

Science Life

# CHRONIC HAEMODIALYSIS IN LATVIA TODAY AND 40 YEARS AGO

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## INTRODUCTION

The number of patients with end-stage chronic kidney disease (CKD) has dramatically increased, particularly in recent years. Chronic haemodialysis, kidney transplant, and peritoneal dialysis are major treatment methods (Čerņevskis, 2008). Special attention has been paid to early stages of CKD, and some studies have shown that their number has already reached up to 10% of the population (Lewey *et al.*, 2011). According to Centres for Disease Control and Prevention, there are 16.8% of people at age above 20 in whom chronic kidney disease was proven between 1999 and 2004. Chronic kidney disease results in renal function exhaustion when further life of those patients is impossible without renal replacement therapy (RRT) (Čerņevskis, 2008).

The first haemodialysis in Latvia was applied in the case of acute renal failure patient, it was conducted in 1964, in Lithuania in 1963 and in Estonia in 1967. Wider introduction of haemodialysis started in Latvia with the foundation of the Kidney Transplantation Centre in 1973 and the start of operation of the first chronic haemodialysis unit (Ярмолинский и др., 1975). The first kidney transplant surgeries in the Baltic States were made in 1968 in Estonia and 1970 in Lithuania (Kuzminskis *et al.*, 2011). Then chronic haemodialysis was a preparatory stage for a following kidney transplant surgery, and patients having no contraindications to kidney transplant were subject to hospitalisation.

The aim of this paper was to compare modern chronic haemodialysis with the technologies that existed 40 years ago.

## DATA SOURCES

The paper is based on data found in the archives of Latvian Kidney Transplantation Centre. Contemporary data was provided by the Renal Patient Registry, Latvian Association of Nephrology. Data concerning patients was collected from Latvian RRT centres, where electronic record forms on patient incidence, prevalence and lethality at various national RRT centres are summarised every year.

The Registry includes data on incident RRT patient age, gender, type of therapy (haemodialysis, peritoneal dialysis, and kidney transplant), and underlying diagnosis, which is obtained from Latvian RRT centres. Similar data are also collected regarding prevalent patients at every RRT centre as of December 31, annually. The data are summarised and published in the Registry website of the European Renal Association — European Dialysis and Transplant Association (ERA-EDTA) and a separate Registry Report every year (Anonymous, 2012).

Data for the last 2–4 years (2008, 2009, 2010, and 2011) were compared with those from 1973, the time when the first steps were made in practical application of RRT. Some data analyses do not include data for 2011, since data for that year from two RRT centres were incomplete.

Calculations usually were done based on the number of patients per million people. The size of the Latvian population by years of the interest are presented in the Table 1.

Table 1

LATVIAN POPULATION SIZE BY YEARS<sup>1</sup>

Year	Population size (millions)
1973	2.352
2002	2.345
2008	2.261
2009	2.225
2010	2.222
2011	2.221

<sup>1</sup>Data of the Central Statistical Bureau, 2012

## DISEASE INCIDENCE

Data presented in Table 2 show that the number of patients has substantially increased since 1973, from 14.88 patients per million to 121.0 in 2010. In comparison with other countries, the relative numbers are 54.5 in Estonia (Anonymous, 2010), 107 in Australia, 83 in Finland, 106 in Scotland, 109 in Rumania, 257 in Turkey, 287 in Japan, 347 in

Table 2

NUMBER OF PATIENTS BY YEARS WHO COMMENCED RENAL REPLACEMENT THERAPY (INCIDENCE) IN LATVIA

Year	Number of patients	
	absolute number	per million people
1973	35	14.88
2002	137	59.6
2008	214	94.6
2009	200	89.9
2010	269	121
2011	243	109.4

Taiwan, and 371 in the United States in 2009, recalculated per million people (Anonymous, 2011).

Table 3 indicates that differences in patient number by gender only occurred in two years (1973 and 2009) when men constituted up to 60% of the total number. Age structure of incident patients greatly differed by years (Table 4). In 1973, no patient was older than 45, but relatively more had younger age. For example, six patients had age up to 19 years old (26.66% of the total number of patients in that year). Such a large proportion of young patients in that age group was not observed in subsequent years. Between 2008 and 2010, the largest proportion (33%) of patients was in the age group between 45 and 64, while the proportions of younger patients was between 0.48% (2008) and 2.23% (2010). The number of elder patients increased greatly from 17 to 24%. There was no significant tendency in the age group between 20 and 44 per years (13 to 19%).

## PATIENT DIAGNOSIS

**Diabetic nephropathy.** Diabetic nephropathy is the most frequent disease causing end-stage CKD. According to the US Renal Data System (Anonymous, 2011), diabetic nephropathy occurs in approximately 44% of all renal pathologies resulting in end-stage CKD, and hypertensive nephropathy occurs in 28% of all cases.

What is situation in Latvia? In 1973, there was no patient commencing RRT who had diabetes mellitus (Table 5). In Latvia, as in other countries, the number of diabetes mellitus patients increased in the new millennium, while a decrease of diabetes patients started from 2002 (from 21.2% in 2002 to 14.1% in 2010).

**Chronic glomerulonephritis.** Chronic glomerulonephritis is still one of the most frequent diagnoses in Latvia (Table 5). Chronic glomerulonephritis occurred in 62.8% of patients who commenced RRT. The number of glomerulonephritis patients tended to decrease recently in Latvia, as worldwide. In 2002, 28.4% of patients had chronic glomerulonephritis, but in 2010 this proportion decreased by half to 13.4%.

In 1973, chronic pyelonephritis was a common diagnosis in end-stage CKD (22.8%), and its incidence later decreased afterwards. However, a growing tendency of this pathology

Table 3

DIVISION OF PATIENTS WHO COMMENCED RENAL REPLACEMENT THERAPY BY YEARS AND GENDER

Gender	Year									
	1973		2008		2009		2010		2011*	
	abs. n	%	abs. n	%	abs. n	%	abs. n	%		
Men	21	60	111	51.87	122	61	135	50.18		
Women	14	40	103	48.13	78	39	134	49.82		
Total	35	100	214	100	200	100	269	100		

\* There was no complete data as regards two renal replacement therapy centres in 2011, thus, no analysis was carried out.

Table 4

DIVISION OF INCIDENT PATIENTS INTO AGE GROUPS BY YEARS

Age	Year									
	1973		2008		2009		2010		2011 <sup>1</sup>	
	abs. n	%	abs. n	%	abs. n	%	abs. n	%	abs. n	%
	6	17.14	1	0.48	1	0.5	6	2.23		
20–44	25	69.44	42	19.64	32	16	36	13.38		
45–64	4	11.42	74	34.58	67	33.5	95	35.32		
65–74	0	0	60	28.01	51	25.5	69	25.65		
Above 75	0	0	37	17.29	49	24.5	63	23.42		
Total	35	100	214	100	200	100	269	100	243	

<sup>1</sup> There was no complete data for two renal replacement therapy centres in 2011

Table 5

COMPARISON OF THE MOST FREQUENT DIAGNOSES<sup>1</sup>

Diagnosis	1973	2002	2008	2009	2010
DN	0	21.2	16.4	14.5	14.1
CGN	62.8	28.4	18.7	13	13.4
CPN	22.8	4.3	11.2	13.5	15.2
ADPKD	2.85	8.6	10.9	8.7	7.8
HN	0	4.3	15.9	14.5	18.5
CRF	11.42	14.6	12.6	11	7.8

<sup>1</sup>Proportions of the total number of patients in years are given. Abbreviations: DN, diabetic nephropathy; CGN, chronic glomerulonephritis; CPN, chronic pyelonephritis; ADPKD, autosomal dominant polycystic kidney disease; HN, hypertensive nephropathy; CRF, unidentified etiology chronic renal failure.

has again been observed recently (11.2% – 13.5% – 15.2%, respectively from 2008–2010).

**Hypertensive nephropathy.** In the United States, hypertensive nephropathy is the second leading pathology in end-stage CKD. In Latvia there is also a increasing tendency of the number of patients with this diagnosis. In 1973, no patient had hypertensive nephropathy, but there has been an increase from 4.3% in 2003 to 15.9%, 14.5% and 18.5%, respectively, in subsequent years (Table 5).

**Autosomal dominant polycystic kidney.** Autosomal dominant polycystic kidney disease has remained stable (8–10%) over the years, as in other countries (Table 5).

**Unidentified etiology.** There is a comparatively high number of patients with unidentified aetiology of chronic kidney disease: 11.42% (1973), 14.6% (2002), and 7.8% (2010) (Table 5).

## RENAL REPLACEMENT THERAPY

Chronic haemodialysis is the most common RRT type in the world, and in Latvia. Origins of chronic haemodialysis date back to 1973 in Latvia. Application of peritoneal dialysis (PD) in end-stage CKD therapy was started in 1994 in Latvia. Peritoneal dialysis was commenced for 19 patients in 2002, for 33 patients in 2008, and for 38 patients in 2010. As data from the United States show, 6% of the total number who commenced RRT were PD patients, 92% were chronic haemodialysis patients, and 2% were kidney transplant patients. In Latvia, in some cases pre-emptive kidney transplantation is also made before application of other RRT methods.

The number of kidney transplant surgeries made in Latvia by years is provided in Figure 1. In 1973, 15 kidney transplant surgeries were conducted, but now the number exceeds 60 surgeries yearly. In 2011, in Latvia 28.36 surgeries per million people were made. Similar incidences are observed in Israel (28.6 surgeries) and New Zealand (28.0 surgeries), higher in Canada (63.1) and Norway (60.5), but lower in Russia (5.9 surgeries per million people). Patients are prepared for kidney transplant both by chronic haemodialysis and peritoneal dialysis. While the average waiting time for kidney transplant is about 2.3 years in the United States, it does not exceed one year in Latvia.

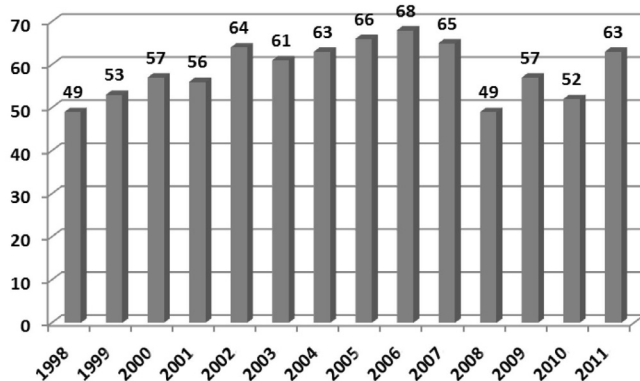


Fig. 1. Number of kidney transplant surgeries in Latvia by years.

Table 6

TOTAL NUMBER OF PATIENTS CALCULATED PER MILLION PEOPLE AS OF DECEMBER 31 (PREVALENCE) BY YEARS

RRT type	2008	2009	2010	2011
Haemodialysis	155,7	160,9	186,2	*
Peritoneal dialysis	49,5	47,2	49,5	*
Kidney transplant	198,1	207,6	206,5	217,1
Total	403,4	405,7	442,2	459,3

RRT, renal replacement therapy; \* There was no complete data for two RRT centres in 2011

A total number of prevalent patients under treatment on December 31 of each year is shown in Table 6. In the USA, 1,811 patients are treated per million people, 2,447 in Taiwan and 1,100 in Belgium. The total number of patients in Latvia has tended to increase yearly and in 2011 has reached 1,020, or 259.3 patients per million people. Similar incidences occur in Rumania (502), Iceland (540), and Brazil (481).

The numbers of patients treated by all RRT methods have tended to increase. 49.5 patients per million people were treated by peritoneal dialysis (7.9% of the total number of patients. According to US data, about 5% of patients are subject to peritoneal dialysis, 30% to kidney transplant, and 65% to chronic haemodialysis as the basic method. In Latvia, approximately equal numbers of patients undergo chronic haemodialysis and kidney transplant. 457 patients are treated by chronic haemodialysis and 482 patients have functioning kidney transplant (205.7 and 217.1 patients per million people, respectively). Data by years are provided in Table 6.

The main diagnoses in a group of prevalent patients are given in Figure 2. Obviously, the leading diagnosis is chronic glomerulonephritis (38%) followed by other kidney diseases, which are not specified in more detail (12%), autosomal dominant polycystic kidney disease (11%), diabetic nephropathy and tubule-interstitial kidney damage (10% each), and hypertensive nephropathy (9%).

Comparison of groups of incident and prevalent patients (Figs. 2 and 3) shows that the number of chronic glomerulonephritis patients has increased among prevalent patients, while the number of unidentified etiology chronic renal failure patients has decreased. Other groups of diagnoses do not differ much.

What has contributed to the great increase in number of chronic glomerulonephritis patients? An answer lies in division of diagnoses among kidney transplant patients (Fig. 4): 45% of all patients were chronic glomerulonephritis patients in 2010.

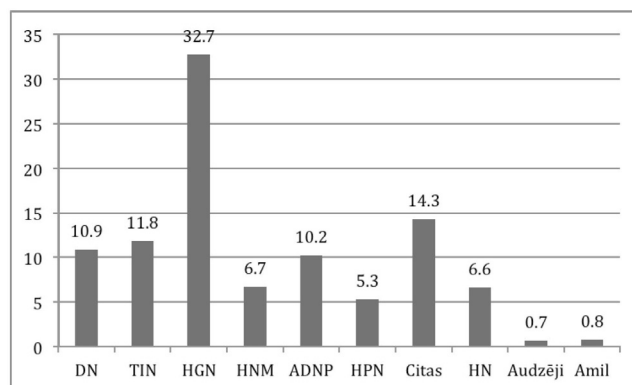


Fig. 2. Basic diagnoses in prevalent patients in 2010. Abbreviations: DN – diabetic nephropathy; TIN – tubulo-interstitial nephritis, CGN – chronic glomerulonephritis; CRF – unidentified etiology chronic renal failure; ADPKD – autosomal dominant polycystic kidney disease; CPN – chronic pyelonephritis, other – other diseases; HN – hypertensive nephropathy; Amil – renal amyloidosis; RVD – renal vascular diseases.

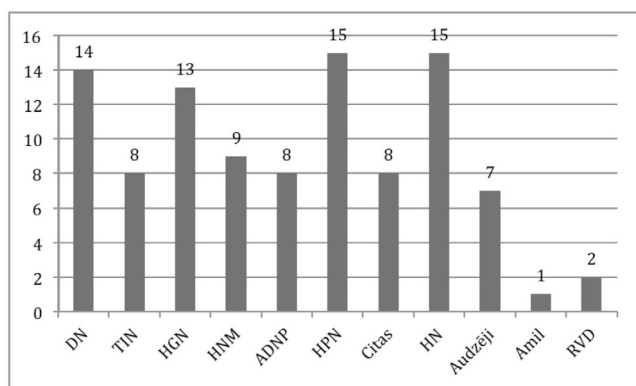


Fig. 3. Basic diagnoses in patients who commenced RRT in 2010. For abbreviations see Fig. 2.

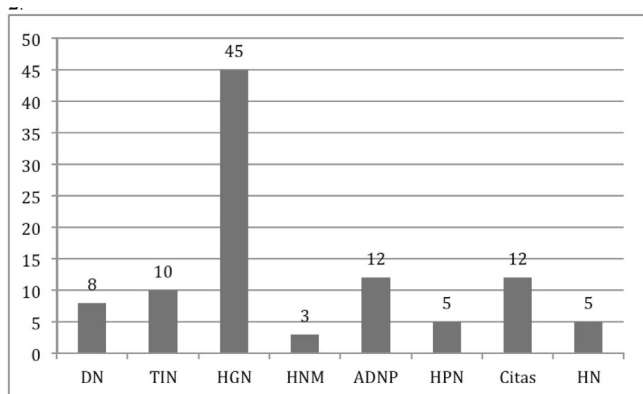


Fig. 4. Basic diagnoses in kidney transplant patients in 2010. For abbreviations see Fig. 2.

Among diabetic nephropathy patients, 8% are in the group of kidney transplant patients. Diabetes patients are more common among haemodialysis and peritoneal dialysis patients (10%). In 2011, there was a decrease of the number of chronic glomerulonephritis patients in the group of kidney transplant patients and increasing in the group of autosomal dominant polycystic kidney disease patients.

By gender, in 2010 (Table 7) slightly more patients were men (510 or 51.93%) than women. Within age groups also there is no clear difference in number of patients by gender: slightly more men were in the age group, (15.6%), compared to 11.1% for women. More women were in the age group of senior patients above 65 years (16.1%) than were men (14.9%).

Figure 5 shows contemporary RRT centres in Latvia; among these peritoneal dialysis is carried out at Latvian Nephrology Centre in Pauls Stradiņš Clinical University



Fig. 5. Renal replacement therapy centres in Latvia in 2011.

Abbreviations: HD, haemodialysis; PD, peritoneal dialysis; TR, kidney transplant; LNC, peritoneal dialysis of Latvian Nephrology Centre; HD Stradiņi, Chronic Haemodialysis Unit of Pauls Stradiņš Clinical University Hospital; Šmerlis, Medical Company “Gaiļezers” (subsid.); BKUS, Children’s Clinical University Hospital; RAKUS, Chronic Haemodialysis Unit of Rīga Eastern Clinical University Hospital; Centrs, MC „Gaiļezers” branch located in the building of the Ministry of Transport in the centre of Rīga; LTC, Latvian Transplantology Centre; Purvciems, SIA Dializes Centrs; MS Gaiļezers, Medical Company „Gaiļezers”.

Hospital, Children’s Clinical University Hospital, Rīga Eastern Clinical University Hospital, in Liepāja, Valmiera, Ventspils and centre „Med Alfa” in Rīga.

## CONCLUSION

RRT has greatly developed during the last 40 years in Latvia. The reason for the rapid progress include new technologies (haemodialysis equipment and units of new types) and RRT methods (vascular access, medication) leading to more extensive application of RRT methods and opportunities to prolong life of people with end-stage chronic kidney disease.

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Table 7

DIVISION OF PREVALENT PATIENTS INTO AGE GROUPS AND GENDER IN ABSOLUTE NUMBERS AND PROPORTIONS OF TOTAL NUMBER OF PATIENTS IN 2010

Gender	Age groups (age)										Total	
	0–19		20–44		45–64		65–74		75			
	abs. n	%	abs. n	%	abs. n	%	abs. n	%	abs. n	%	abs. n	%
Women	4	0.4	104	10.7	205	20.9	98	9.9	61	6.2	472	48.1
Men	14	1.4	139	14.2	209	21.4	89	8.9	59	6.0	510	51.9

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## HRONISKA HEMODIALĪZE LATVIJĀ ŠODIEN UN PIRMS 40 GADIEM

Pēdējo 40 gadu laikā hroniska hemodialīze Latvijā ir attīstījusies par vienu no vadošajām nieru aizstājterapijas (NAT) metodēm. 2010. gadā no kopējā pacientu skaita (442,2 pacienti uz 1 miljonu iedzīvotāju) ar hronisko hemodialīzi ārstēja 186,2 pacientus uz 1 miljonu iedzīvotāju. Rakstā analizēti NAT pacientu dati (dzimums, vecums, primārā nieru diagnoze, NAT veids), uzsākot NAT (incidence) un stāvoklis uz 2010. gada 31. decembri (prevalence).