	691	688	719
	East	445	594	620	625	650	508	691	725	733	764
	North	310	446	510	532	526	424	617	702	731	721
Entire country		2490	3320	3753	3826	3943	484	638	714	725	744

The number of RRT patients and the prevalence of RRT on 31 December 1997–2007 are presented in Table 5. In the entire country, the prevalence has increased by 54% since 1997 and by 17% since 2002. On 31 December 2007, the prevalence was higher in the southwestern region than in the other regions. Since 1997, the prevalence has increased the most in the northern region (70%) and the least in the southern region (46%). In 20 healthcare districts, the prevalence has increased by 35–119% during the past ten years. In one healthcare district, the prevalence has remained virtually unchanged.

Table 6. Patients in RRT according to age group and gender.  
Finnish Registry for Kidney Diseases 1997–2007

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
1997	Men	62	388	709	240	51	1450	94	426	1080	1277	534	578
	Women	29	322	446	197	46	1040	46	367	674	788	210	394
	Total	91	710	1155	437	97	2490	71	397	876	998	309	484
2002	Men	78	424	970	362	129	1963	122	484	1351	1840	1116	771
	Women	43	320	584	285	125	1357	70	380	810	1169	516	510
	Total	121	744	1554	647	254	3320	97	433	1080	1468	710	638
2005	Men	82	443	1101	396	265	2287	131	511	1485	1939	1999	889
	Women	53	304	638	285	186	1466	88	365	856	1168	714	546
	Total	135	747	1739	681	451	3753	110	440	1170	1519	1148	714
2006	Men	77	442	1109	420	282	2330	123	512	1492	1972	2040	902
	Women	54	299	667	289	187	1496	90	361	892	1147	704	555
	Total	131	741	1776	709	469	3826	107	438	1191	1525	1162	725
2007	Men	77	441	1162	439	300	2419	123	513	1539	2065	2099	932
	Women	58	287	698	283	198	1524	97	349	918	1132	734	564
	Total	135	728	1860	722	498	3943	110	432	1228	1561	1207	744

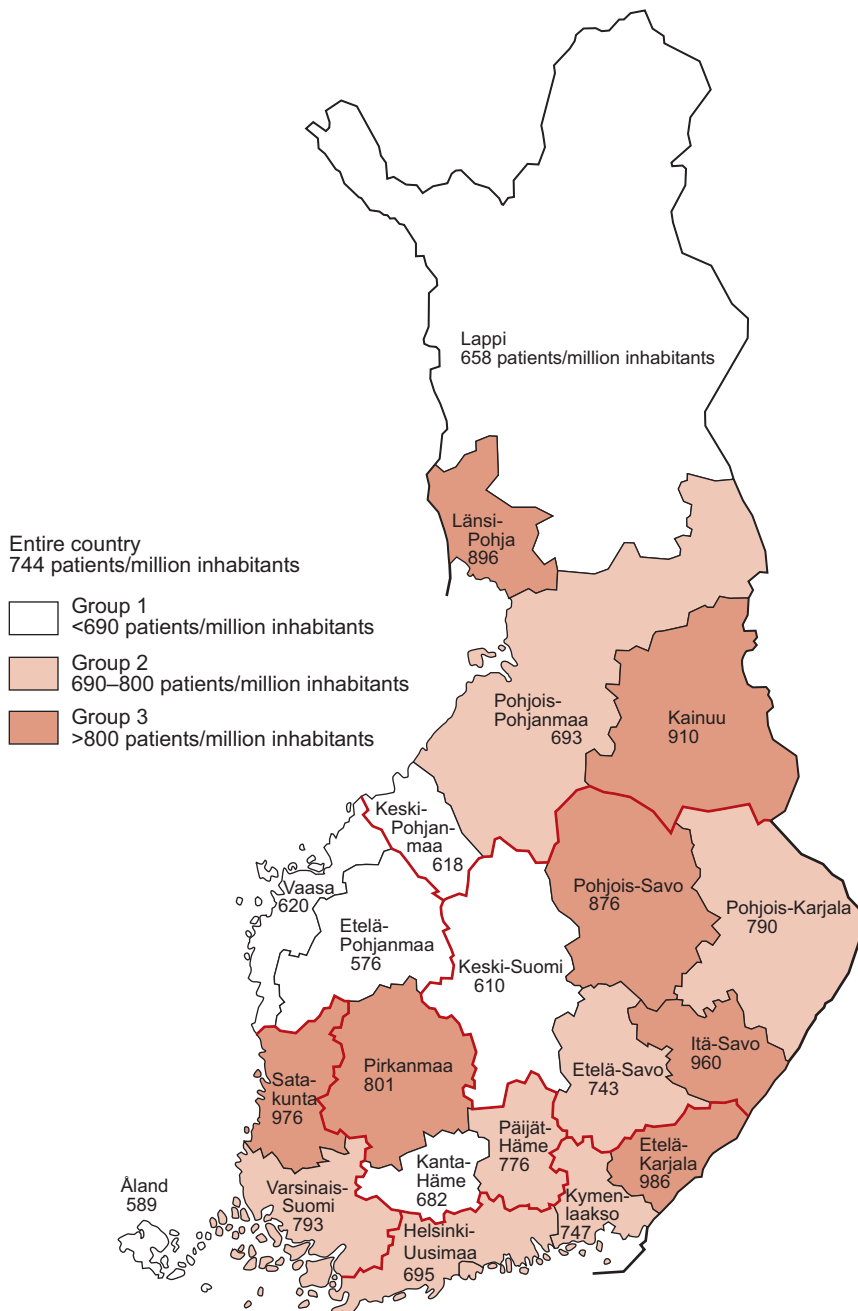
Figure 7. Standardized prevalence of RRT in regions.  
Finnish Registry for Kidney Diseases 1997–2007



In Table 6, the number of RRT patients and the prevalence of RRT on 31 December 1997–2007 are shown according to age group and gender. In the age group 75 years and older, the prevalence of RRT has increased by almost 300% during the past ten years and by 70% during the past five years. In the younger age groups, the prevalence has increased by 9–56% in ten years and by 0–14% in five years. Since 1997, the prevalence of RRT has increased faster among men (61%) than among women (43%).

In Figure 7, the prevalence rates for 1997–2007 are age- and gender-standardized using the Finnish population on 31 December 2007 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. In recent years, the prevalence has been greatest in the southwestern region and smallest in the western region.

Figure 8. Prevalence of RRT in healthcare districts on 31 December 2007.  
Finnish Registry for Kidney Diseases 2007



The healthcare districts shown on the map are grouped according to the prevalence of RRT at the end of 2007 (Figure 8). The prevalence was <690 in seven districts, 690–800 in seven districts, and >800 patients/million inhabitants in seven districts. The borders of the regions are indicated with thick lines.

Figure 9. Prevalence of RRT at end of year according to type of treatment.  
Finnish Registry for Kidney Diseases 1965–2007

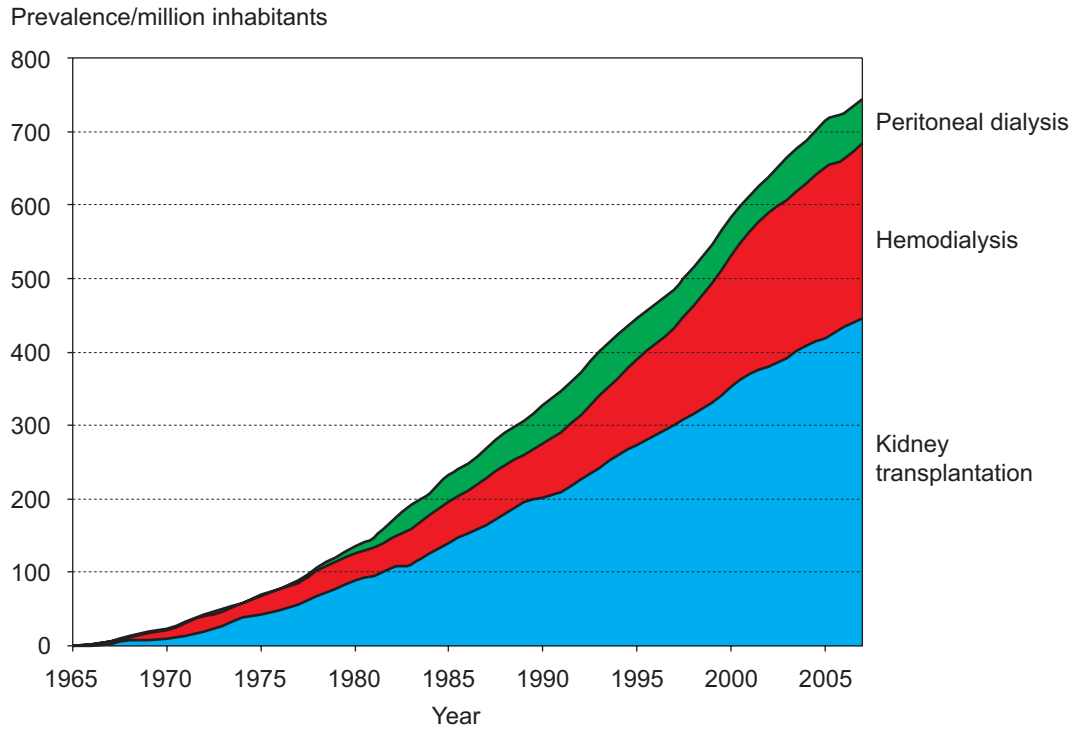
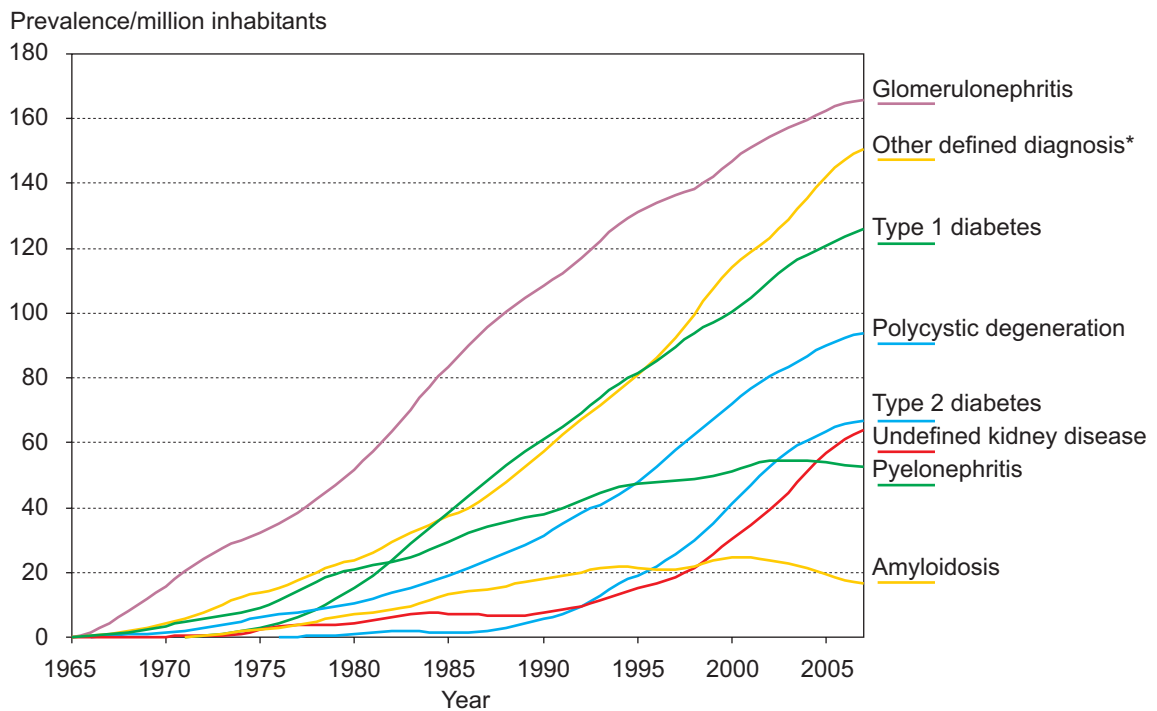


Figure 9 displays the prevalence of RRT according to type of treatment. During the past ten years the prevalence of peritoneal dialysis has increased by 18% and that of hemodialysis by 80%. The prevalence of kidney transplantations has increased by 48%. The proportion of hemodialysis patients of all RRT patients was 27% in 1997

and 32% in 2007. The proportion of peritoneal dialysis patients had correspondingly decreased from 11% to 8%. The proportion of kidney transplantation patients has remained virtually unchanged (59–62%) during the past ten years.



Figure 10. Prevalence of RRT at end of year according to diagnosis.  
Finnish Registry for Kidney Diseases 1965–2007



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

The prevalence of RRT according to diagnosis is shown as smoothed averages in Figure 10. At the end of 2007, the most common kidney diagnosis of RRT patients was glomerulonephritis (prevalence rate 166/million inhabitants), with 22% of all RRT patients having glomerulonephritis.

Type 1 diabetes was the second most common diagnosis (prevalence rate 128/million inhabitants) and polycystic degeneration the third most common diagnosis (prevalence rate 95/million inhabitants).

Figure 11. Prevalence of dialysis treatment at end of year according to diagnosis.  
Finnish Registry for Kidney Diseases 1965–2007

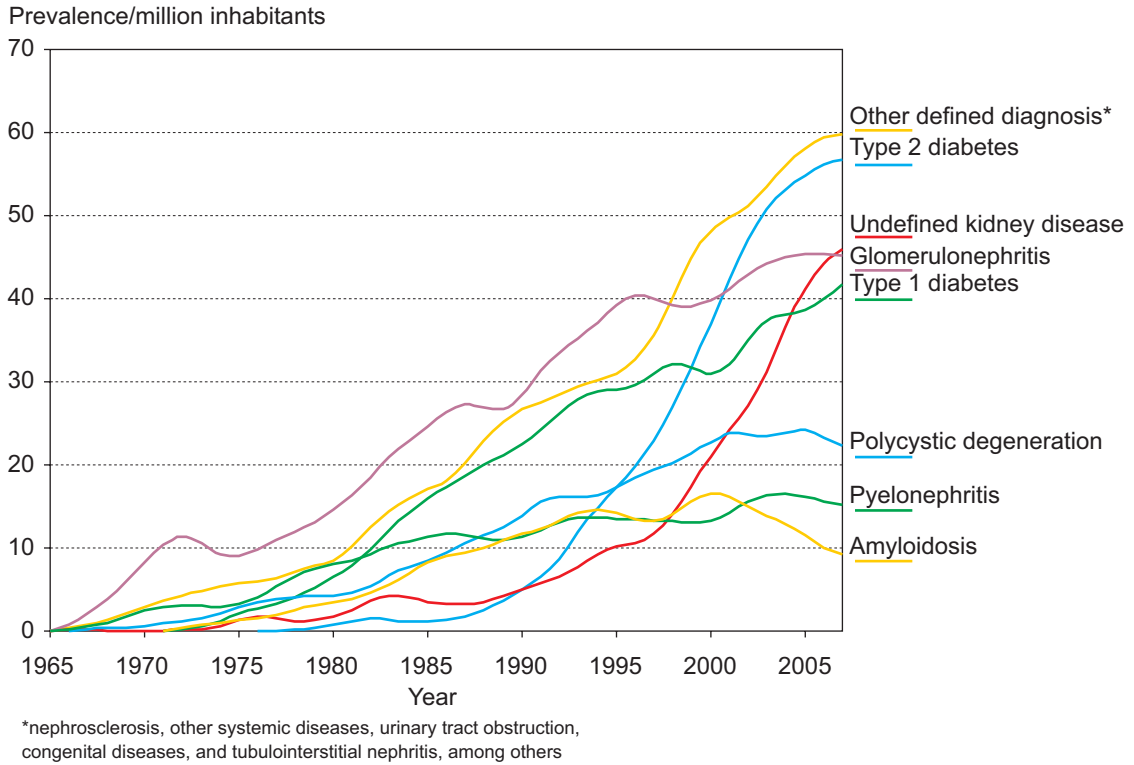


Figure 12. Prevalence of kidney transplantation at end of year according to diagnosis.  
Finnish Registry for Kidney Diseases 1965–2007

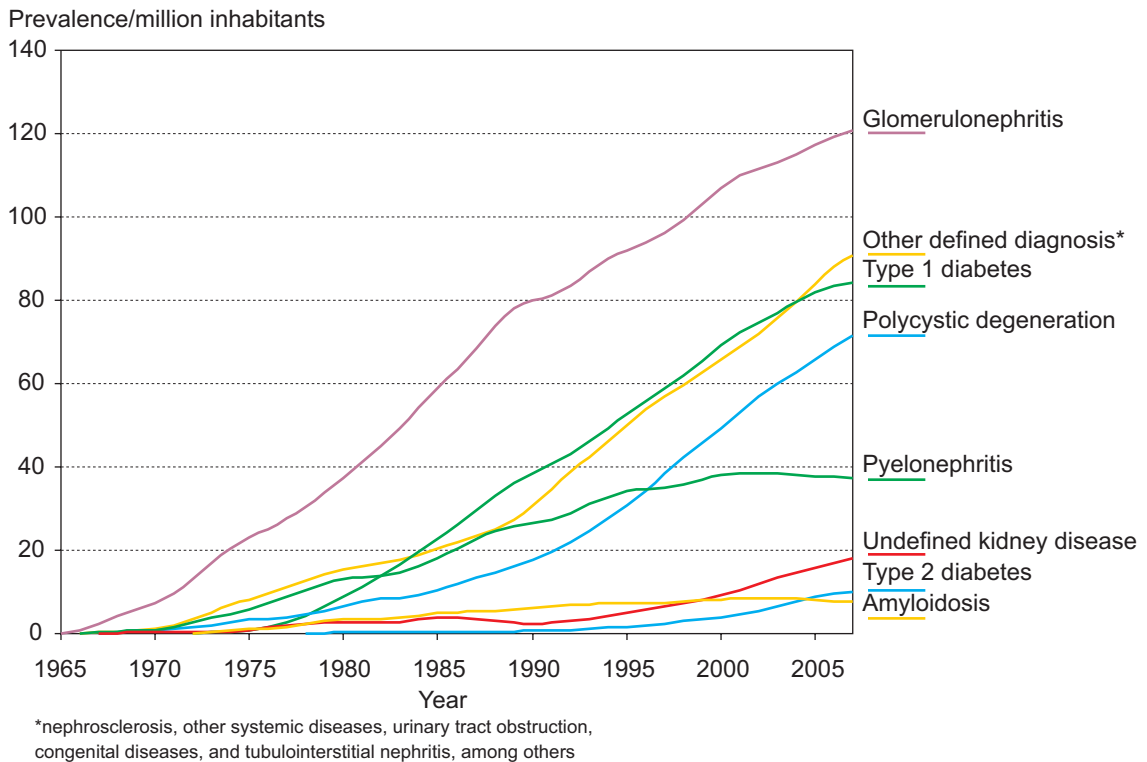


Figure 11 shows the prevalence of dialysis treatment according to diagnosis as smoothed averages. On 31 December 2007, type 2 diabetes was the most common kidney disease diagnosis of dialysis patients, with 19% having type 2 diabetes. “Undefined kidney disease” has increased rapidly, mainly due to the increased number of

patients aged 75 years or older.

The prevalence of kidney transplantation patients is shown according to diagnosis as smoothed averages in Figure 12. At end of 2007, 27% of kidney transplantation patients had glomerulonephritis, 19% had type 1 diabetes, and 17% had polycystic degeneration.

Figure 13. International comparison of prevalence of RRT on 31 December 2006.  
Finnish Registry for Kidney Diseases 2006

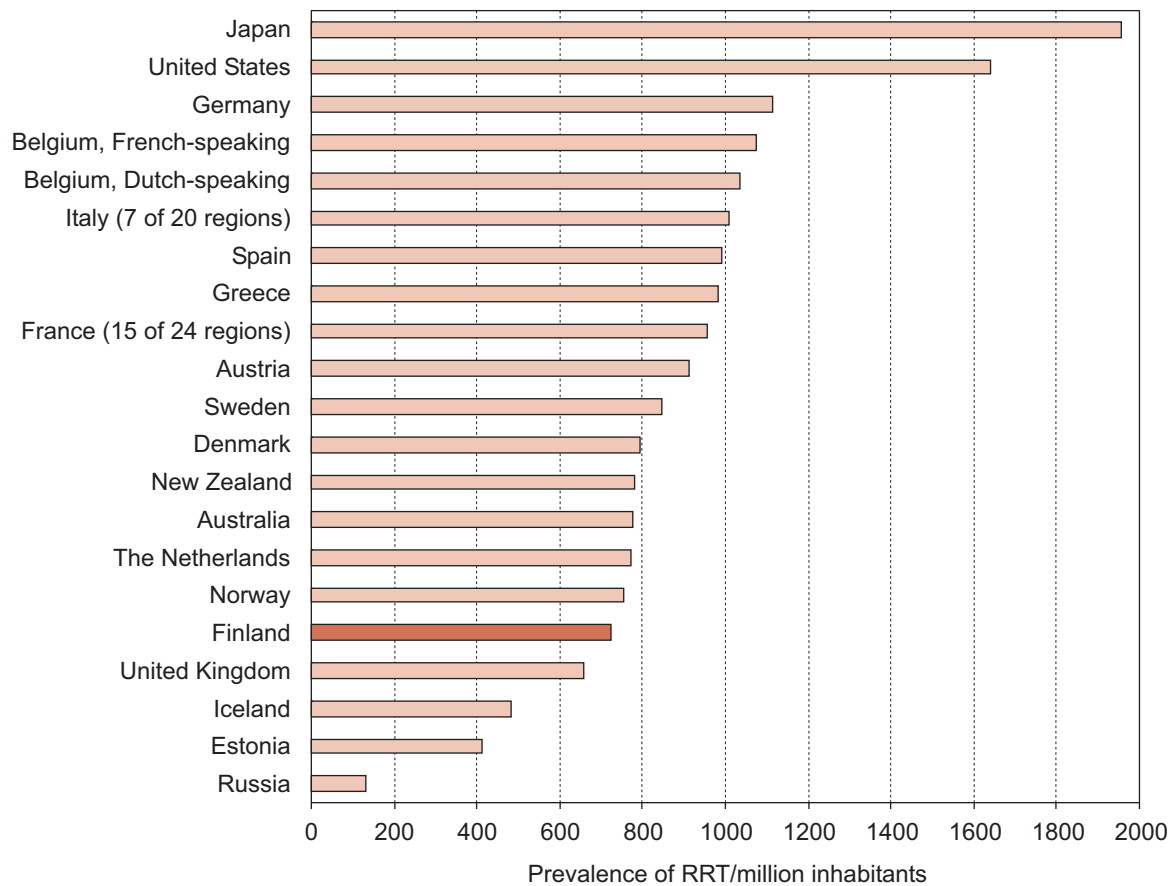


Figure 13 displays the prevalence of RRT on 31 December 2006 in countries reporting to the ERA-EDTA Registry (Annual Report 2006, <http://www.era-edta-reg.org>), and in the United States, Australia, New Zealand, and Japan (The 2008 USRDS Annual Data Report Atlas, <http://www.usrds.org>). The prevalence rate in Finland was the fifth

lowest. In Sweden, the prevalence was 17% higher, in Norway 4% higher, and in Denmark 10% higher than in Finland. The prevalence rates differed less than the incidence rates between the Scandinavian countries. International incidence rates are shown in Figure 6.

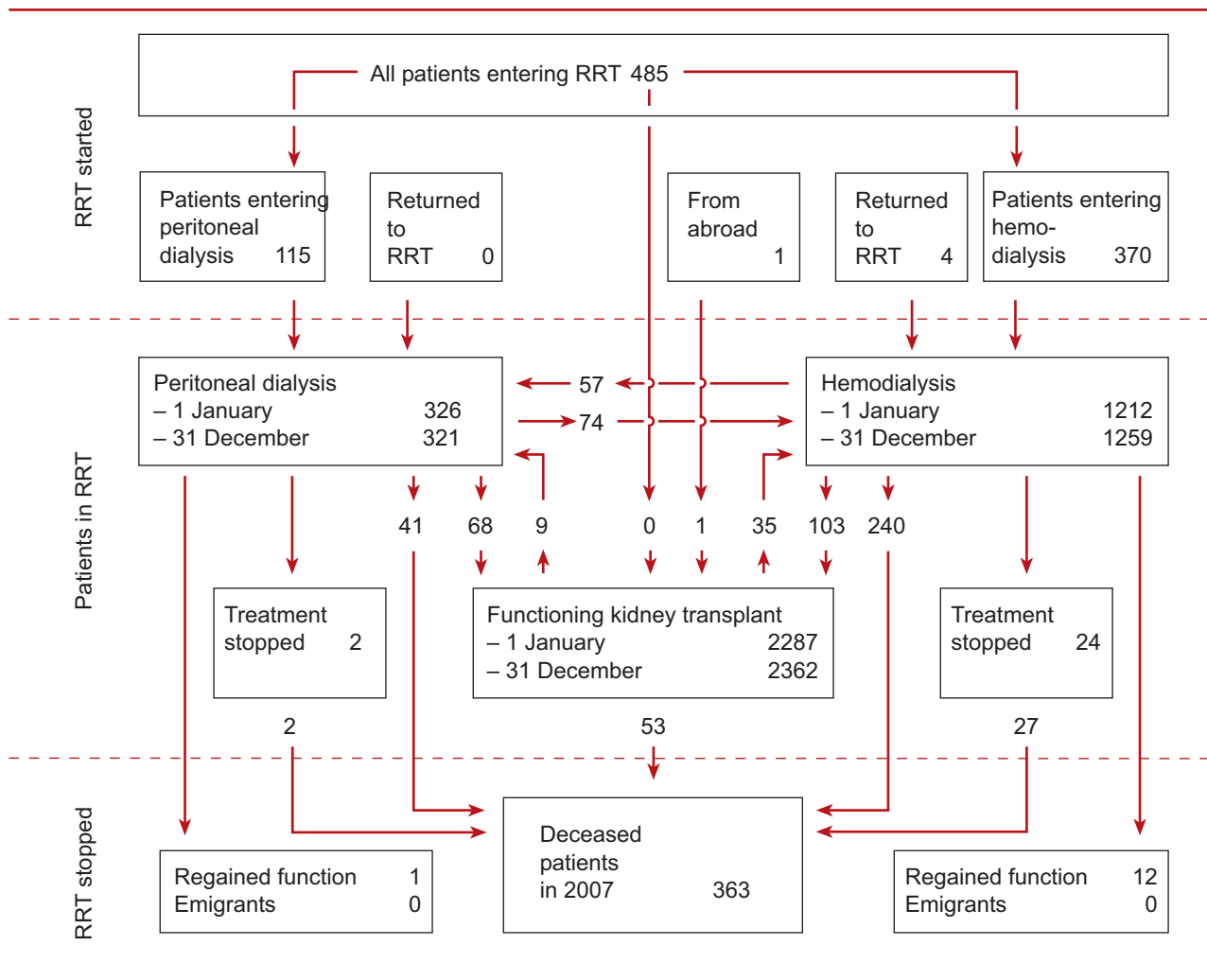
Table 7. Number of patient-years of all RRT patients according to diagnosis and type of treatment. Finnish Registry for Kidney Diseases 1997–2007

Diagnosis	Number of patient-years in 1997 (%)				Number of patient-years in 2007 (%)			
	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total	Peritoneal dialysis	Hemo-dialysis	Trans-plantation	Total
Glomerulonephritis	60 (22.0)	148 (22.6)	487 (32.2)	695 (28.5)	47 (15.2)	194 (15.6)	641 (27.6)	882 (22.7)
Type 1 diabetes	84 (30.5)	70 (10.7)	295 (19.5)	448 (18.4)	81 (26.2)	136 (11.0)	448 (19.3)	666 (17.2)
Polycystic degeneration	15 (5.6)	80 (12.2)	186 (12.3)	281 (11.5)	13 (4.2)	108 (8.7)	374 (16.1)	496 (12.8)
Type 2 diabetes	22 (7.9)	82 (12.6)	12 (0.8)	116 (4.8)	50 (16.1)	251 (20.2)	52 (2.2)	354 (9.1)
Undefined kidney disease	10 (3.8)	41 (6.3)	34 (2.2)	85 (3.5)	41 (13.1)	188 (15.1)	95 (4.1)	324 (8.3)
Pyelonephritis	23 (8.4)	44 (6.7)	180 (11.9)	247 (10.1)	20 (6.3)	62 (5.0)	197 (8.5)	279 (7.2)
Nephrosclerosis	15 (5.5)	48 (7.3)	32 (2.1)	95 (3.9)	22 (7.0)	80 (6.4)	63 (2.7)	165 (4.2)
Other systemic diseases	7 (2.7)	24 (3.7)	45 (3.0)	77 (3.1)	15 (4.8)	59 (4.7)	72 (3.1)	146 (3.8)
Urinary tract obstruction	4 (1.6)	20 (3.0)	61 (4.0)	85 (3.5)	5 (1.6)	34 (2.8)	95 (4.1)	134 (3.5)
Congenital diseases	7 (2.5)	6 (1.0)	65 (4.3)	78 (3.2)	3 (1.0)	15 (1.2)	94 (4.0)	112 (2.9)
Amyloidosis	10 (3.6)	60 (9.1)	36 (2.4)	105 (4.3)	2 (0.5)	45 (3.6)	40 (1.7)	87 (2.2)
Congenital nephrosis, Finnish type	6 (2.2)	1 (0.1)	37 (2.4)	44 (1.8)	5 (1.6)	3 (0.3)	61 (2.6)	69 (1.8)
Tubulointerstitial nephritis	4 (1.6)	15 (2.3)	31 (2.1)	51 (2.1)	0 (0.0)	17 (1.4)	40 (1.7)	57 (1.5)
Other kidney diseases	2 (0.8)	5 (0.8)	5 (0.3)	13 (0.5)	2 (0.6)	19 (1.5)	35 (1.5)	56 (1.4)
Malignancies	3 (1.2)	8 (1.2)	1 (0.1)	12 (0.5)	3 (1.1)	27 (2.2)	6 (0.3)	36 (0.9)
Metabolic diseases	0 (0.0)	3 (0.4)	5 (0.4)	8 (0.3)	2 (0.7)	5 (0.4)	12 (0.5)	19 (0.5)
All	274 (100)	655 (100)	1513 (100)	2441 (100)	311 (100)	1244 (100)	2325 (100)	3880 (100)

Table 7 shows the number of patient-years according to diagnosis of kidney disease and type of treatment in 1997 and 2007. The number of patient-years indicates patients' time in RRT during the year. Overall, the number of patient-years has increased by 59% since 1997. In hemodialysis, the number of patient-years has increased the most, 90%. Glomerulonephritis was the most common diagnosis in both 1997 and 2007 among all RRT patients and among kidney transplantation patients. The proportion of patient-years due to glomerulonephritis has, however, decreased, being 23%. The proportion of type 1 diabetes has remained virtually

unchanged and is the most common diagnosis in peritoneal dialysis patients. The proportion of type 2 diabetes has tripled in ten years, and in 2007 type 2 diabetes was the most common diagnosis among hemodialysis patients and the second most common diagnosis among peritoneal dialysis patients. Among kidney transplantation patients, type 2 diabetes is a rare cause of kidney failure. The proportion of patient-years due to "undefined kidney disease" has increased markedly. Amyloidosis is the only diagnosis for which the number of patient-years has decreased (by 17%) since 1997.

Figure 14. Net changes in type of treatment.  
Finnish Registry for Kidney Diseases 2007



During 2007, 485 new patients entered RRT (Figure 14). In addition, four patients returned to RRT. In all, 3825 patients were receiving RRT at the beginning of the year. Altogether 363 patients died and dialysis for 13 patients was discontinued because patients' own kidney function resumed. Of those who died, 53 had a functioning transplant, 41 were receiving peritoneal dialysis, and 240 were on hemodialysis.

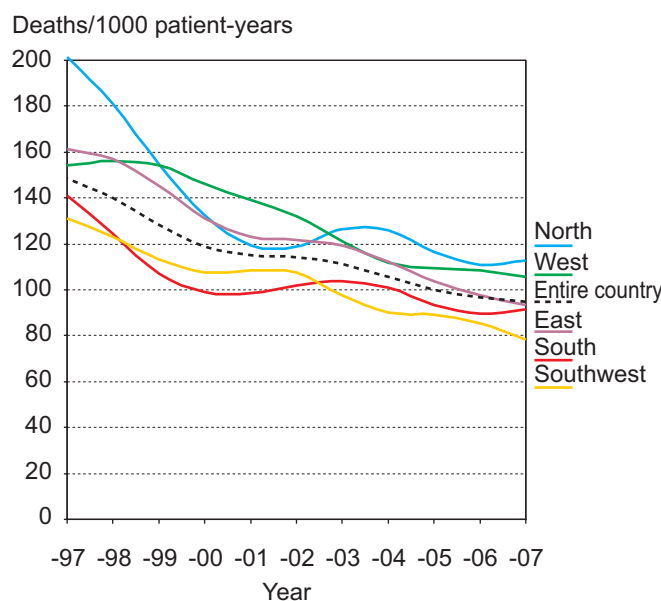
The RRT of 26 uremic patients was discontinued. The treatment of three patients who died in 2007 had been discontinued in 2006. A kidney transplant was received by 173 patients; three received combined liver and kidney transplantations (source: Kidney Transplantation Unit, Helsinki University Central Hospital).

**Table 8. Mortality of RRT patients by region.  
Finnish Registry for Kidney Diseases 1997–2007**

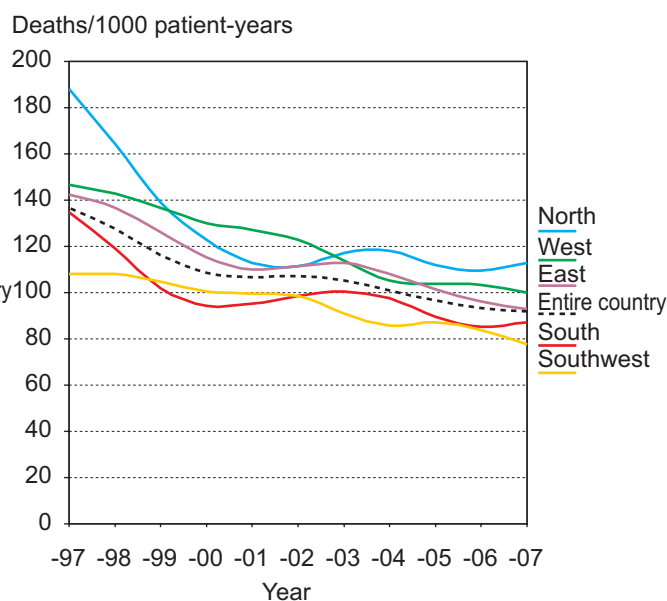
Region	Deaths/1000 patient-years						Deaths/1000 patient-years*					
	1997	2002	2005	2006	2007	2003–2007	1997	2002	2005	2006	2007	2003–2007
South	118	95	82	73	91	88	111	93	80	68	87	84
Southwest	84	120	111	86	77	86	70	109	109	85	77	84
West	121	117	92	133	96	107	117	112	89	126	90	102
East	123	112	100	105	91	104	109	106	98	103	91	101
North	106	91	101	92	118	112	100	87	99	92	118	108
Entire country	113	106	94	96	94	98	105	101	92	93	91	94

\*patients who died within 90 days of start of RRT were excluded

**Figure 15. Standardized mortality of RRT patients in regions.  
Finnish Registry for Kidney Diseases 1997–2007**



**Figure 16. Standardized mortality of RRT patients in regions (patients who died within 90 days of start of RRT were excluded).  
Finnish Registry for Kidney Diseases 1997–2007**



RRT patients' mortality according to region in 1997–2007 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 2003–2007 was highest in the northern region and lowest in the southwestern and southern regions.

In Figures 15 and 16, mortality in the regions is shown as smoothed averages. The regional mortality rates for

1997–2007 have been age- and gender-standardized using all patient-years in 2007 as the reference. 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 16. In the entire country, the standardized mortality rate has decreased over the past ten years.

**Table 9. Number of deaths according to age group and region.  
Finnish Registry for Kidney Diseases 1997–2007**

Region	Number of deaths in 1997–2002						Number of deaths in 2003–2007					
	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
South	3	47	196	184	90	520	2	17	182	173	151	525
Southwest	1	25	74	86	60	246	1	12	65	93	68	239
West	1	36	149	163	118	467	0	29	144	124	134	431
East	0	29	132	123	66	350	1	22	101	106	86	316
North	2	23	82	77	40	224	1	19	88	85	79	272
Entire country	7	160	633	633	374	1807	5	99	580	581	518	1783

**Table 10. Number of patient-years in RRT according to age group and region.  
Finnish Registry for Kidney Diseases 1997–2007**

Region	Number of patient-years in 1997–2002						Number of patient-years in 2003–2007					
	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
South	215	1351	2747	995	348	5656	222	1242	2820	1118	591	5993
Southwest	62	609	1074	579	180	2505	77	474	1261	593	358	2762
West	157	912	1644	660	309	3681	135	806	1798	759	516	4014
East	135	745	1366	623	190	3059	151	525	1407	603	366	3052
North	57	622	1006	367	104	2156	55	532	1161	423	268	2438
Entire country	626	4239	7838	3224	1131	17 057	640	3579	8447	3495	2098	18 259

**Table 11. RRT patients' mortality according to age group and region.  
Finnish Registry for Kidney Diseases 1997–2007**

Region	Deaths/1000 patient-years in 1997–2002						Deaths/1000 patient-years in 2003–2007					
	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
South	14	35	71	185	259	92	9	14	65	155	256	88
Southwest	16	41	69	148	333	98	13	25	52	157	190	87
West	6	39	91	247	382	127	0	36	80	163	260	107
East	0	39	97	197	347	114	7	42	72	176	235	104
North	35	37	81	210	386	104	18	36	76	201	295	112
Entire country	11	38	81	196	331	106	8	28	69	166	247	98
Change in mortality in 2003–2007 vs. 1997–2002 (%)							–30	–27	–15	–15	–25	–8

Table 9 shows the number of deaths and Table 10 shows the number of patient-years in RRT according to age group and region in 1997–2002 and 2003–2007. Based on this data, RRT patients' mortality (number of deaths/1000 patient-years) has been calculated in Table 11. In each age group, mortality was 15–30% lower in 2003–2007 than in

1998–2002. However, mortality as a whole had only decreased by 8%, because the number of patient-years had increased, especially among patients aged 75 years or older. In this age group mortality is greatest. The difference in mortality between the regions is fairly small.

Figure 17. Frequency of angina pectoris at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

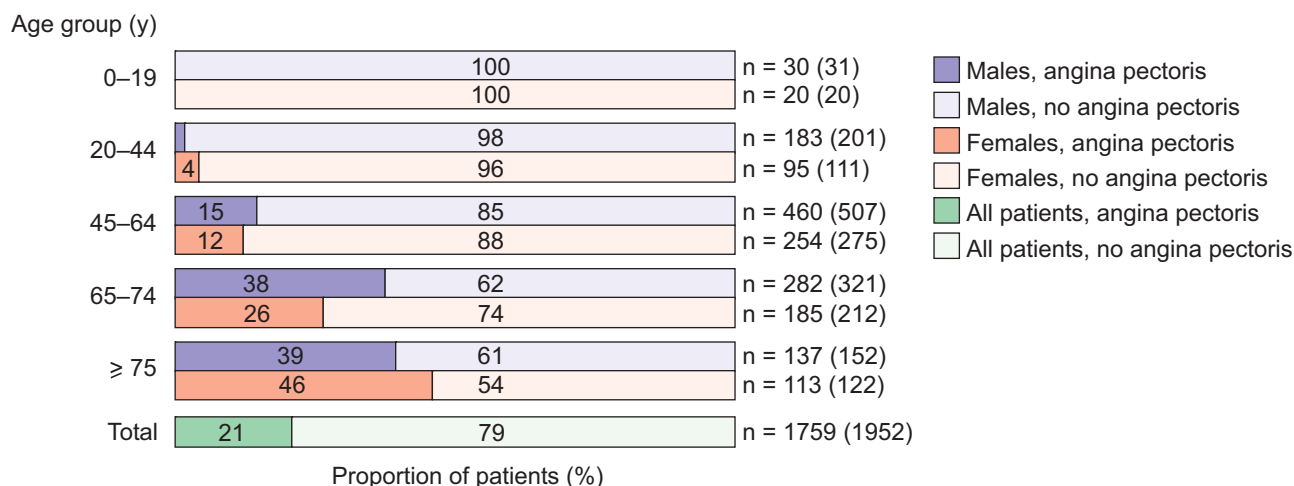
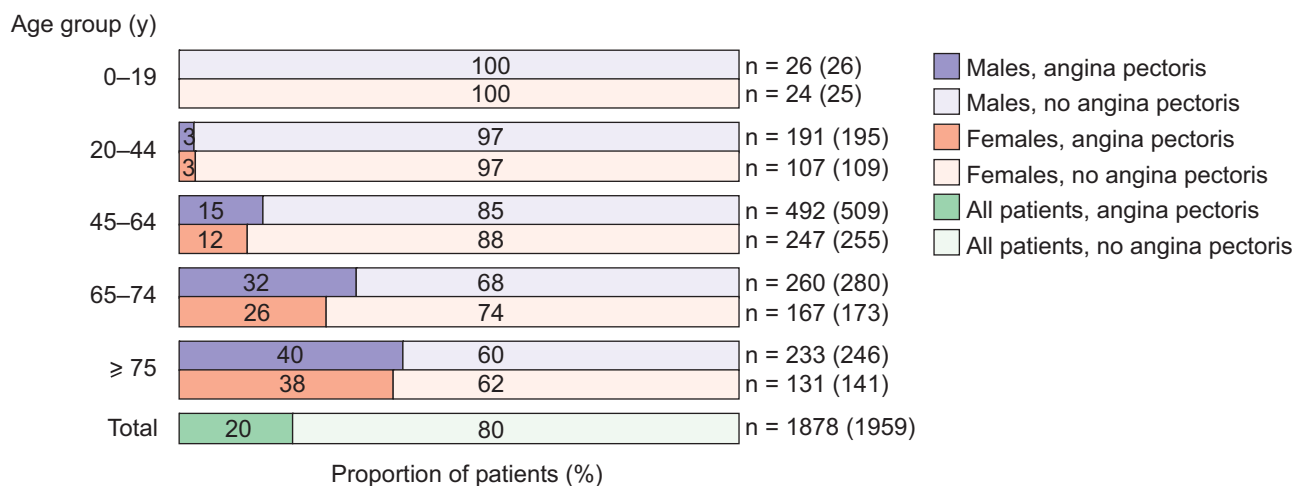


Figure 18. Frequency of angina pectoris at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Figures 17–38 display the frequency of comorbidities at start of RRT according to age group and gender in 2000–2003 and 2004–2007. The number of patients with data on comorbidity is shown in the right margin of the figures. The total number of patients is indicated in parentheses.

In 2000–2003, 21% of patients entering RRT had

symptoms of angina pectoris (Figure 17). In 2004–2007, the corresponding proportion was 20% (Figure 18). Angina pectoris symptoms were more common in older age groups. No significant difference existed between men and women. Data were available for 90% of the patients in 2000–2003 and for 96% in 2004–2007.



Figure 19. Coronary bypass or angioplasty in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

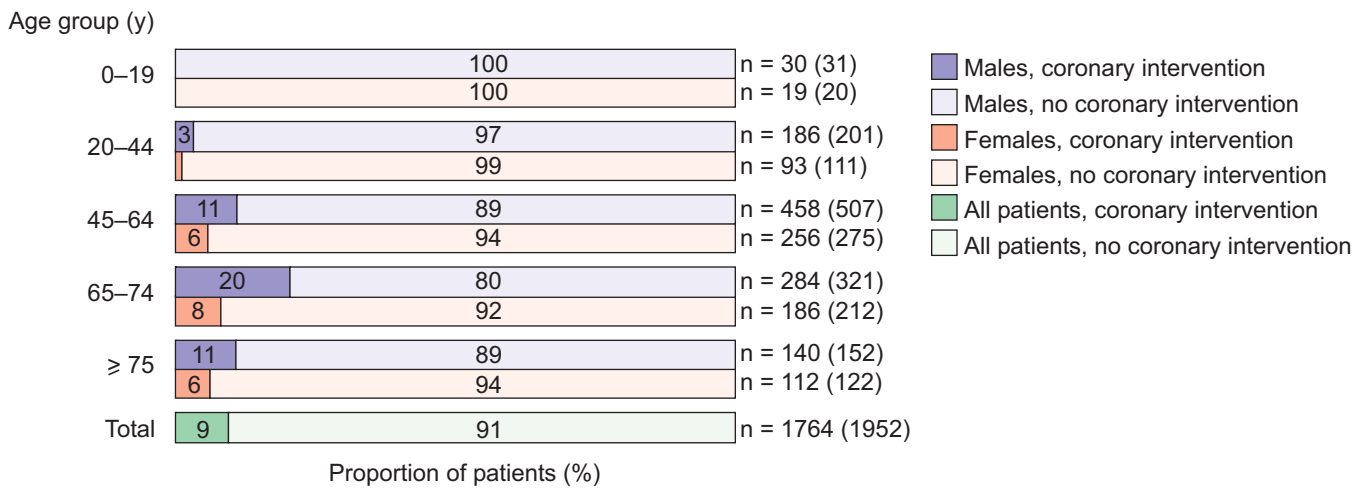
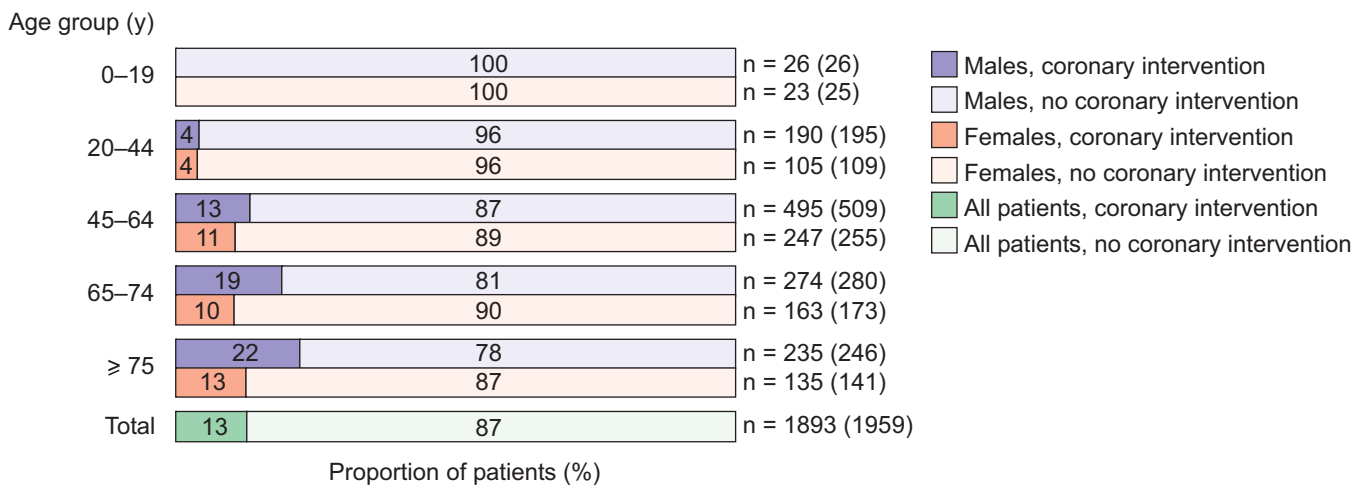


Figure 20. Coronary bypass or angioplasty in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Figures 19 and 20 show the frequency of history of coronary bypass or angioplasty at start of RRT according to age group and gender in 2000–2003 and 2004–2007.

Coronary bypass or angioplasty had been performed on 9% of patients entering RRT in 2000–2003 and on 13% of

those in 2004–2007 ( $p=0.001$ ). A history of coronary bypass or angioplasty had become more frequent, especially among patients aged 75 years or older. A coronary intervention was more common among men than women (13% vs. 8% in 2000–2003,  $p<0.001$ ).

Figure 21. Myocardial infarction in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

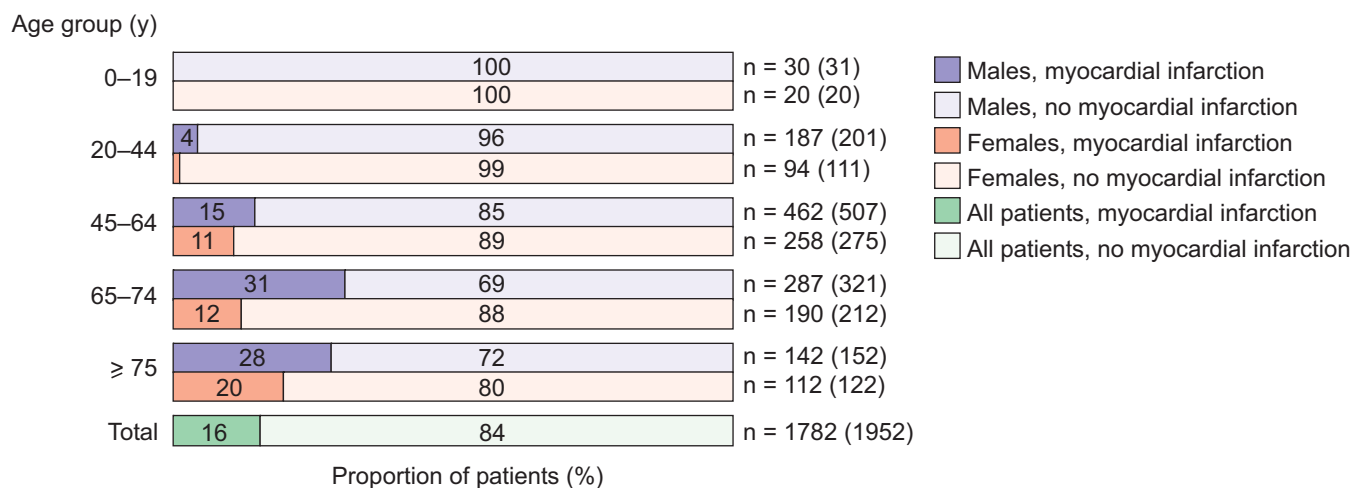
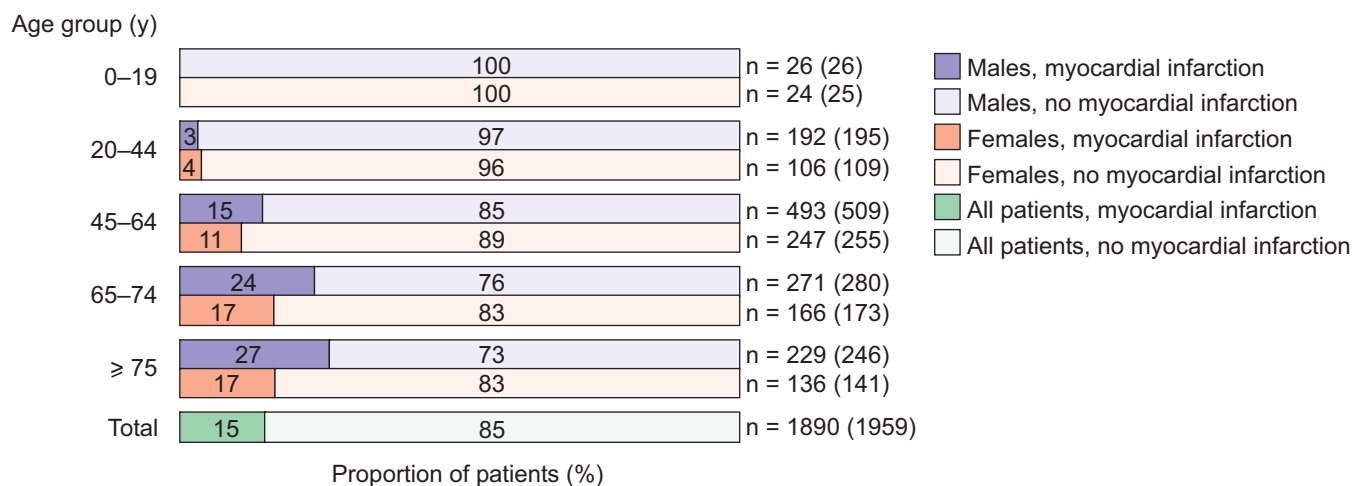


Figure 22. Myocardial infarction in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Figures 21 and 22, show according to age group and gender, how often patients entering RRT in 2000–2003 and 2004–2007 had previously had a myocardial infarction. The frequency had remained unchanged over the years. In 2000–2007, 18% of male patients and 12% of female patients

had a history of myocardial infarction ( $p < 0.001$ ). An anamnesis of myocardial infarction was more than twice as common in patients older than 65 years than in younger patients ( $p < 0.001$ ). The proportion of patients with data available was 91% in 2000–2003 and 96% in 2004–2007.

Figure 23. Left ventricular hypertrophy at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

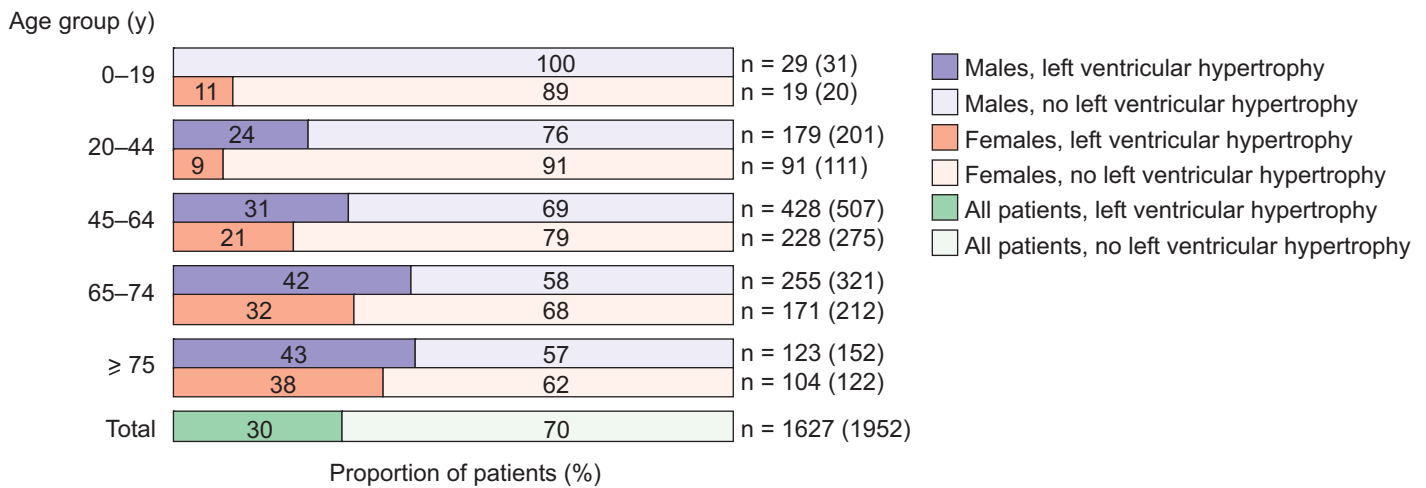
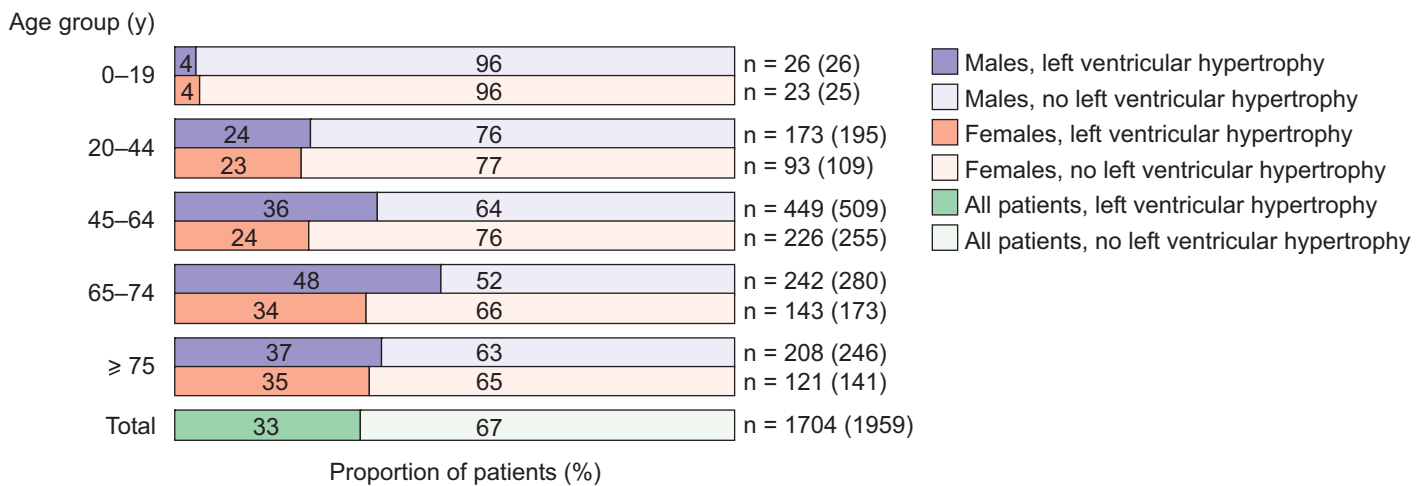


Figure 24. Left ventricular hypertrophy at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



The frequency of left ventricular hypertrophy at start of RRT in 2000–2003 and 2004–2007 is shown according to age group and gender in Figures 23 and 24. Left ventricular hypertrophy had not become more frequent during the

2000–2007, but it was more frequent among men (35%) than women (26%) ( $p < 0.001$ ). Data were available for 83% of patients in 2000–2003 and for 87% in 2004–2007.

Figure 25. Chronic heart failure at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

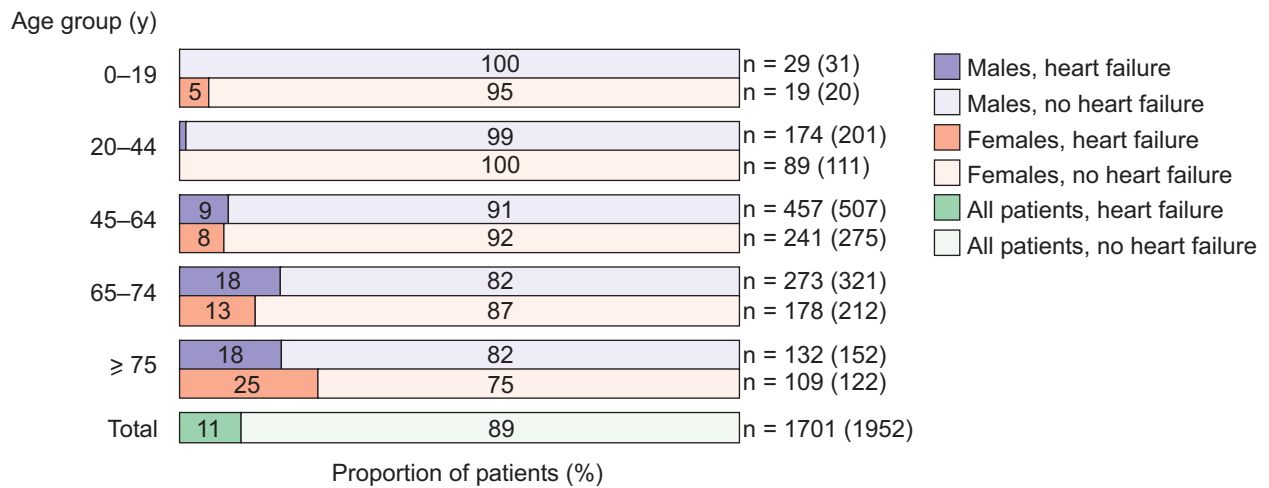
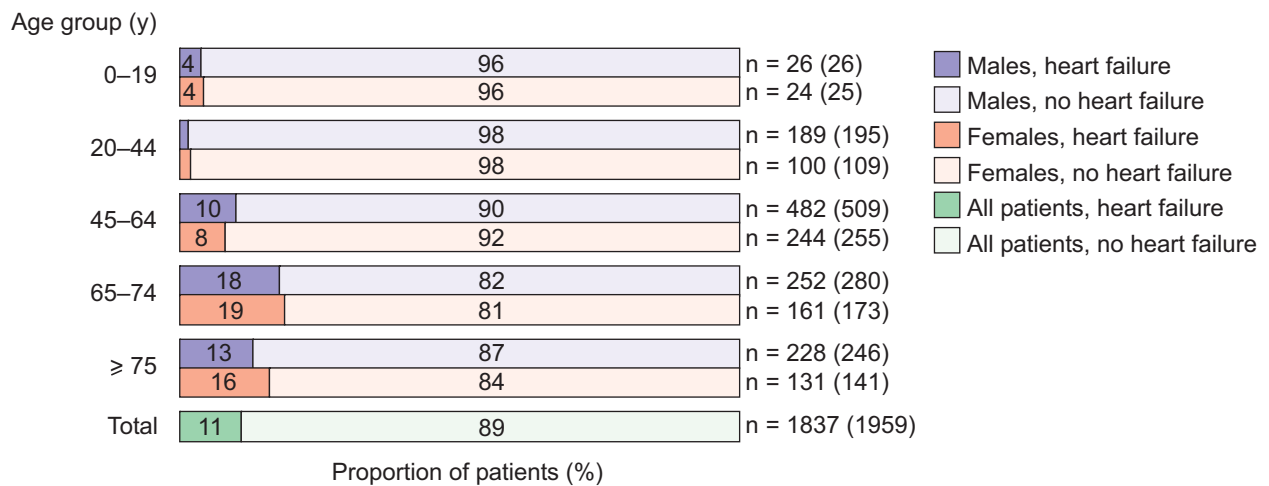


Figure 26. Chronic heart failure at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Of patients entering RRT in 2000–2003 and 2004–2007, 11% had chronic heart failure (Figures 25 and 26). Chronic heart failure was more common among patients older than 65 years (17%) than among younger patients (7%) ( $p < 0.001$ ). No significant difference was observed between men and

women. In patients older than 75 years, chronic heart failure was less frequent in 2004–2007 than in 2000–2003 ( $p = 0.035$ ). Data were available for 87% of patients in 2000–2003 and for 94% in 2004–2007.

Figure 27. Symptomatic arterial disease other than coronary or cerebrovascular disease at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

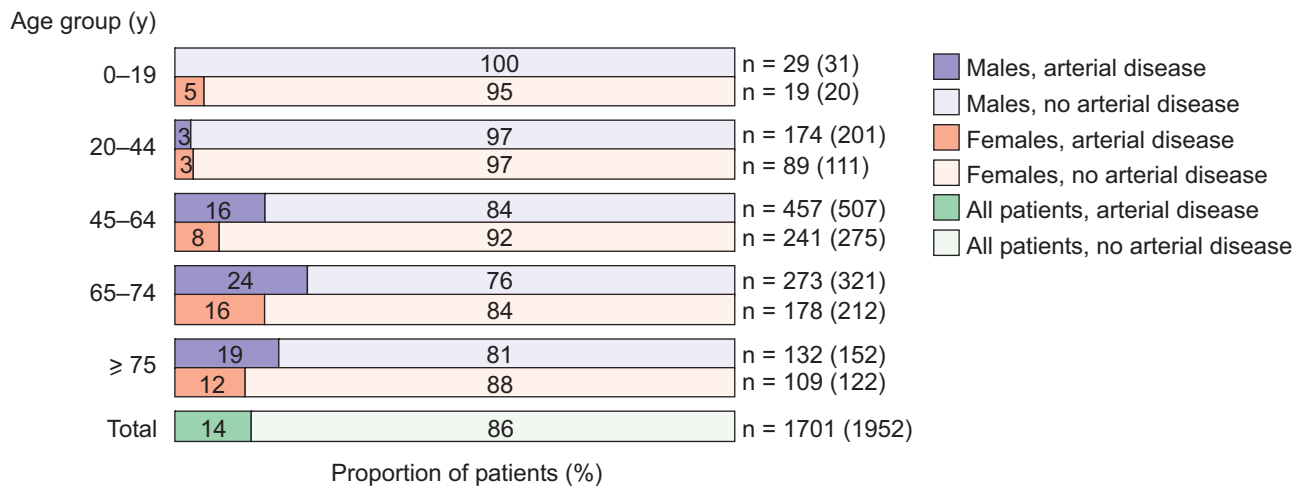
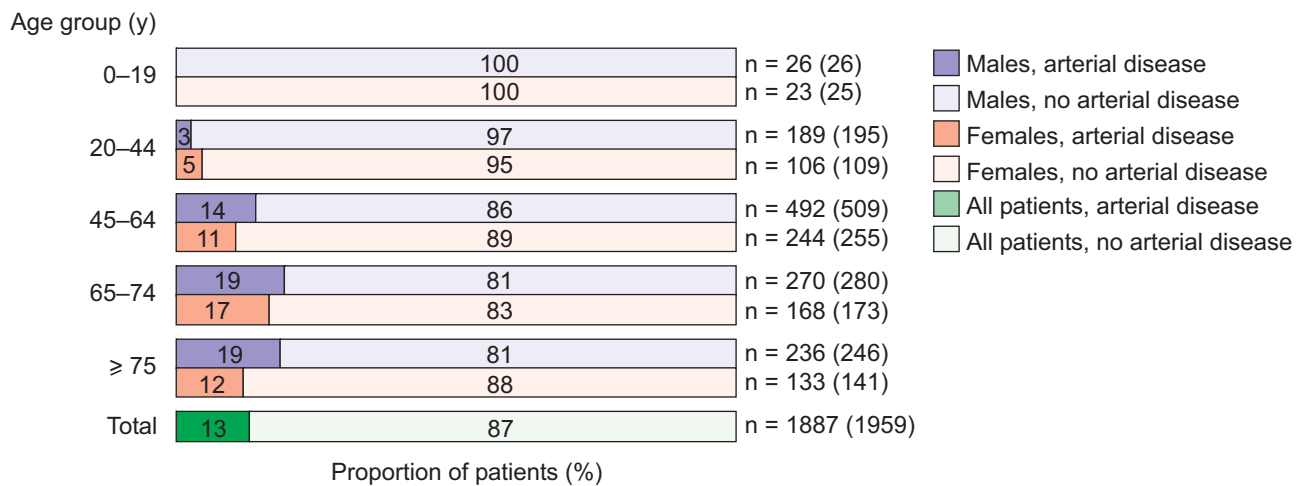


Figure 28. Symptomatic arterial disease other than coronary or cerebrovascular disease at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Of patients entering RRT in 2000–2003 and 2004–2007, 13–14% had peripheral arterial disease (symptomatic arterial disease, other than coronary or cerebrovascular disease) (Figures 27 and 28). Peripheral arterial disease was more common among men (15%) than women (11%) ( $p < 0.001$ ).

Patients older than 65 years (18%) more frequently had peripheral arterial disease than younger patients (10%) ( $p < 0.001$ ). Data were available for 87% of patients in 2000–2003 and for 96% in 2004–2007.

Figure 29. Surgical bypass of arteries (not coronary artery) in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

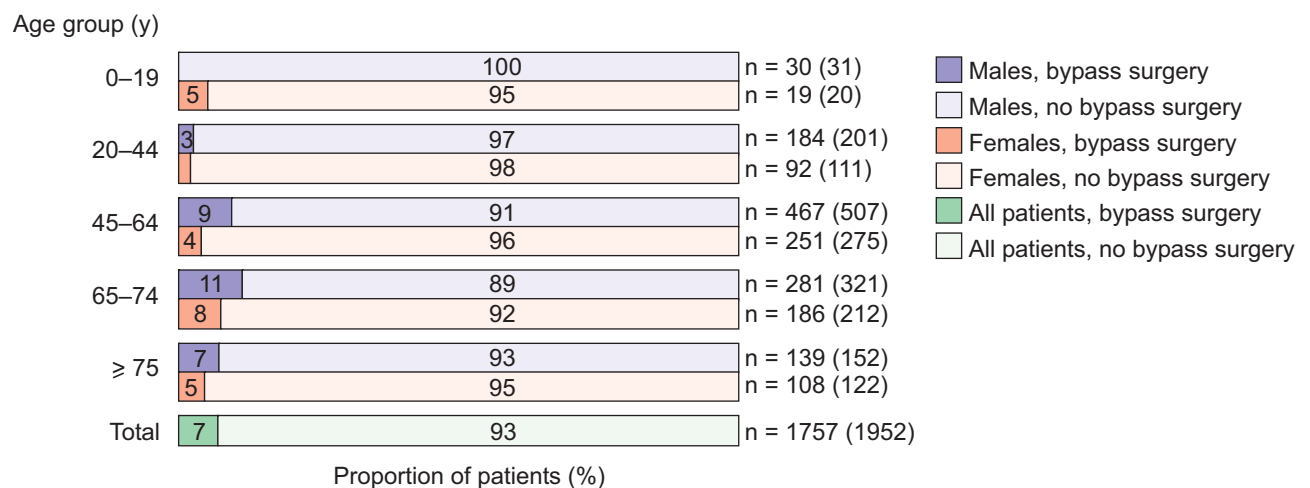
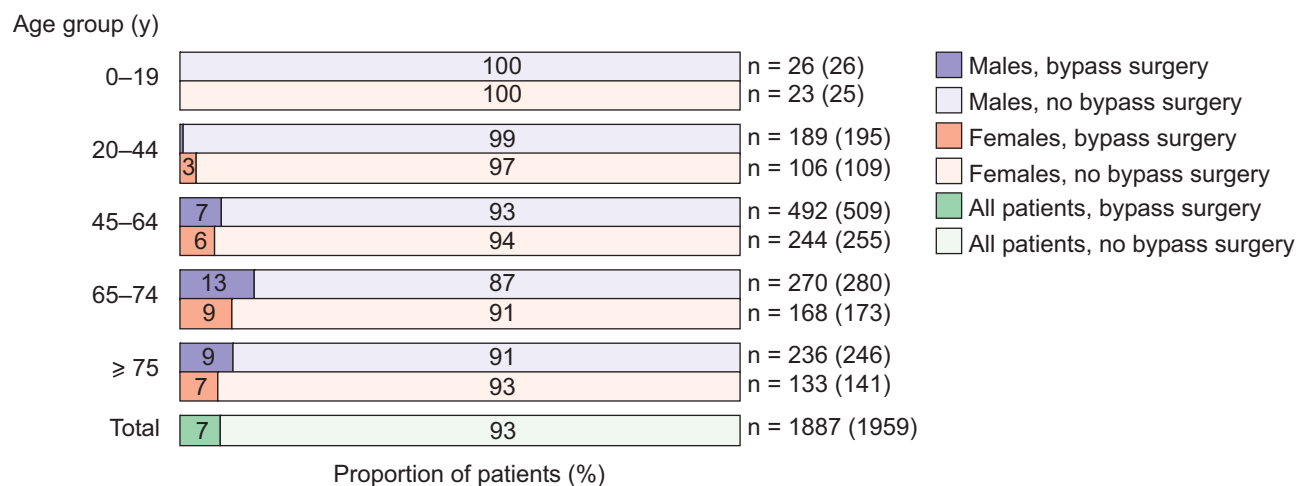


Figure 30. Surgical bypass of arteries (not coronary artery) in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Of patients entering RRT in 2000–2007, 7% had surgical bypass of arteries (other than coronary artery) in anamnesis at start of RRT (Figures 29 and 30). Surgical bypass was most common among 65–74-year-old men. The frequency

of surgical bypass did not change over time in any age group. Data were available for 90% of patients in 2000–2003 and for 96% in 2004–2007.

Figure 31. Amputation performed due to arterial disease before start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

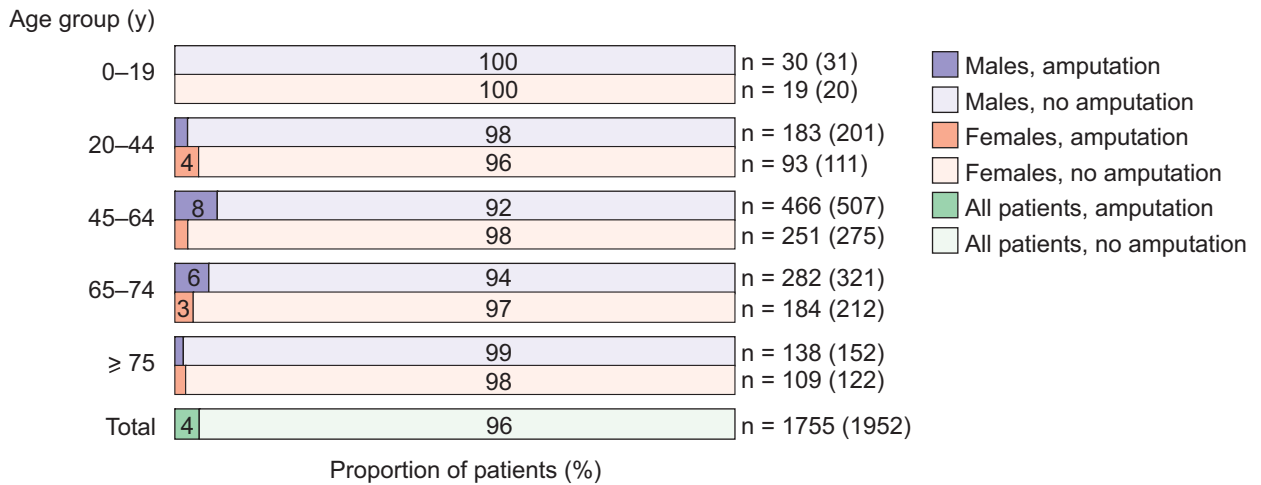
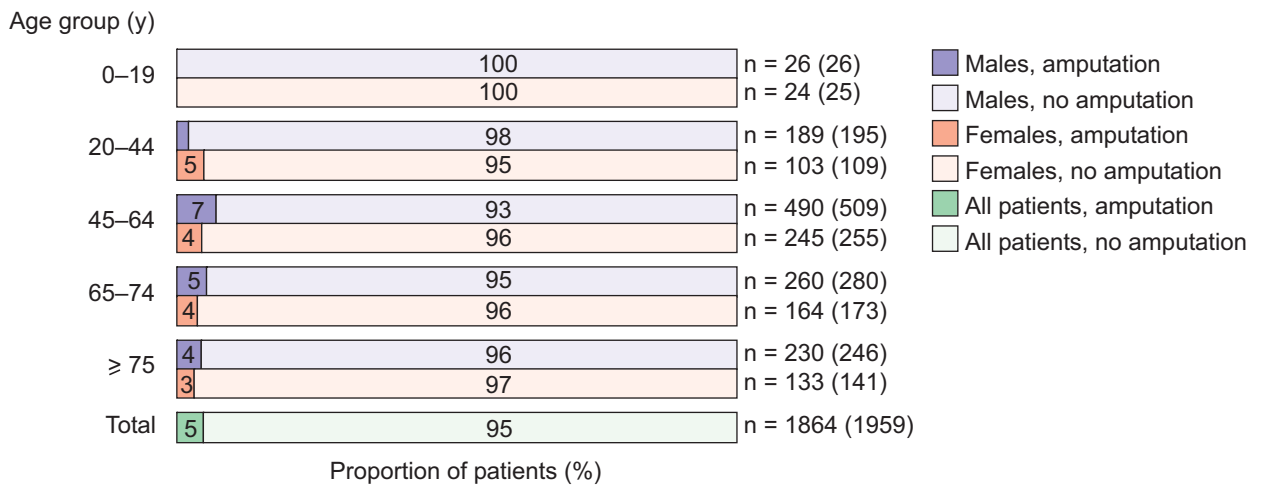


Figure 32. Amputation performed due to arterial disease before start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



In 2000–2003 and 2004–2007, arterial disease had led to amputation in 4–5% of patients entering RRT (Figures 31 and 32). Of patients entering RRT in 2000–2003, amputations were more common among men than women ( $p=0.011$ ),

but in 2004–2007 no significant difference between genders was observed. The frequency of amputation did not change during 2000–2007. Amputation was most common among 45–64-year-old men.

Figure 33. Cerebrovascular hemorrhage or infarction in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

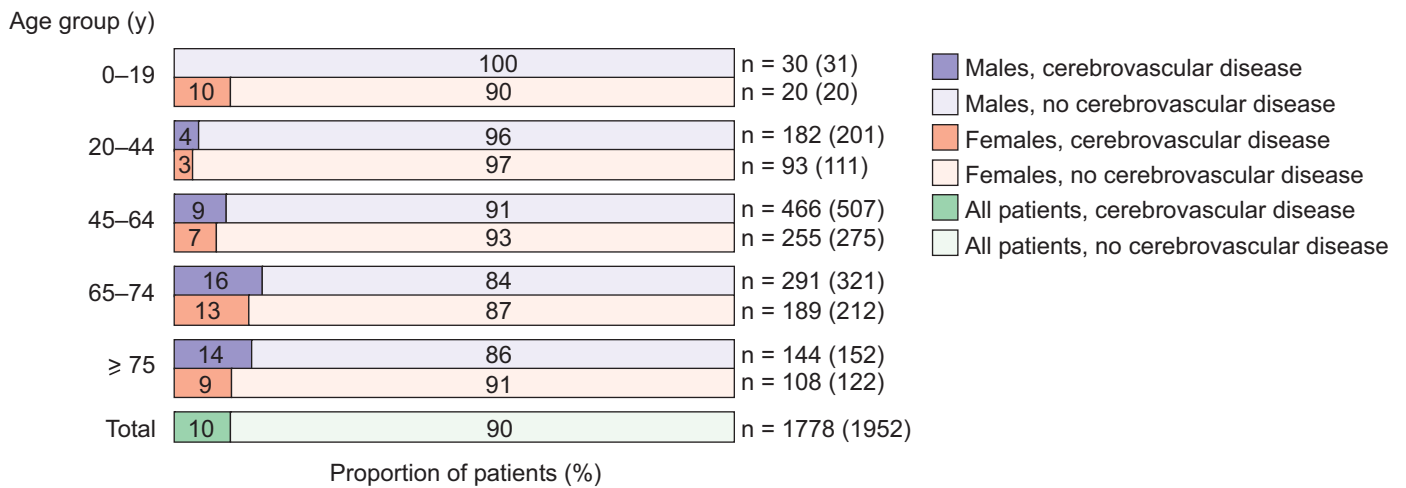
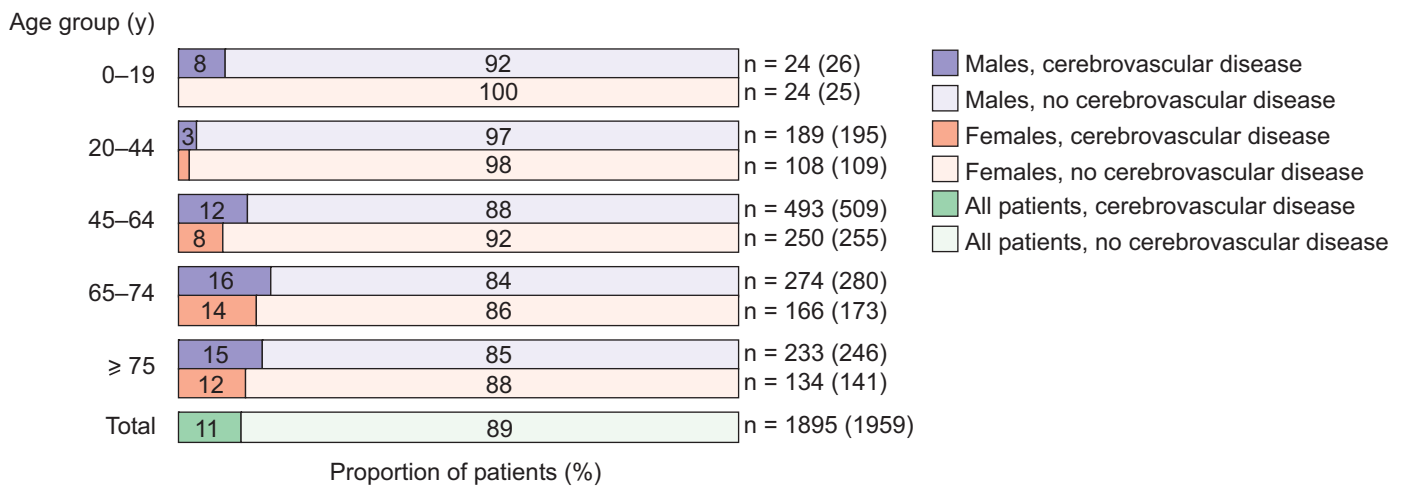


Figure 34. Cerebrovascular hemorrhage or infarction in anamnesis at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Of patients entering RRT in 2000–2003 and 2004–2007, 10% and 11%, respectively, had previously had a cerebrovascular hemorrhage or infarction ( $p=0.282$ ) (Figures 33 and 34). Eleven percent of male patients and 9% of

female patients had a history of cerebrovascular disease ( $p=0.019$ ). Cerebrovascular disease was most common among 65–74-year-old patients. Data were available for 91% of patients in 2000–2003 and for 97% in 2004–2007.



Figure 35. Treatment of high blood pressure at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

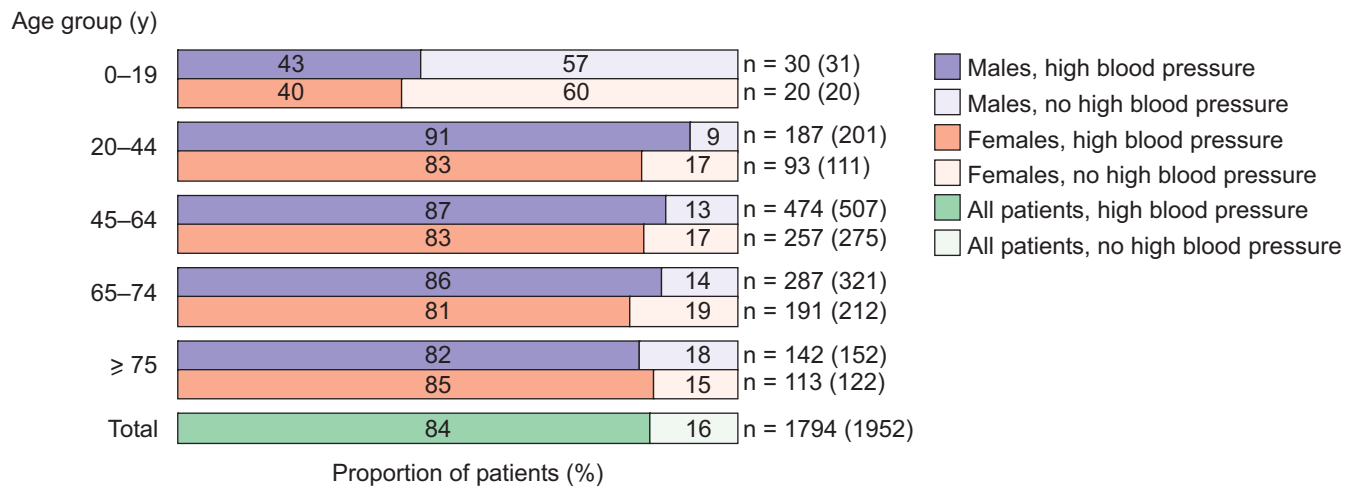
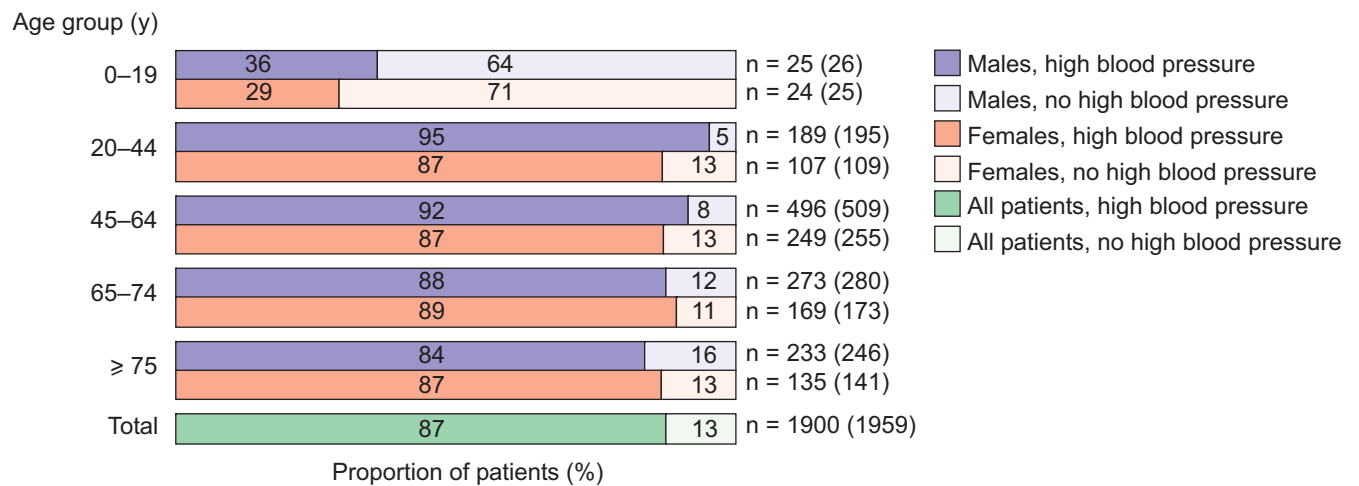


Figure 36. Treatment of high blood pressure at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Of patients entering RRT in 2000–2003 and 2004–2007, 84% and 87%, respectively, received drug treatment for high blood pressure ( $p=0.005$ ) (Figures 35 and 36). Treatment for high blood pressure was most common among

20–44-year-old men (93%). Altogether 87% of all male patients and 84% of all female patients were treated for high blood pressure ( $p=0.002$ ). Data were available for 92% of patients in 2000–2003 and for 97% in 2004–2007.

Figure 37. Treatment of hyperlipidemia at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

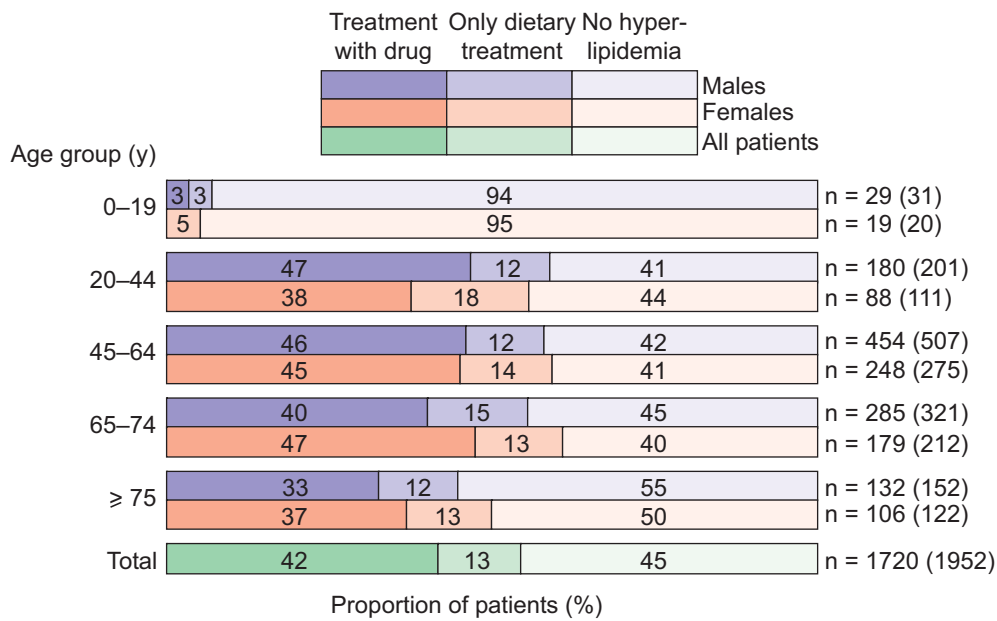
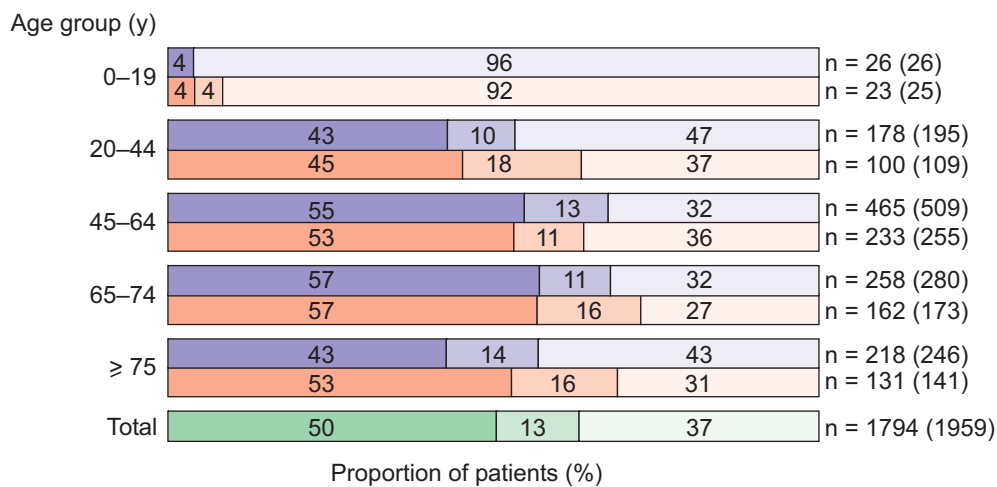


Figure 38. Treatment of hyperlipidemia at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Of patients entering RRT in 2000–2003, 42% received drug treatment for hyperlipidemia (Figure 37). Among patients entering RRT in 2004–2007, treatment frequency had

increased to 50% ( $p < 0.001$ ) (Figure 38). Treatment frequency had not increased in patients younger than 45 years. No gender difference existed in treatment frequency.

Figure 39. Tobacco smoking at start of RRT.  
Finnish Registry for Kidney Diseases 2000–2003

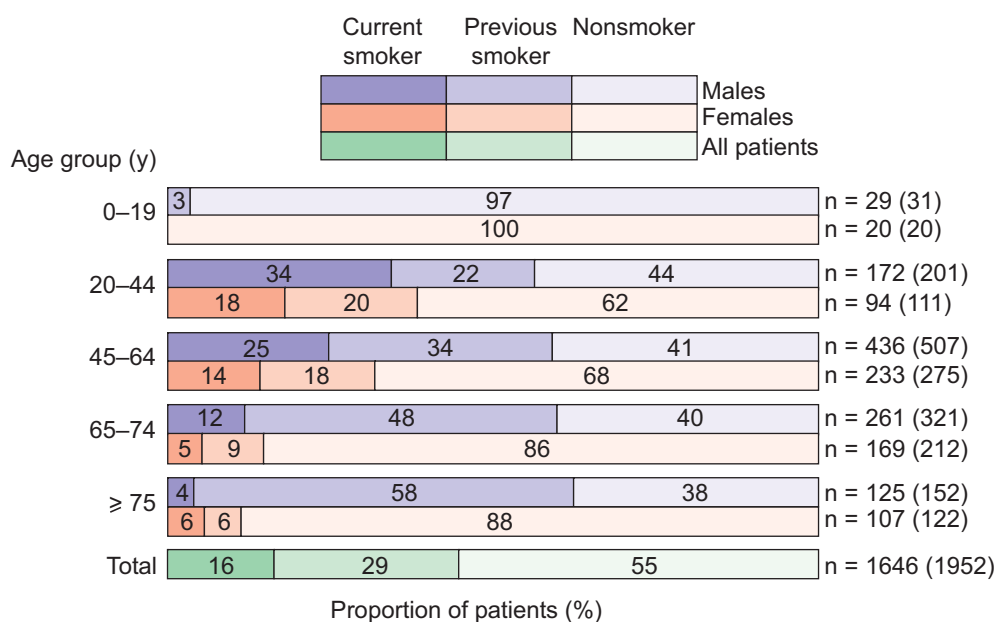
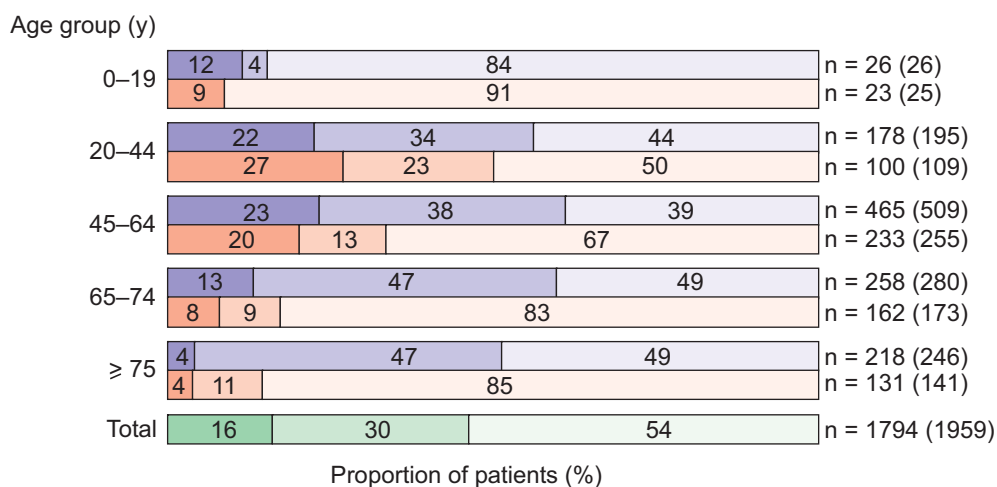


Figure 40. Tobacco smoking at start of RRT.  
Finnish Registry for Kidney Diseases 2004–2007



Of patients entering RRT in 2000–2007, 16% were current and 29–30% previous tobacco smokers (Figures 39 and 40). Of men aged 20 years or older, 19% were current and 40% previous smokers. For women, the corresponding proportions were 13% and 13%. Women entering RRT in 2004–2007 smoked more frequently than women entering RRT in 2000–2003 (14% vs. 10%,  $p=0.029$ ). For men, the corresponding proportions were 17% and 20% (i.e. smoking

frequency had decreased), but the difference was not statistically significant. For both sexes, smoking was most common among 20–64-year-olds, and in 2004–2007 smoking was equally frequent in men and women of this age group. Among men aged 65 years or older, 50% were previous smokers, but only 10% were current smokers. Data were available for 92% of patients in 2000–2003 and for 97% in 2004–2007.

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