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Slovenian Renal Replacement Therapy Registry

2007 & 2008 ANNUAL REPORTS

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Ljubljana, July 2010

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Contents

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Introduction

The present report provides an update of epidemiology and treatment practices in end-stage renal disease (ESRD) patients treated with renal replacement therapy (RRT) in Slovenia in 2007-8. The report is based on individual and center questionnaires prepared by the Slovenian Renal Replacement Therapy Registry Group. The response rate to the questionnaires was 100%. Pediatric data has also been included.

The Expert group for dialysis initiated annual RRT reports in 1999. These reports were initially based on data from renal center questionnaires, with each questionnaire tapping the aggregate data for patients at one center. In 2002, we began collecting individual patient data as well, and by 2004, a response rate of 100% was achieved for individual patients. With these data, the Slovenian RRT registry joined the ERA/EDTA (European Renal Association-European Dialysis and Transplant Association) registry (Section B, aggregated data), and the Slovenian RRT Registry Group was founded, sponsored by the Slovenian Society of Nephrology. In 2007 Slovenian RRT Registry joined ESPN Registry (European Society for Pediatric Nephrology Registry) with individual patient data. The registry is voluntary.

From 2007-2010 Slovenian RRT Registry (University Medical Center Ljubljana) was the partner of the NephroQUEST project (The European Nephrology Quality Improvement Network) which has received funding from the European Union in the framework of the Public Health Programme (project No: 2006114).

The aims of the registry, which collects data on individual RRT patients as well as data on renal center characteristics, are: 1) to be informed on the number of patients and their characteristics, 2) to monitor and improve the quality of RRT care, 3) to compare Slovenian RRT care with that of other countries, 4) to use registry data for the planning of health care facilities and personnel, 5) to use registry database for the research.

The general population of Slovenia is about 2 million (in 2007 (2008): 2,025,866 (2,032,362); 1,025,242 (1,028,417) women and 1,000,624 (1,003,945) men).

Renal centers

On December 31, 2007 as well as 2008, there were 21 renal centers in Slovenia (the same as in 2006): 15 in-hospital dialysis centers, 5 private, out-patient hemodialysis centers (4 of them Fresenius Medical Care centers), and 1 transplant center (Fig. 1). One of the 15 in-hospital centers is the Center for Pediatric Dialysis and Transplantation, and another is the Center for Peritoneal Dialysis at the University Medical Center Ljubljana. 11 out of the 15 in-hospital centers perform hemodialysis procedures for patients with acute renal failure. In addition to the specialized Center for Peritoneal Dialysis and the University Medical Center, peritoneal dialysis is performed at 8 in-hospital dialysis centers in Slovenia.

Fig. 1. *Renal centers in Slovenia on December 31, 2008.*

Incident patients

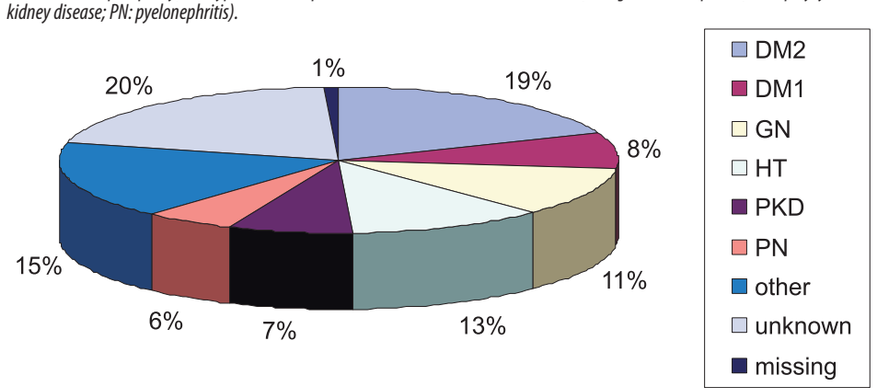
Incident patients at day 1

2007

There were 238 incident patients (incidence rate 117.5 pmp (per million of population)), of these 152 were men (63.9%, incidence rate 151.8 pmp) and 86 were women (36.1%, incidence rate 83.9 pmp). The (age and gender) adjusted incidence rate pmp (with a general population of EU25 of year 2000 used for the adjustment calculation) was 111.5 pmp, men 149.6 pmp and women 77.3 pmp.

The mean age was 64.1 ± 15.6 years (median 68 years), the mean age of men was 64.0 ± 14.5 years (median 66.5 years) and the mean age of women was 64.2 ± 17.5 years (median 70.0 years). Two patients starting RRT were ≤20 years old.

Fig. 2, Incident patients day 1, 2007. *Primary renal disease in incident patients (at day 1) in Slovenia in 2007 (abbreviations: DM: diabetic nephropathy; HT: hypertensive nephrosclerosis and/or renovascular disease; GN: glomerulonephritis; PKD: polycystic kidney disease; PN: pyelonephritis).*



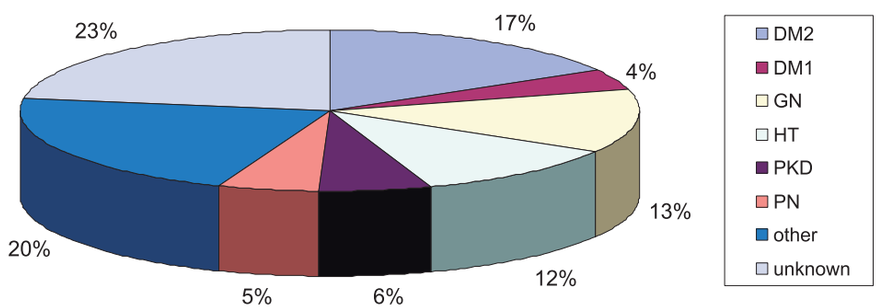
The primary renal diseases in incident patients at day 1 in 2007 were: diabetic nephropathy: type 1: 8.0%, type 2: 18.9%, both 26.9%; hypertension 11.3%; renovascular disease 2.1%; glomerulonephritis 10.9%; polycystic kidney disease 7.1%; pyelonephritis 5.5%; miscellaneous (other) 15.1%; unknown: 20.2%; data missing 0.8%. Diabetes was present in 82/238 (34.5%) of incident dialysis patients (information on the presence of diabetes is collected separately as comorbidity data).

2008

There were 235 incident patients (incidence rate 115.6 pmp), of these 144 were men (61.3%, incidence rate 143.6 pmp) and 91 were women (38.7%, incidence rate 88.4 pmp). The (age and gender) adjusted incidence rate pmp (with a general population of EU27 of year 2005 used for the adjustment calculation) was 113.7 pmp, men 144.7 pmp and women 84.9 pmp.

The mean age was 63.9 ± 15.1 years (median 67 years), the mean age of men was 61.3 ± 15.6 years (median 65.0 years) and the mean age of women was 67.2 ± 13.8 years (median 69.0 years). Five patients starting RRT were ≤20 years old.

Fig.3, Incident patients (day 1), 2008. *Primary renal disease in incident patients (at day 1) in Slovenia in 2008 (abbreviations: DM: diabetic nephropathy; HT: hypertensive nephrosclerosis and/or renovascular disease; GN: glomerulonephritis; PKD: polycystic kidney disease; PN: pyelonephritis).*



The primary renal diseases in incident patients at day 1 in 2008 were: diabetic nephropathy: type 1: 4.3%, type 2: 16.6%, both 20.9%; hypertension 11.1%; renovascular disease 1.3%; glomerulonephritis 12.8%; polycystic kidney disease 6.0%; pyelonephritis 5.1%; miscellaneous (other) 20.4%; unknown: 22.6%. Diabetes was present in 65/235 (27.7%) of incident dialysis patients (information on the presence of diabetes is collected separately as comorbidity data).

Incident patients at day 91 (patients alive and on RRT at day 91)

2007

There were 231 incident patients alive and on RRT at day 91, (incidence rate 114.0 pmp), of these 147 were men (63.6%, incidence rate 146.9 pmp) and 84 were women (36.4%, incidence rate 82.0 pmp). The adjusted incidence rate pmp (with a general population of EU25 of year 2000 used for the adjustment calculation) was 108.2 pmp, men 144.1 pmp and women 75.7 pmp.

The mean age was 63.8 ± 15.6 years (median 67.0 years), the mean age of men was 63.7 ± 14.5 years (median 66.0 years) and the mean age women was 63.9 ± 17.5 years (median 69.0 years). 2 patients were ≤20 years old.

The primary renal diseases in incident patients at day 91 were almost the same as in incident patients at day 1: diabetic nephropathy: type 1: 7.4%, type 2: 19.5%, both 26.8%; hypertension 11.3%; renovascular disease 2.2%; glomerulonephritis 11.3%; polycystic kidney disease 7.4%; pyelonephritis 5.6%; miscellaneous (other) 15.2%; unknown: 19.9%; data missing 0.4%. Diabetes was present in 78/231 (33.8%) of incident day 91 dialysis patients (information on the presence of diabetes is collected separately as comorbidity data).

2008

There were 228 incident patients alive and on RRT at day 91, (incidence rate 112.2 pmp), of these 141 were men (61.8%, incidence rate 140.6 pmp) and 87 were women (38.2%, incidence rate 84.5 pmp). The adjusted incidence rate pmp (with a general population of EU27 of year 2005 used for the adjustment calculation) was 110.2 pmp, men 141.7 pmp and women 81.2 pmp.

The mean age was 63.7±15.2 years (median 67.0 years), the mean age of men was 61.6 ± 15.5 years (median 65.0 years) and the mean age of women was 67.1 ± 14.2 years (median 69.0 years). 2 patients were ≤20 years old.

The primary renal diseases in incident patients at day 91 were almost the same as in incident patients at day 1: diabetic nephropathy: type 1: 4.4%, type 2: 17.1%, both 21.5%; hypertension 11.4%; renovascular disease 1.3%; glomerulonephritis 13.2%; polycystic kidney disease 6.1%; pyelonephritis 5.3%; miscellaneous (other) 20.2%; unknown: 21.1%. Diabetes was present in 67/228 (29.3%) of incident day 91 dialysis patients (information on the presence of diabetes is collected separately as comorbidity data).

Prevalent patients

Data relating to different forms of RRT in prevalent ESRD patients are presented in Fig. 4 and Table 1. The annual increase in prevalent patients in 2007 (as compared to 2006) was 3.4% and in 2008 (as to 2007) 3.7%. After three years of a decrease in the number of prevalent patients treated with peritoneal dialysis an increase was observed in 2008.

Fig. 4, Prevalent patients by RRT. *Number of patients on different forms of renal replacement therapy from 1998-2008 (HD: hemodialysis; PD: peritoneal dialysis; Tx: kidney transplantation).*

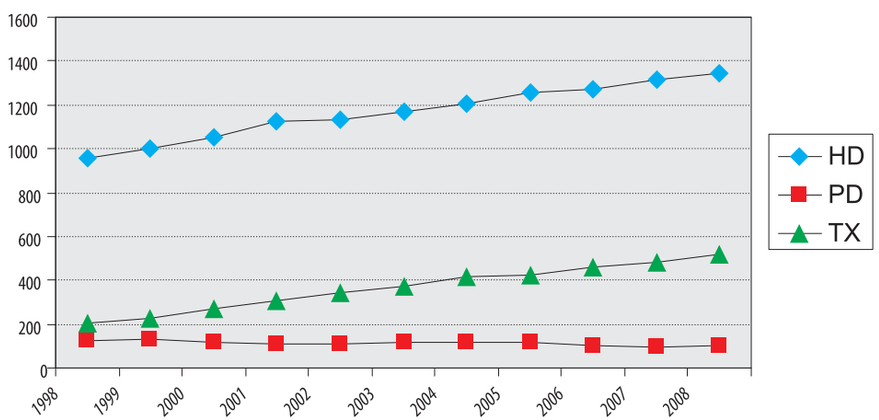


Table 1. *Prevalence of end-stage renal disease patients on different forms of renal replacement therapy on December 31 in the period from 1998-2008 (residents only).*

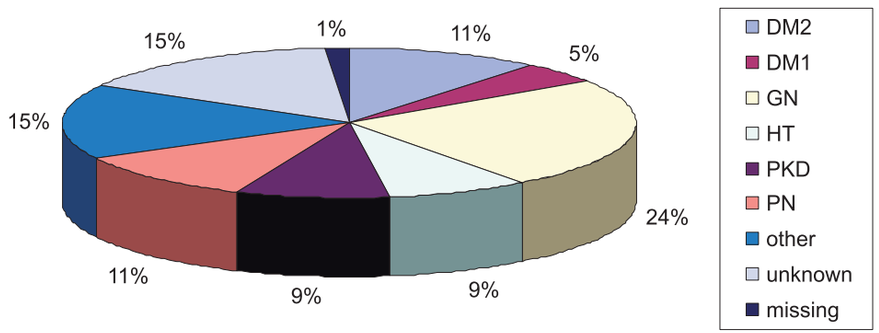
December 31	Hemodialysis	Peritoneal dialysis	Functioning graft	All
1998 (n)	957	121	201	1279
1999 (n)	1000	129	230	1359
2000 (n)	1051	117	267	1435
2001 (n)	1125	113	304	1542
2002 (n)	1131	110	343	1584
2003 (n)	1171	116	374	1661
2004* (n)	1202	119	415	1736
2005* (n)	1260	115	427	1802
2006* (n)	1271	103	461	1835
2007* (n)	**1318**	**97**	**482**	**1897**
2008* (n)	**1343**	**105**	**519**	**1967**
Increase 1999 (n / %)	43 / 4.5%	8 / 6.6%	29 / 14.4%	80 / 6.3%
Increase 2000 (n / %)	51 / 5.1%	-12 / -9.3%	37 / 16.1%	76 / 5.6%
Increase 2001 (n / %)	74 / 7.0%	-4 / -3.4%	37 / 13.9%	107 / 7.5%
Increase 2002 (n / %)	6 / 0.5%	-3 / -2.7%	39 / 12.8%	42 / 2.7%
Increase 2003 (n / %)	40 / 3.5%	6 / 5.5%	31 / 9.0%	77 / 4.9%
Increase 2004* (n / %)	31 / 2.6%	3 / 2.6%	41 / 11.0%	75 / 4.9%
Increase 2005* (n / %)	58 / 4.8%	-4 / -3.4%	12 / 2.9%	66 / 3.8%
Increase 2006* (n / %)	11 / 0.9%	-12 / -10.5%	34 / 8.0%	33 / 1.8%
Increase 2007* (n / %)	**47 / 3.7%**	**-6 / -5.8%**	**21 / 4.6%**	**62 / 3.4%**
Increase 2008* (n / %)	**25 / 1.9%**	**8 / 8.2%**	**37 / 7.7%**	**70 / 3.7%**

** Based on individual patient data*

2007

On December 31, 2007, there were 1897 prevalent RRT patients in Slovenia with a prevalence rate of 936.3 pmp, 1082 men (1080.9 pmp) and 815 women (795.1 pmp). Men represented 57% of the prevalent RRT patients. The mean age of prevalent patients was 59.1 ± 15.1 years (median 60 years), the mean age of men was 58.6 ± 14.6 years (median 60 years) and the mean age of women was 59.7 ± 15.8 years (median 60 years). 17 patients were ≤20 years of age.

Fig. 5, Prevalent patients, 2007. *Primary renal diseases in prevalent patients in Slovenia in 2007 (abbreviations: DM: diabetic nephropathy; HT: hypertensive nephrosclerosis and/or renovascular disease; GN: glomerulonephritis; PKD: polycystic kidney disease; PN: pyelonephritis).*

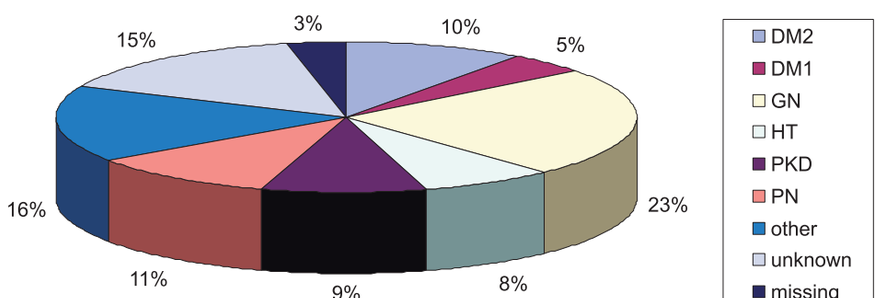


The primary renal diseases in prevalent RRT patients in 2007 were: diabetic nephropathy: type 1: 4.8%, type 2: 10.8%, both 15.5%; hypertension 8.2%, renovascular disease 0.7%; glomerulonephritis 24.0%; polycystic kidney disease 8.7%; pyelonephritis 10.8%; miscellaneous (other) 15.2%; unknown: 15.3%; missing data: 1.5%.

2008

On December 31, 2008, there were 1967 prevalent RRT patients in Slovenia with a prevalence rate of 968.0 pmp, 1130 men (1126.6 pmp) and 837 women (813.4 pmp). Men represented 57% of the prevalent RRT patients. The mean age of prevalent patients was 59.4 ± 15.2 years, the median age was 61 years. The mean age of prevalent men was 58.7 ± 14.9 years, median age 60 years. The mean age of prevalent women was 60.3 ± 15.5 years, median age 61 years. 22 patients were ≤20 years of age.

Fig. 6, Prevalent patients, 2008. *Primary renal diseases in prevalent patients in Slovenia in 2008 (abbreviations: DM: diabetic nephropathy; HT: hypertensive nephrosclerosis and/or renovascular disease; GN: glomerulonephritis; PKD: polycystic kidney disease; PN: pyelonephritis).*



The primary renal diseases in prevalent RRT patients in 2008 were: diabetic nephropathy: type 1: 4.5%, type 2: 10.0%, both 14.5%; hypertension 7.5%, renovascular disease 0.9%; glomerulonephritis 23.5%; polycystic kidney disease 9.2%; pyelonephritis 10.6%; miscellaneous (other) 15.6%; unknown: 15.0%; missing data: 3.4%.

The distribution of RRT modalities is presented in Table 2. The majority of prevalent RRT patients are treated with chronic hemodialysis. These patients are older and have a higher percentage of diabetics than patients treated with peritoneal dialysis or kidney transplantation.

Table 2. *Patients treated with different forms of renal replacement therapy (RRT) in Slovenia on December 31, 2008.*

	No. of patients (% of all RRT)	men	Median age (years)	Diabetic nephropathy/ diabetes **	Crude death rate in 2008***
Hemodialysis	1343 (68.3%)	57%	66	18% / 24%	12.5%
Peritoneal dialysis	105 (5.3%)	61%	57	16% / 23%	9.1%
Transplantation*	519 (26.4%)	57%	53	5% / 13%	1.4%
All	1967	57%	61	15% / 22%	9.4%

**Residents only;*
***The presence of diabetes is collected separately as comorbidity data.*
**** Incident day 1 included.*

Table 3. *Number of unadjusted prevalent and incident (day 1) patients per million of the population (p.m.p.) from 1998-2008.*

December 31	Prevalence p.m.p.	Incidence p.m.p.
1998	651	-
1999	692	115
2000	723	109
2001	771	144
2002	807	115
2003	846	131
2004*	869	125
2005*	901	125
2006*	913	124
2007*	**936**	**118**
2008*	**968**	**116**

**Based on individual patient data.*

Pediatric RRT patients

2007

There were 18 prevalent patients aged 20 years or younger in Slovenia on December 31, 2007. Two of them started RRT in 2007 with chronic hemodialysis. Out of prevalent pediatric patients, 7 had a functioning kidney graft from a cadaveric donor, 6 were treated with chronic hemodialysis and 5 with peritoneal dialysis. The median age of prevalent pediatric patients was 17 years (range 3 - 20 years). None of the patients died in 2008.

2008

There were 20 prevalent patients aged 20 years or younger in Slovenia on December 31, 2008. Five of them started RRT in 2008, three with chronic hemodialysis and two with peritoneal dialysis. Out of prevalent pediatric patients, seven pediatric patients had a functioning kidney graft from cadaveric donors, 8 were treated with chronic hemodialysis and 5 with peritoneal dialysis. The median age of prevalent pediatric patients was 16 years (range 3 - 20 years). None of the patients died in 2008.

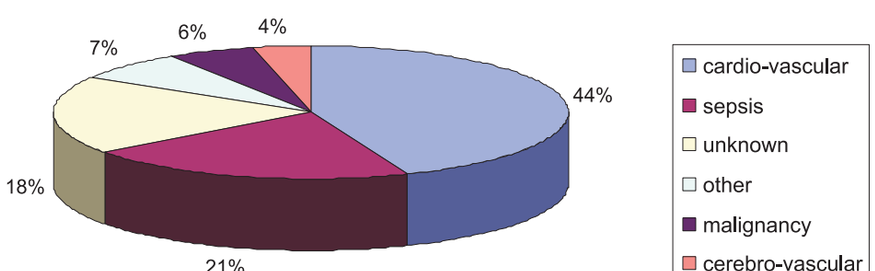
Mortality of RRT patients

2007

168 patients on RRT died in 2007 (incident (day 1) patients were included), of these 86 were men (51%) and 82 were women. Their mean age was 70.3 ± 11.1 years (median 72) and their mean RRT vintage was 5.4 ± 5.7 years (median 3.7). Of these, 161 were dialysis patients (159 hemodialysis and 2 peritoneal dialysis) and 7 were kidney graft recipients (<91 days of dialysis between graft failure and death).

The crude death rate was calculated by dividing the number of patients who died with the average number of prevalent RRT patients at the end of 2006 and 2007 (Table 4). The crude death rate for dialysis patients in 2007 was 11.6% (12.3% for HD patients and 2.0% for PD patients), 1.5% for transplanted patients, and 9.0% for all RRT patients. The most common cause of death in dialysis patients was cardiovascular disease (44%), followed by sepsis (21%), malignoma (6%), and cerebrovascular disease (4%) (Fig. 7). There was one suicide among hemodialysis patients in 2007. The cause of death in 7 kidney graft recipients was: sepsis in 2, sudden death (probably due to cardiac disease) in two, malignancy in three.

Fig. 7. *Causes of death of dialysis patients in 2007 (N = 162).*



2008

182 patients on RRT died in 2008 (incident (day 1) patients were included), of these 103 were men (57%) and 79 were women. Their mean age was 69.6 ± 11.4 years (median 72) and their mean RRT vintage was 5.8 ± 6.3 years (median 3.6). Of these, 174 were dialysis patients (165 hemodialysis and 9 peritoneal dialysis) and 8 were kidney graft recipients.

The crude death rate for dialysis patients in 2008 was 12.4% (12.5% for HD patients and 9.1% for PD patients), 1.4% for transplanted patients, and 9.4% for all RRT patients. The most common cause of death in dialysis patients was cardiovascular disease (42%), followed by sepsis (14%), malignoma (5%), and cerebrovascular disease (3%) (Fig. 8). The cause of death in 7 kidney graft recipients was: malignancy in 3, sepsis in one, pulmonary thrombembolic disease in one, cardio-vascular in one and cerebrovascular in one.

Fig. 8. *Causes of death of dialysis patients in 2008 (N = 175).*

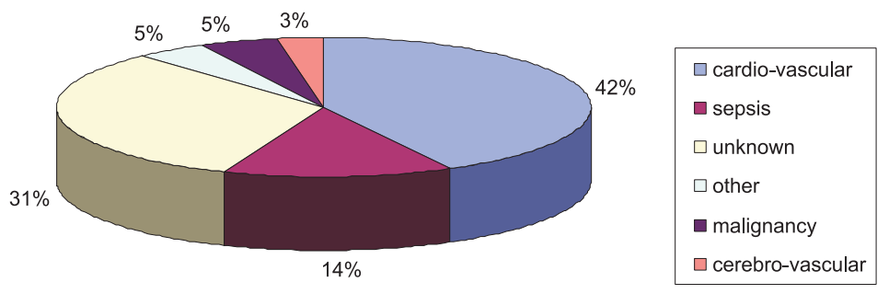


Table 4. *Crude death rate of dialysis patients in the period from 1999-2008 (incident patients at day 1 included).*

year	All RRT	All dialysis (HD†+PD‡)	HD	PD	Tx
1999		10.9%	11.3%	8.8%	
2000		10.4%	10.8%	7.3%	
2001		10.4%	10.5%	9.6%	
2002		12.9%	13.2%	9.8%	
2003		11.8%	12.0%	9.8%	
2004		12.6%	13.1%	8.3%	
2005	10.0%	12.8%	13.4%	6.8%	0.9%
2006	11.4%	14.7%	15.6%	4.6%	1.4%*
2007	9.0%	11.6%	12.3%	2.0%	1.5%**
2008	9.4%	12.4%	12.5%	9.1%	1.4%***

† HD: Hemodialysis
‡ PD: Peritoneal dialysis
** 3 kidney graft recipients requiring hemodialysis 2, 14 and 36 days before death were counted as transplant deaths.*
*** 1 kidney graft recipient requiring hemodialysis 42 days before death was counted as transplant death*
**** 1 kidney graft recipient requiring hemodialysis 7 days before death was counted as transplant death*

Survival analysis in incident patients

Incident patients from the 5-year period (2004 - 2008) were included in the survival analysis. Kaplan-Meier survival curves are shown for: all incident day 1 RRT patients (Fig. 9), all incident day 1 dialysis patients (Fig. 10), all incident day 1 RRT patients by age group (Fig. 11), all incident day 1 dialysis patients by age group (Fig. 12) and diabetes status (Fig. 13).

Figure 9. *Survival of all incident (day 1) patients (HD + PD + TX) in the 2004 - 2008 period (N = 1262).*

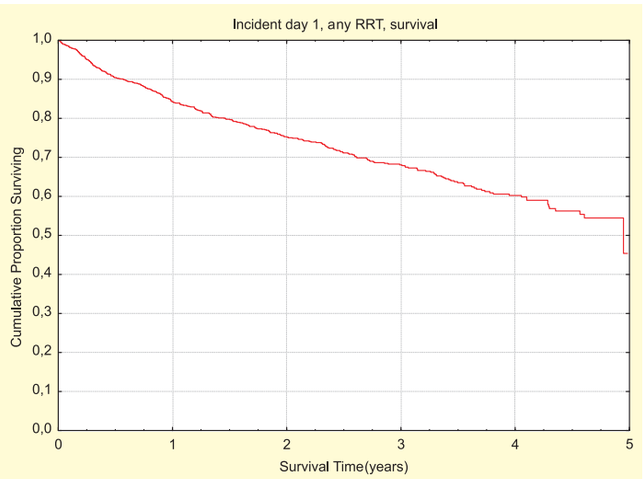


Figure 10. *Survival of incident (day 1) dialysis (HD + PD) patients in the 2004 - 2008 period, censored for transplantation (N = 1260).*

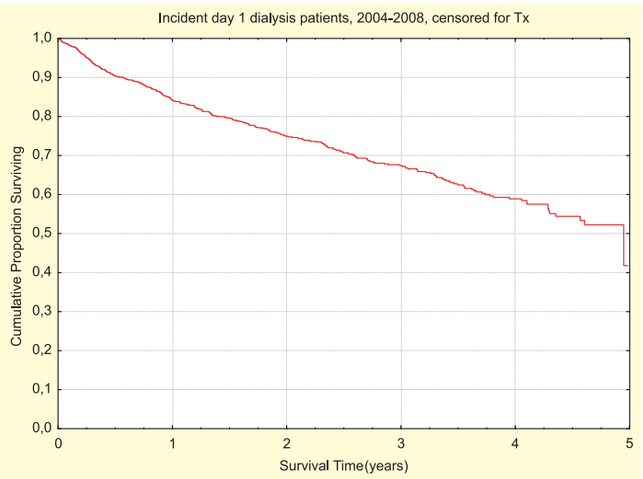


Figure 11. *Survival of all incident (day 1) patients (HD + PD + TX) in the 2004 - 2008 period, by age group (N = 1262).*

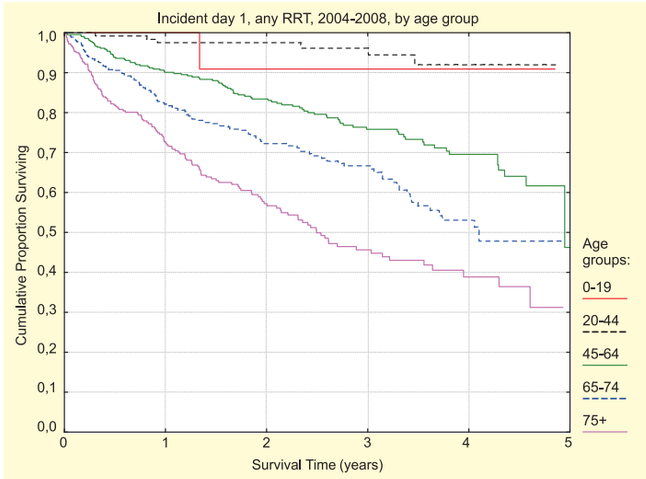


Figure 12. *Survival of incident (day 1) dialysis (HD + PD) patients in the 2004 - 2008 period, censored for transplantation (N = 1260).*

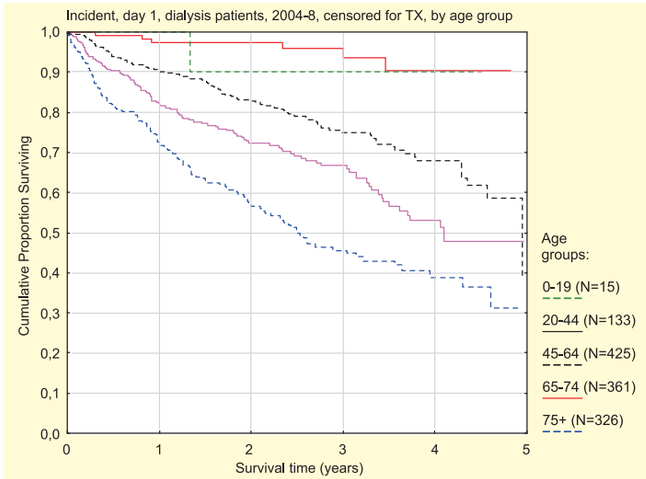
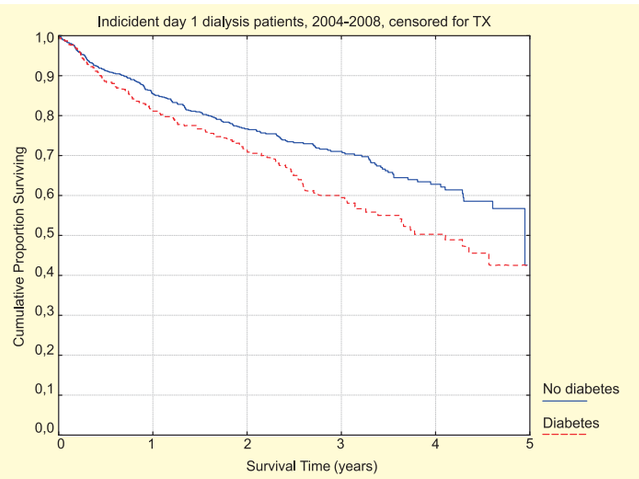


Figure 13. *Survival of incident (day 1) dialysis (HD + PD) patients in the 2004 - 2008 period, censored for transplantation. Comparison of diabetics and non-diabetics. (N = 1260)*



Hemodialysis in prevalent patients

2008

In 2008 68.3% (1343 / 1967) of prevalent RRT patients were treated with chronic HD (57.5% men, median age 66 yrs, range 9-94, mean 63.1± 14.6), 18.2% were classified as having diabetic nephropathy as the primary renal disease, and 24.3% of HD patients were reported as having diabetes.

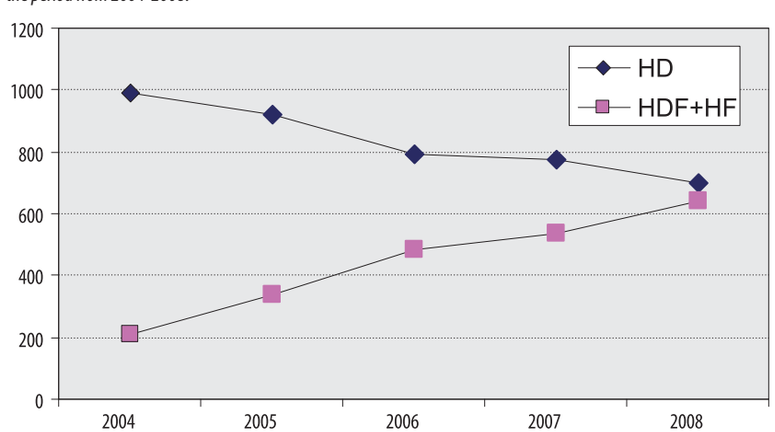
Table 5. *Number and percentage of hemodialysis patients treated in private, out-patient hemodialysis centers on December 31, 1999-2008.*

Dec. 31	1999	2000	2001	2002	2003	2004*	2005*	2006*	**2007***	**2008***
private HD patients (n)	131	157	177	223	246	243	269	292	**294**	**313**
all HD patients (n)	1000	1051	1125	1131	1171	1202	1260	1271	**1313**	**1343**
% of private	13.1%	14.9%	15.7%	19.7%	21.0%	20.2%	21.3%	23.0%	**22.4%**	**23.3%**

**Individual patient data.*

The percentage of patients treated with convective techniques (hemodiafiltration / hemofiltration) is increasing (Fig. 14): 17.5% in 2004, 26.9% (N = 339) in 2005, 37.3% (N = 481) in 2006, 40.9% (N = 537) in 2007 and 48% (N = 643) in 2008, of which 611 patients are treated with on-line HDF, 7 patients with on-line hemofitration and 25 with acetate free biofiltration. At the end of 2008, the majority of the patients (52%, N = 700) were still treated with bicarbonate hemodialysis. In the majority of hemodialysis patients (74.8%, 1005 / 1343), ultrapure dialysis fluid was used (including patients treated with convective techniques).

Fig. 14. *Dialysis modality in prevalent patients. Increasing percentage of convective techniques in prevalent hemodialysis patients in the period from 2004-2008.*



Prescription of hemodialysis

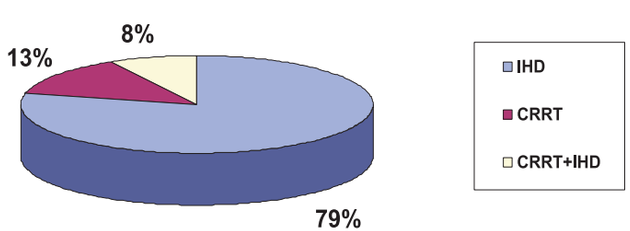
A minority of patients are treated with twice-weekly dialysis (7.4%, N = 99) or once-weekly hemodialysis (0.4%, N = 5), 11 patients (0.8%) with 4-times-weekly hemodialysis, and the vast majority, 91.4% (1228 / 1343), are treated with 3-times-weekly hemodialysis. The average weekly time on dialysis is 12.9 ± 2.2 hours (3 - 24 hours, including patients treated with once- or twice-weekly dialysis), the median weekly time on hemodialysis is 13.5 hours. Regular night-shift in-hospital hemodialysis is offered at the Dialysis Center Zaloška to employed patients, students and pupils. 123 patients (9.2%) were dialyzed in the single-needle dialysis mode. The mean dry body weight of hemodialysis patients was 69.4 ± 16.0 kg (21-138 kg, median body weight 68 kg). The mean blood flow was 283 ± 51 ml/min (120 - 500). Anticoagulation was performed using low molecular weight heparin in 18.2% (N = 244) of hemodialysis patients, while unfractioned heparin was used in the majority (80.5%) of hemodialysis patients. The mean unfractioned heparin dose was 5386 ± 2376 IU per hemodialysis, median 5000 IU, range 250 - 18500 IU.

Acute hemodialysis

Hemodialysis in intensive care units is performed in 11 hospitals, in 10 of them continuous renal replacement therapy (CRRT) is also performed. CRRT in newborns and small children is performed in pediatric intensive care of the University Medical Center Ljubljana, by the nephrologists and renal nurses of the Dialysis Center Zaloška, University Medical Center Ljubljana.

In 2008, 653 patients were reported to be treated by acute hemodialysis: 513 (78.6%) patients were treated by intermittent hemodialysis only, 87 (13.3%) by CRRT only and 53 patients (8.1%) by a combination of CRRT and intermittent hemodialysis.

Fig. 15. *Patients treated by acute hemodialysis in 2008: intermittent hemodialysis (IHD), continuous renal replacement therapy (CRRT) and combination of CRRT and IHD (N = 653)*



Vascular access in hemodialysis patients

Prevalent hemodialysis patients, 2008

On December 31, 2008 there were 1343 prevalent chronic hemodialysis patients, 58% were men, median age was 66 years (range 9-94, mean 63 ± 15), 24% were diabetics.

The vascular accesses were: native arteriovenous fistula (AVF) in 82% (N = 1107), PTFE graft in 6% (N = 74), and HD catheter in 12% (N = 162) (Fig. 15). Hemodialysis catheters (N = 162) were: temporary (noncuffed) in 96% and permanent silastic in 3.7% (N = 6) of patients; precurved jugular in 78%, subclavian in 18%, and femoral in 4% of patients; single-lumen in 80% and double-lumen in 20% of patients.

Fig. 16. *Vascular access in prevalent hemodialysis patients on December 31, 2008 (N = 1343).*

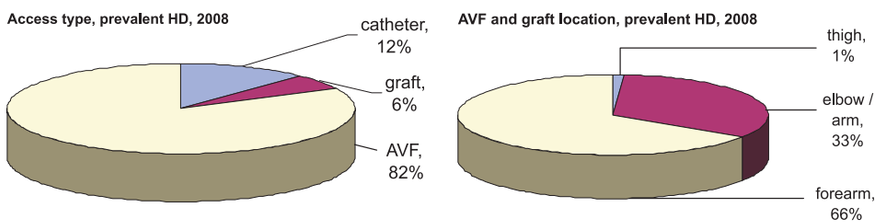
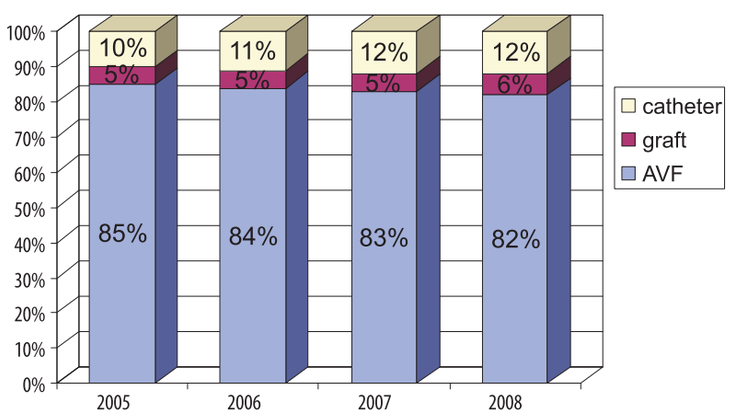


Fig. 17. *Vascular access in prevalent hemodialysis patients from 2005-2008.*



Incident (day 91) hemodialysis patients, 2007

On December 31, 2007, there were 217 new hemodialysis patients who were alive and on hemodialysis at day 91 (patients on PD are excluded), 65% were men, median age was 68 years (mean 64.2 ± 15.6, range 9-88 years), 35% were diabetic.

The vascular accesses (on December 31) were: native arteriovenous fistula in 70% (N = 151), PTFE graft in 1% (N = 2), and HD catheter in 29% (N = 68) of patients. In patients with AV fistula and graft, the location of fistula / anastomosis was on the forearm in 70%, and on the elbow / arm in 30% of cases. The hemodialysis catheters were: temporary (non-cuffed) in all patients; precurved jugular in 78%, subclavian in 21% and femoral in 2% of patients; single-lumen in 81% and double-lumen in 19% of all cases.

Incident (day 91) hemodialysis patients, 2008

On December 31, 2008, there were 224 new hemodialysis patients who were alive and on hemodialysis at day 91 (patients on PD are excluded), 62% were men, median age was 67.5 years (mean 64.0 ± 15.0, range 16-93 years), 29.5% were diabetic.

The vascular accesses (on December 31) were: native arteriovenous fistula in 68% (N = 152), PTFE graft in 3% (N = 6), and HD catheter in 29% (N = 66) of patients. In patients with AV fistula and graft, the location of fistula / anastomosis was on the forearm in 65%, and on the elbow / arm in 35% of cases. The hemodialysis catheters were: temporary (non-cuffed) in all patients; precurved jugular in 84%, subclavian in 13% and femoral in 3% of patients; single-lumen in 82% and double-lumen in 18% of all cases.

Vascular access activities at the Dialysis Center Zaloška, Department of Nephrology

Two dedicated nephrologists (M. M. and R. P.) from the Department of Nephrology perform vascular access surgery for approximately half of all Slovenian hemodialysis patients, including children. This includes vascular access surgery for all private hemodialysis centers in Slovenia. In the rest of the country, vascular access surgery is performed by a dedicated surgeon at each hospital, with complicated cases being referred to nephrologists at the Dialysis Center Zaloška. These cases include the salvage of suddenly thrombosed AV fistulas and grafts. Surgical procedures are performed in the operative theatre of the Dialysis Center Zaloška under local anesthesia and as outpatient procedures in the vast majority of patients. In a few patients (mainly pediatric), an AV fistula is created under general anesthesia, again by nephrologists.

In the 1970-2009 period, in dialysis center Zaloska, there were altogether 5302 vascular access surgeries performed and over 20.000 hemodialysis catheters inserted.

Fig. 18. *Vascular access surgeries, 2001-2009.*

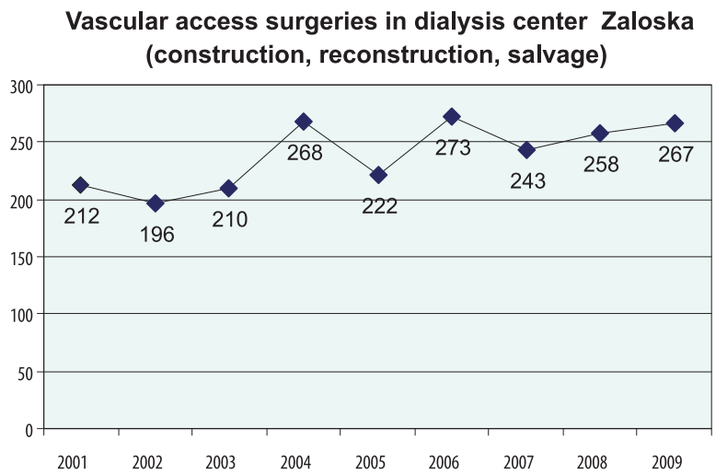
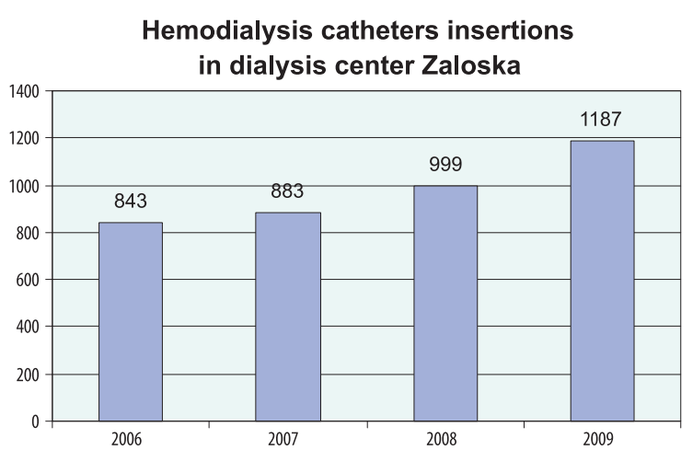


Fig. 19. *Hemodialysis catheters insertions, 2006-2009.*



Transmissive diseases in dialysis patients

Data on transmissive diseases in dialysis patients are collected through dialysis center questionnaire. In 2008, 2.3% (33 / 1448) of dialysis patients had the hepatitis B or C virus infection (2 patients had both hepatitis B and C virus infections), whose number and percentage has been low over the years (Table 6). The number of methycillin-resistant Staphylococcus aureus (MRSA)-positive dialysis patients has been decreasing in the last years. All positive patients (including MRSA) have been isolated. The main dialysis unit for patients with transmissive diseases is in the Dialysis Center Zaloška, with 5 dialysis stations (in a separate room) dedicated to hepatitis B and C virus-positive patients and an additional 2 dialysis stations (in a separate room) dedicated to MRSA-positive patients or patients with other transmissive diseases.

There were no HIV-positive patients on chronic renal replacement therapy through the end of the year 2008.

Table 6. *Number and percentage of dialysis patients (both hemodialysis and peritoneal dialysis) positive for hepatitis B or C virus and MRSA (methycillin-resistant Staphylococcus aureus).*

	2000	2001	2002	2003	2004	2005	2006	**2007**	**2008**
†HBV (n)	14	20	20	20	20	18	17	**18 (+3)***	**19 (+2)***
‡HCV (n)	22	21	22	20	15	12	15	**11 (+3)***	**12 (+2)***
HBV + HCV (%)	3.1	3.3	3.4	3.1	2.7	2.2	2.3	**2.3**	**2.3**
MRSA (%)	1.6	2.9	3.2	2.8	2.3	1.9	1.5	**0.9**	**0.9**

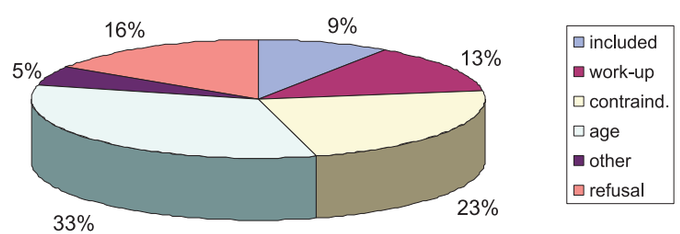
† HBV: hepatitis B virus
‡ HCV: hepatitis C virus
**: both hepatitis B and hepatitis C virus infection*
†‡MRSA: methycillin-resistant Staphylococcus aureus

Dialysis patients and waiting list for cadaveric kidney transplantation

2007

According to the referrals from the Kidney Transplant Center, 9.5% of dialysis patients (134 / 1415) were on the waiting list for cadaveric kidney transplantation at December 31, 2007, with an additional 188 patients (13.3%) under work-up for inclusion. 33.0% (467 / 1415) of the patients were not included because of their age (and associated comorbities), 23.1% (327) because of medical contraindications, 5.2% (71) for other reasons, and 16.1% (228) of dialysis patients reportedly refused to be transplanted. Some of these patients have significant comorbidities. The patients referred as refusing kidney transplantation and being >65 years of age were counted as not referred to the waiting list because of age (although there is no upper age limit for inclusion in the waiting list for kidney transplantation).

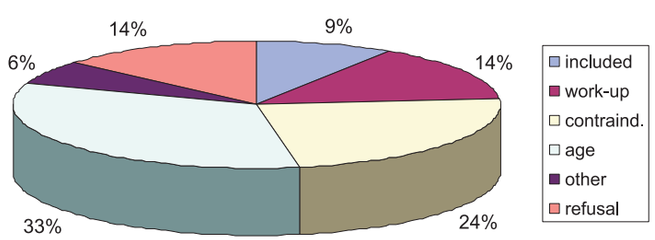
Fig. 20. *Dialysis patients and waiting list for cadaveric kidney transplantation on December 31, 2007.*



2008

According to the referrals from the Kidney Transplant Center, 9.1% of dialysis patients (132 / 1448) were on the waiting list for cadaveric kidney transplantation at December 31, 2008, with an additional 208 patients (14.4%) under work-up for inclusion. 33.3% (482 / 1448) of the patients were not included because of their age (and associated comorbities), 23.8% (345) because of medical contraindications, 5.7% (82) for other reasons, and 13.7% (199) of dialysis patients reportedly refused to be transplanted. Some of these patients have significant comorbidities. The patients referred as refusing kidney transplantation and being >65 years of age were counted as not referred to the waiting list because of age (although there is no upper age limit for inclusion in the waiting list for kidney transplantation). All patients refusing kidney transplantation are usually thoroughly informed on kidney transplantation and on studies showing the survival benefits of transplantation compared to dialysis, and are continuously being informed on new drugs, improvements in immunosuppressive protocols, and other approaches that are expected to improve the results and decrease the side effects of immunosuppressive therapy after transplantation. Their decision to refuse kidney transplantation were discussed during their regular visits to nephrologists.

Fig. 21. *Dialysis patients and waiting list for cadaveric kidney transplantation on December 31, 2008.*



Kidney transplantation

There is one transplant center in Slovenia, located at the University Medical Center Ljubljana. Slovenia has been a member of Eurotransplant since January 1, 2000.

2007

Thirty-one kidney transplantations were performed in 2007, 30 from deceased donor and one from living related donor (mother). This was the first graft in 28 patients and the second graft in 3 patients. Five transplant recipients were older than 60 years, three transplant recipients were diabetics.

Seven kidney graft recipients died in 2007 with functioning kidney grafts, including one that died 58 days after graft failure (dialysed for 58 days). Eight patients started chronic dialysis because of end-stage kidney graft failure.

The total number of renal transplantations in Slovenia from 1970 to December 31, 2007 was 715, of which 125 involved a living related donor and 590 a deceased donor. The total number of patients with functioning kidney grafts (residents only) was 481 on December 31, 2007.

2008

Fifty-two kidney transplantations were performed in 2008, all from deceased donor. This was the first graft in 46 patients and the second graft in 6 patients. Ten transplant recipients were older than 60 years, three transplant recipients were diabetics.

Seven kidney graft recipients died in 2008 with functioning kidney grafts, including one that died 7 days after graft failure (dialysed for 7 days). Seven patients started chronic dialysis because of end-stage kidney graft failure.

The total number of renal transplantations in Slovenia from 1970 to December 31, 2008 was 767, of which 125 involved a living related donor and 642 a deceased donor. The total number of patients with functioning kidney grafts (residents only) was 519 on December 31, 2008. Of these patients, 501 (97%) received grafts from deceased and 18 (3%) from living related donors.

Survival analysis

Kaplan-Meier survival analysis shows better patient and graft survival in Slovenia compared to Eurotransplant data (Fig. 21 and 22).

Fig. 22. *Five year kidney graft survival (%) in Slovenia compared to Eurotransplant (cadaveric kidney transplants from 1.1.2000 - 31.12.2009, Slovenija N = 445, Eurotransplant N = 30895).*

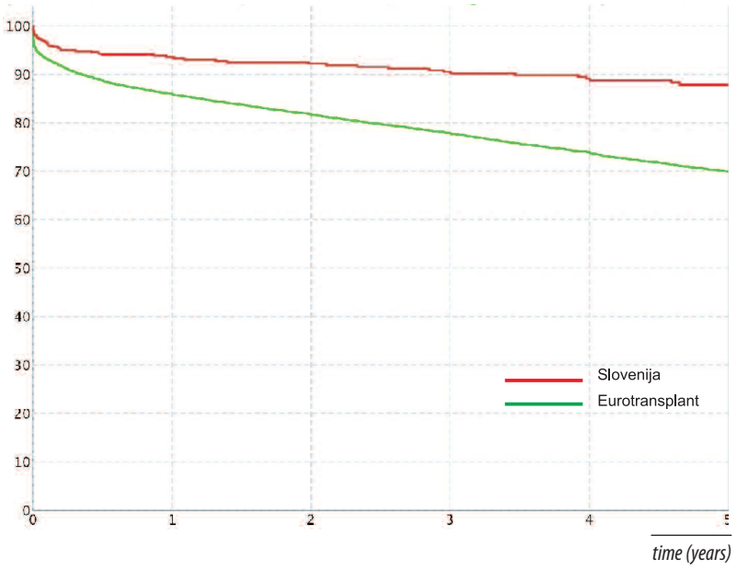
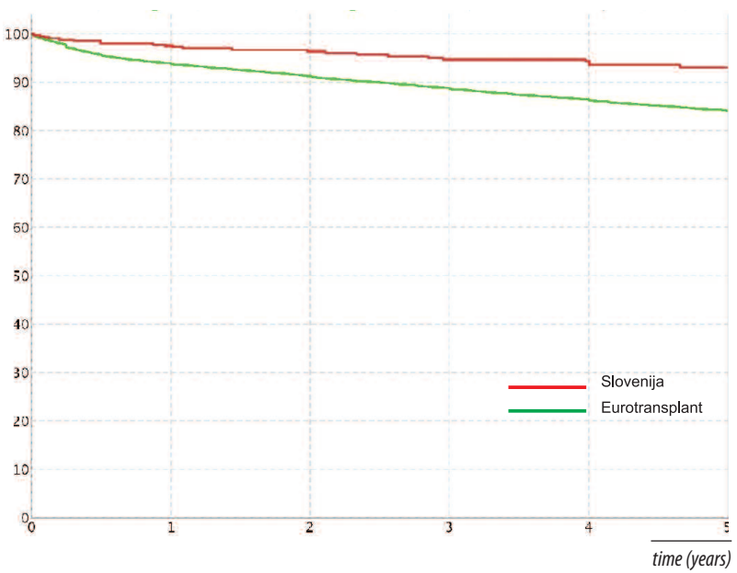


Fig. 23. *Five year patient survival (%) after kidney transplantation in Slovenia compared to Eurotransplant (cadaveric kidney transplants from 1.1.2000 - 31.12.2009, N = , Slovenija N = 445, Eurotransplant N = 30895).*

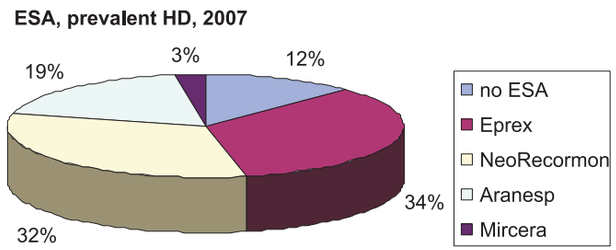


Erythropoiesis stimulating agents (ESA) therapy in prevalent RRT patients

2007

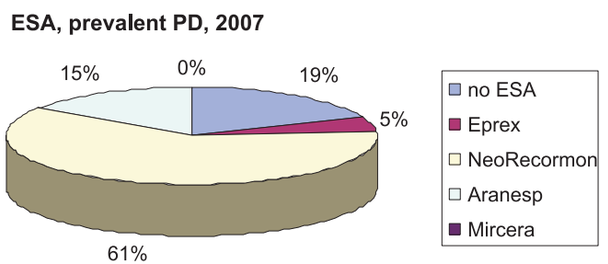
Hemodialysis patients (n = 1318): 87.6% (1150 / 1318) have received ESA, almost all of them intravenously, while 12.4% (n = 163) of patients did not receive epoetin. 32.2% (n = 423) have received NeoRecormon, 34.2% (N = 449) Eprex, 18.7% (n = 245) Aranesp, and 2.5% (n = 33) Mircera.

Fig 24. *ESA therapy (last week in December 2007) in prevalent hemodialysis patients (N = 1318).*



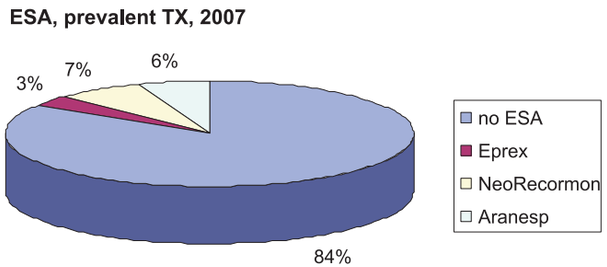
Peritoneal dialysis patients (n = 97): 81.4% (79 / 97) have received ESA subcutaneously.

Fig 25. *ESA therapy (last week in December 2007) in prevalent peritoneal dialysis patients (N = 97).*



Transplant patients (n = 482): 15.8% (76 / 482) have received ESA subcutaneously.

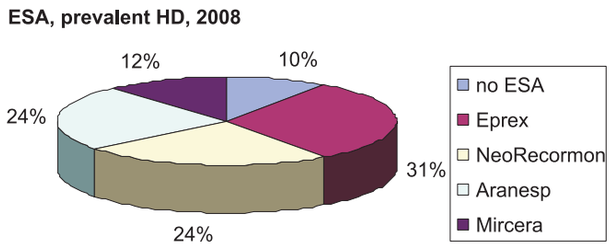
Fig 26. *ESA therapy (last week in December 2007) in patients with functioning kidney grafts (N = 482).*



2008

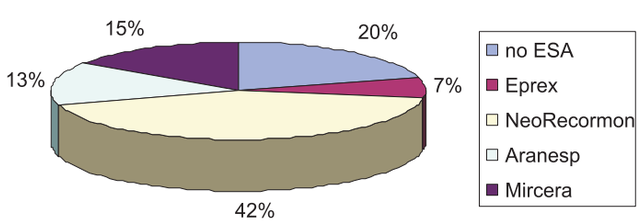
Hemodialysis patients (n = 1343): 90.2% (1212 / 1343) have received ESA, almost all of them intravenously, while 9.8% (n = 131) of patients did not receive epoetin. 23.8% (n = 319) have received NeoRecormon, 30.5% (N = 410) Eprex, 24.2% (n = 325) Aranesp, and 11.8% (n = 158) Mircera.

Fig 27. *ESA therapy (last week in December 2008) in prevalent hemodialysis patients (N = 1343).*



Peritoneal dialysis patients (n = 105): 80.0% (84 / 105) have received ESA subcutaneously.

Fig 28. *ESA therapy (last week in December 2008) in prevalent peritonal dialysis patients (N = 105).*



Transplant patients (n = 519): 16.4% (85 / 519) have received ESA subcutaneously.

Fig 29. *ESA therapy (last week in December 2008) in patients with functioning kidney grafts (N = 519).*

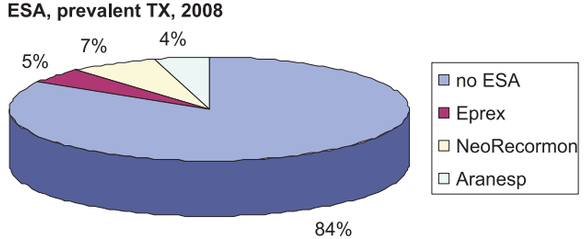
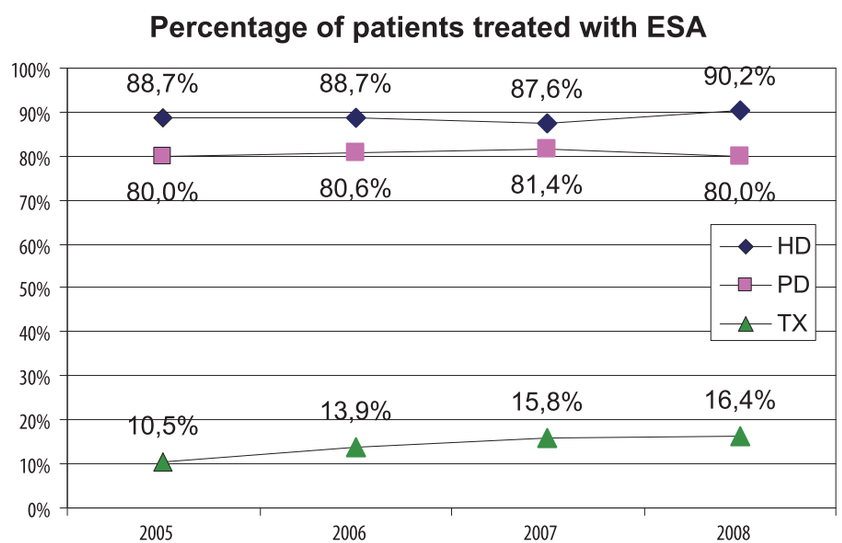


Fig. 30. *Percentage of prevalent RRT patients treated with erythropoiesis stimulating-agents (ESA) from 2000-2008.*



Apheresis procedures at the Department of Nephrology, University Medical Center Ljubljana

Apheresis procedures (membrane plasma exchange, LDL apheresis with dextrane-sulphate columns - Kaneka and protein A immunoadsorption) are performed at the Dialysis Center Zaloška, Department of Nephrology, University Medical Center Ljubljana.

Table 7. *Number of apheresis (membrane plasma exchange, LDL apheresis and protein A immunoadsorption) procedures performed in the period from 1997-2009*

	All apheresis procedures	Membrane plasma exchange	LDL apheresis	Immunoadsorption (protein A)
1997	183	113	27	43
1998	251	136	17	98
1999	296	180	64	52
2000	452	293	65	94
2001	443	231	61	151
2002	480	235	54	191
2003	572	242	80	250 (24 new*)
2004	569	246	78	245 (22 new)
2005	673	410	34	229 (21 new)
2006	609	416	19	174 (17 new)
2007	674	426	18	230 (18 new)
2008	**526**	**338**	**24**	**164 (8 new)**
2009	683	513	33	137 (7 new)

**new refers to the first use of Fresenius (Excorim) protein A Immunosorba columns.*

International comparison

Table 8. *Some data from other countries selected from the ERA-EDTA registry, Annual Report 2007*

Country	General population in thousands*	Incidence at day 1 (N)	Incidence pmp, unadj.	Incident diabetics pmp	Prevalence (N)	Prevalence pmp, unadj.
Austria	8.281	1.261	152	48	7.738	934
Bosnia and Herzegovina	3.508	575	164	33	2.306	657
Denmark	5.461	770	141	32	4.511	826
Finland	5.289	485	92	32	3.943	746
Greece	11.193	2.126	190	53	11.298	1.009
Italy	59.619	5.263	145	29	29.747	817
Macedonia	2.022	186	92	21	1.350	668
Montenegro	625	20	32	18	199	318
Norway	4.709	530	112	15	3.692	784
Poland	38.115	4.615	128	32	23.540	650
Romania	21.547	1.933	90	11	7.917	368
Russia	142.221	4.184	31	5	19.689	146
Slovenia	**2.026**	**238**	**118**	**32**	**1.897**	**937**
Spain	45.201	4.577	126	30	34.025	939
Sweden	9.148	1.180	129	35	7.969	871
Netherlands	16.382	1.925	118	21	13.163	804
UK	60.976	6.746	111	23	46.153	757
Turkey	70.586	16.154	231	64	50.221	719

- *general population covered by the registry*

Table 9. *Some data from other countries selected from the ERA-EDTA registry, Annual Report 2008.*

Country	General population in thousands*	Incidence at day 1 (N)	Incidence pmp, unadj.	Incident diabetics pmp	Prevalence (N)	Prevalence pmp, unadj.
Austria	8.332	1.224	147	47	7.920	951
Bosnia and Herzegovina	3.508	572	163	33	2.442	696
Croatia	4.437	679	153	45	4009	904
Denmark	5.494	694	126	29	4.683	852
Finland	5.313	504	95	32	4.081	768
Greece	11.237	2.239	199	58	11.607	1.033
Italy	60.045	6.676	151	31	37.144	839
Macedonia	2.022	241	119	30	1427	706
Montenegro	627	19	30	11	208	332
Norway	4.768	533	112	20	3.890	816
Poland	38.135	4.972	137	31	25.013	690
Romania	21.514	2.073	96	12	9.067	422
Russia	141.904	4.993	37	6	22.234	165
Slovenia	**2.032**	**235**	**116**	**24**	**1.967**	**968**
Spain	46.158	5673	128	29	44.067	994
Sweden	9.220	1.126	122	29	8.044	873
Netherlands	16.446	1.988	121	22	13.895	845
UK	61.383	6.596	108	22	48.242	786
Turkey	71.517	18.672	264	80	53.589	761

- *general population covered by the registry*

Summary – Renal Replacement Therapy in Slovenia in 2008

- Population of Slovenia at the end of 2008 was 2,032,362;
- 21 renal centers (20 dialysis, 1 transplant center);
- Prevalence rate (2008) 968 pmp, 3.7% increase compared to 2007, incidence rate 116 pmp;
- Median age of incident patients 67 years, 61% men, diabetics 27.7%;
- RRT modality of prevalent patients: 68.3% hemodialysis, 26.4% functioning kidney graft, 5.3% peritoneal dialysis;
- Crude death rate (incident day one included): hemodialysis 12.4%, peritoneal dialysis 9.1%, kidney transplantation 1.4%, all (dialysis+transplantation) 9.4%;
- 77% of prevalent HD patients are treated in public, in-hospital centers (23% in private);
- 48% of prevalent HD patients are treated by on-line HDF (the rest of them BHD), ultrapure dialysis fluid is used in 74.8% of HD patients;
- Nocturnal (8-hour) in-hospital hemodialysis program available;
- Vascular access of prevalent hemodialysis patients – 82% native AV fistula, 6% PTFE graft and 12% catheter;
- Longest RRT survival – 37.5 years – hemodialysis only, still alive on July 2010.

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12. Couchoud C, Kooman J, Finne P, Leivestad T, Stojčeva-Taneva O, Buturović-Ponikvar J, Collart F, Kramar R, de Francisco A, Jager KJ, on behalf of the QUEST working group on dialysis adequacy. From registry data collection to international comparisons: examples of haemodialysis duration and frequency. Nephrol Dial Transplant 2009; 24: 217-224.
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Date:

RENAL REPLACEMENT THERAPY QUESTIONNAIRE FOR 2008 – DIALYSIS AND KIDNEY TRANSPLANTATION – INDIVIDUAL PATIENT

Renal center:

Questionnaire is provided for:

- All patients treated with renal replacement therapy in your renal center for **end-stage renal failure on December 31, 2008**
- All patients treated with renal replacement therapy who died during 2008 in your renal center (even if they were dialyzed for ESRD only once):

Name: Sex: Date of birth:

Type of RRT on December 31, 2008: HD CAPD Automated PD Tx

Primary renal disease: EDTA code:

Date and type of first RRT in life ever: HD PD Tx **Date:** _____

Comorbity at the end of 2008 :

a) Diabetes mellitus Type 1 2
b) Ischemic heart disease
c) Peripheral art. occlusive dis.
d) Cerebrovascular dis.
e) Malignant dis. _____

Comorbidity at the start of RRT:

a) Diabetes Type 1 2
b) Ischemic heart disease
c) Periph. art. occlusive dis.
d) Cerebrovascular dis.
e) Malignant dis. _____

Dates of changes in RRT, chronologically (e.g. HD from……., 1. Tx date ……. Donor cadaveric or living related, restarted HD from ……, .2. Tx date ……. Donor cadaveric or living related, PD from ……, Not requiring dialysis from ……..),

_____

_____

_____

_____

_____

Transfer of the patient from another renal center in 2008 (vacation dialysis not counting):

The patient came from: Date:

Positive for transimissive diseases (mark): hepatitis B hepatitis C MRSA other: _____

Patient on RRT who died in 2008 in your renal center:

Date of death: Cause of death: EDTA code:

Epoetin dose (per week) in the last week of December 2008: Dose: _____ No. of applications/week: _____

EPO (mark): Eprex NeoRecormon Aranesp Route of application: i.v. s.c.

Is the **dialysis patient** treated in your renal center on 31 December 2008 included in the **waiting list for cadaveric kidney transplantation**?

❒ yes ❒ no

If not, please explain why:

a) medical contraindications

b) refusal

c) diagnostic workup (preparing for inclusion)

d) age

e) other

Remarks:

Signature:

ADDITIONAL QUESTIONNAIRE FOR HEMODIALYSIS PATIENTS TREATED AT YOUR DIALYSIS CENTER (FOR ESRD) ON DECEMBER 31, 2008

Name:

If »positive« for transmissible disease, mark the isolation policy:

A) isolated room
B) isolated HD monitor
C) last in the dialysis shift
D) not isolated

Type of hemodialysis procedure in the last week of December 2008:

BHD
Online HDF
Online HF
AFBF

Ultrapure dialysis fluid: ❒ yes ❒ no

Number of HD procedures per week in the last week of December 2008:

Number of hours of HD per week in the last week of December 2008 (e.g. 12; 13,5; 15….):

If HF/HDF, the amount of fluid exchanged per procedure:

If HF/HDF (mark) predilutional postdilutional combination

Dialyzer in the last week of December 2008:

Dry body weight in the last week of December 2008:

Blood flow in the last week of December 2008 (ml/min) :

Single-needle procedure: ❒ yes ❒ no

Anticoagulation (last week of December 2008): Unfractioned heparin: Dose per HD:

Low molecular weight heparin (original name): dose per HD:

Vascular access on December 31, 2008:

AV FISTULA (mark)

Type	native	Gore-tex		
Position of anastomosis	forearm	elbow	arm	thigh
Side	right	left		

CATHETER

jugular	subclavian	femoral	
right	left		
temporary (noncuffed)		silastic	
single-lumen		double-lumen	

Remarks:

Signature:

NEPHROQUEST QUESTIONNAIRE

ADDITIONAL QUESTIONNAIRE – HEMODIALYSIS PATIENTS, DIALYSED FOR END STAGE KIDNEY DISEASE IN YOUR CENTER ON DECEMBER 31, 2008 - NEPHROQUEST

(Data refers the end of 2008, or the closest date to the end of 2008):

Patient's code: Dialysis centre:

Height:

Major amputation (below or above knee): yes no

Smoking (underline): smoker / past smoker / nonsmoker

Blood pressure before HD (the last HD in the year):

Blood pressure after HD (the last HD in the year):

Ultrafiltration during completed HD procedure (the last HD in the year):

LAB VALUES (the last value in regular monthly blood lab values in 2008) :

Dialysis shift (underline): morning afternoon evening overnight (nocturnal)

Urea before : Urea after HD:

Creatinine: K: CO2/bicarbonate:

Ca (underline) total/corrected/ionized: P:

Le Hb: Tr ferritin: albumin: CRP:

Total cholesterol: HDL: LDL: TG:

iPTH

Remarks:

Date:

RENAL REPLACEMENT THERAPY QUESTIONNAIRE FOR 2008 – DIALYSIS CENTER

Renal center:

Number of RRT patients on December 31, 2008

All: HD: PD:

Number of hemodialysis stations on December 31, 2008:

Number of »positive« dialysis patients on December 31, 2008:

Hepatitis B Hepatitis C HBV+HCV HIV:

MRSA: Other:

The isolation policy of »positive« patients (mark):

HBV pos. A) Dedicated rooms B) Dedicated monitors C) Last in shift D) No isolation

HCV pos. A) Dedicated rooms B) Dedicated monitors C) Last in shift D) No isolation

MRSA pos. A) Dedicated rooms B) Dedicated monitors C) Last in shift D) No isolation

Remarks:

Number of employed physicians in renal center:

Number of employed graduate renal nurses:

Number of employed medical technicians:

Number of employed administrative personnel:

Number of employed technicians for hemodialysis monitor maintenance:

Additional personnel employed in renal center:

Remarks:

Number of HD procedures performed in 2008 (data for state insurance):

All: **Type I:** **Type III:**

Number of acute HD procedures performed in 2008 (data for state insurance):

Acute renal failure treated with dialysis – number of patients in 2008:

Of these, the number of patients treated:
a) only with intermittent HD: _____ patients
b) only with CRRT: _____ patients
c) with combined HD and CRRT: _____ patients

Number of dialysis patients treated with epoetins on December 31, 2008:

All: HD: PD:

Number of predialysis patients treated with epoetin on December 31, 2008 (approximations according to available data, assuming that predominantly nephrologists from dialysis centers prescribe epoetins to predialysis patients): _____

New patients starting chronic dialysis in 2008:

All: HD: PD:

Number of dialysis patients who died in 2008 (even if they were dialyzed for ESRD only once):

All: HD: PD:

Number of dialysis patients included in waiting list for cadaveric renal transplantation on December 31, 2008:

All: HD: PD:

Number of hemodialysis monitors on December 31, 2008:

Types of hemodialysis monitors on December 31, 2008:

Fresenius: _____ **Gambro:** _____ **Integra:** _____ **Prisma:** _____ **Other:** _____

Remarks:

Signature: *E-mail:*

NephroQuest questionnaire:

Blood samples for monthly lab values are takev before
a) midweek dialysis
b) the first dialysis in the week

CRP level
a) non high-sensitive method
b) high-sensitive method

Date: _____

RENAL REPLACEMENT THERAPY QUESTIONNAIRE FOR 2008 – CENTER FOR KIDNEY TRANSPLANTATION

Number of kidney transplantations performed in 2008: _____

Out of these: 1. Tx_____ 2. Tx_____

Cadaveric: _____ Living related: _____

Of all transplantations performed in 2008, the number of functioning kidney grafts on December 31, 2008 was: _____

Of all transplantations in 2008, there were _____ diabetics.

Number of kidney transplantations according to age of patients:

< 15 years _____

< 18 years _____

> 60 years _____

Total number of kidney transplantations from 1970 to December 31, 2008:

All: _____ LRD: _____ Cadaveric: _____

Number of patients with functioning kidney graft on December 31, 2008: _____

Number of patients who died in 2008 with a functioning kidney graft: _____

Number of patients with failed kidney graft who started chronic dialysis in 2008: _____

Number of Tx patients receiving epoetin on December 31, 2008: _____

Number of dialysis patients on the waiting list for cadaveric kidney transplantation on December 31, 2008: _____

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Chief, Center for Kidney Transplantation

Slovensko zdravniško društvo
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