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Burden of disease: prevalence and incidence of ESRD in Latin America

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Key words
chronic kidney disease – dialysis – kidney transplant – Latin America – end-stage renal disease

Abstract. Introduction: Chronic kidney disease (CKD) represents a major challenge for Latin America (LA), due to its epidemic proportions and high burden to the population affected and to public health systems. Methods: Our methods have been reported previously: This paper shows the data for the last 10 years until 2010, from the Latin American Dialysis and Renal Transplantation Registry (RLADTR). Results: 20 countries participated in the surveys, covering 99% of Latin America (LA). The prevalence of end-stage renal disease (ESRD) under renal replacement therapy (RRT) in LA increased from 119 patients per million population (pmp) in 1991 to 660 pmp in 2010 (hemodialysis (HD) 413 pmp, peritoneal dialysis (PD) 135 pmp, and LFG 111 pmp). HD proportionally increased more than PD and transplant and continues to be the treatment of choice in the region (75%). The kidney transplant rate increased from 3.7 pmp in 1987 to 6.9 pmp in 1991 and to 19.1 in 2010. The total number of transplants in 2010 was 10,397, with 58% being deceased donors. The total RRT prevalence correlated positively with gross national income (GNI) ($r = 0.86$; $p < 0.05$) and life expectancy at birth ($r = 0.58$; $p < 0.05$). The global incidence rate correlated significantly only with GNI ($r = 0.56$; $p < 0.05$). Diabetes remained the leading cause of ESRD. Conclusion: The prevalence and incidence of RRT continues to increase. In countries with 100% public health or insurance coverage for RRT the rates are comparable to those displayed by developed countries with better GNI. PD is still an underutilized strategy for RRT in the region. Diagnostic and prevention programs for hypertension and diabetes, appropriate policies promoting the expansion of PD and organ procurement as well as transplantation as cost effective forms of RRT are needed in the region.

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Introduction

Latin America (LA) is a region extending from Mexico and the Caribbean Islands in the North to Argentina and Chile in the South. It is going through a fast demographic and epidemiologic transition process, characterized by a reduction in mortality and birth rates, accompanied by rapid lifestyle changes. However, the fight against infections continues, especially emerging ones such as HIV and re-emerging diseases such as dengue and Chagas disease. Significant improvements have occurred in the last 10 years, an increasing gross national income (GNI), from 3,683 USD in the year 2001 to 7,821 USD in 2010; and an increased life expectancy at birth, from 71.6 (2000) to 74 (2010) [1, 2, 3]. This translates into an increase in chronic diseases. Due to its epidemic proportions, chronic kidney disease (CKD) represents a major challenge for the region. It imposes a high burden to the population affected and public health systems.

This paper shows the data over a 10-year period (2001 – 2010), from the Latin American Dialysis and Renal Transplantation Registry (LADTR).

Methods

Our methods have been reported previously [4, 5, 6, 7, 8, 9]: An annual survey was conducted to gather data on the incidence and prevalence of patients undergoing various modalities of renal replacement treatment (RRT): hemodialysis (HD), peritoneal dialysis (PD), and transplant patients with a

Table 1. Prevalence and Incidence of RRT in Latin America at year 2010.

Country	Population in millions	GNI	Life expectancy at birth	Prevalence rates pmp					Incidence Rate	Kidney Tx number	Kidney Tx rate
				HD	PD	Total dialysis	LFG	Total RRT			
Argentina	40,370,000	9,740	76	616.3	27.2	643.5	134.3	777.8	152.5	1,140	28.2
Bolivia	9,995,000	2,040	66	103.9	17.7	121.7	33.0	153.1	ND	82	8.2
Brazil	165,153,000	9,540	73	530.8	22.1	552.9	155.8	708.7	173.7	4,630	28.0
Chile	17,149,000	10,750	79	901.6	39.1	940.8	195.9	1,136.7	174.9	233	13.6
Colombia	46,448,000	5,520	73	306.5	139.5	446.1	87.0	533.1	141.9	886	19.1
Costa Rica	4,669,000	6,860	79	29.1	20.8	49.9	288.9	338.8	ND	123	26.3
Cuba	11,298,000	5,460	79	222.6	10.2	232.8	71.2	303.9	99.0	117	10.4
Ecuador	14,490,000	3,850	75	352.0	34.5	386.5	19.5	405.9	127.7	79	5.5
El Salvador	6,218,000	3,370	72	161.0	335.2	496.1	66.3	562.4	ND	28	4.5
Guatemala	14,334,000	2,740	71	76.9	17.6	94.5	28.8	123.3	10.7	45	3.1
Honduras	7,619,000	1,870	73	167.1	16.3	183.4	3.8	187.2	197.1	4	0.5
Mexico	112,364,000	8,930	77	381.9	485.0	866.9	108.0	974.9	458.0	2,290	20.4
Nicaragua	5,813,000	1,100	74	29.2	2.6	31.8	5.2	37.0	ND	11	1.9
Panama	3,474,000	7,010	76	340.0	96.7	436.7	80.6	517.3	ND	35	10.1
Paraguay	6,458,000	2,730	72	126.2	1.5	127.7	20.9	148.7	33.3	30	4.6
Peru	29,272,000	4,900	74	230,7	39,1	269,8	65,5	335,3	34,3	176	6,0
Puerto Rico	3,998,000	15,500	79	1,096.5	85.5	1,182.1	173.1	1,355.2	368.9	87	21.8
Dominican Republic	9,907,000	5,020	73	127.4	8.9	136.3	28.8	165.0	ND	45	4.5
Uruguay	3,373,000	10,290	76	671.5	73.8	745.3	285.8	1,031.1	161.0	93	27.6
Venezuela	3,1267,000	11,660	74	339.8	58.5	398.3	59.1	457.4	ND	263	8.4
Total no. of countries, LA	543,669,000	7,821	74	413.4	135.7	549.1	111.2	660.3	190.8	10,397	19.1

GNI = gross national income; HD = hemodialysis; LA = Latin America; LADTR = Latin American Dialysis and Transplant Registry; LFG = living with a kidney functioning graft; ND = not reported; PD = peritoneal dialysis; RRT = renal replacement treatment; Tx = transplant.

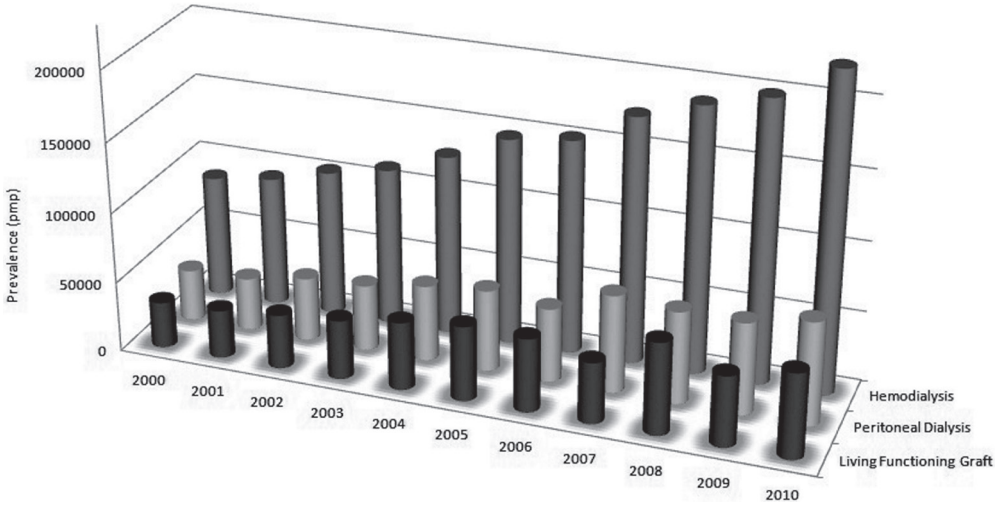

Figure 1. Evolution of number of RRT patients in Latin America by treatment modality (2000 – 2010).

functioning graft (LFG). Prevalence and incidence were compared with previous years. The type of RRT was analyzed, with special emphasis on peritoneal dialysis and transplantation. These variables were correlated with the gross national income and the life expectancy at birth. For the statistical analysis, the Pearson correlation coefficient (r) was applied and a $p < 0.05$ was considered significant.

Results

20 countries participated in the surveys, covering 99% of the LA countries. Table 1 describes the most prominent variables analyzed.

The prevalence of ESRD under RRT in LA increased from 119 patients per million population (pmp) in 1991 to 660 pmp in 2010 (HD 413 pmp, PD 135 pmp, and LFG 111 pmp). The highest rates were reported by Puerto Rico (1,355). Argentina, Mexico, Uruguay and Chile reported rates between 777 and 1,136 pmp respectively.

Although the increase of RRT patients has occurred in all modalities, HD proportionally increased more than PD and transplantation (Figure 1). The growth rate for these modalities compared to 2008 was 20%, 14% and 5% for HD, PD, and transplant respectively. HD continues to be the treatment of choice in the region (75%), and 39% of HD patients are located in Brazil. PD prevailed only in El Salvador and Mexico (67.6% and 55.9%, respectively); PD was also common in Colombia, although the percentage of Colombian PD patients has consistently decreased in the last 10 years from 54% in 2000 to 31.3% in 2010. Nicaragua had a decreased percentage of PD patients (8.1%), with a corresponding increase in the number of patients on hemodialysis between 2009 and 2010. In the remaining countries, between 1.2% and 41.6% of the patients were on PD; 73% of PD patients were located in Mexico.

The kidney transplantation rate increased from 3.7 pmp in 1987 to 6.9 pmp in 1991 and to 19.1 in 2010, although it showed remarkable variations in that year, from 28.2 pmp in Argentina to 0.5 pmp in Honduras. With a larger population, 4,630 kidney transplants were registered in Brazil. A total of 197 dual kidney-pancreas transplants were performed (Brazil 129, Argentina 58, Uruguay 4, Colombia 3, Cuba 1, Chile 1, and Peru 1). The total number of transplants in 2010 was 10,397, with 58% from deceased donors (the highest percentages were observed in Uruguay (96.8%), Cuba (94.9%), Colombia (92%) and Argentina (78.7%)).

The total RRT prevalence correlated positively with GNI ($r = 0.86$; $p < 0.05$) and life expectancy at birth ($r = 0.58$; $p < 0.05$). The HD prevalence and the kidney transplant rate correlated significantly with the same indices, while the PD rate showed no correlation with these variables. Data on incidence of RRT was gathered from 13 countries, comprising 87% of the LA population (Table 1). A wide rate variation in incidence was observed from 458 in Mexico to 10.7 pmp in Guatemala. A tendency to rate stabilization/little growth was reported in the most regional countries, except Ecuador with a significant growth rate incidence (38 in 2008 to 127 ppm in 2010). As in previous reports [7, 8, 9], the global incidence rate correlated significantly only with GNI ($r = 0.56$); $p < 0.05$).

Diabetes remained the leading cause of ESRD. The highest incidence was reported by Puerto Rico (66.8%), Mexico (61.8%) and Colombia (42.5%), and the lowest by Cuba (26.2%) and Uruguay (23.2%).

Discussion

This report shows that the prevalence of RRT continues to increase, particularly in countries with 100% public health or insurance coverage for RRT; where rates are comparable to those from developed countries.

The incidence also continues to increase in countries that have not yet extended their coverage to 100% of the population as well as in countries that have an adequate program for timely detection and treatment of CKD and its associated risk factors.

PD is still an underutilized modality for RRT in the region; this fact particularly contrasts with the continued expansion of hemodialysis. The causes are presumably multifactorial, the shortage of trained nephrologists and nurses on the one hand, and the lack of financial support and health policies on the other. This approach could be adequate to overcome particular geographical demands and to reduce the need for long distance travel to receive treatment in certain regions. It is likely that locally produced dialysis solutions could be cost-effective.

Even though renal transplantation is feasible, available, and an increasingly used modality for RRT in all LA countries, its growth rate is still not as fast as it should be in order to compensate for the increased prevalence of patients on waiting lists. This

fact further strengthens the need to consider transplantation programs and procurement of suitable organs.

Diabetes and hypertension are the leading causes of admission to dialysis; prevention programs for CKD should include early diagnosis and treatment of these conditions.

In most of the regional countries reporting is voluntary. Therefore, the LA registry has weaknesses such as a wide variability in data consistency. As an example, data from Mexico are extrapolated from other local registries (Morelos and Guadalajara) and the number of prevalent patients with functioning allograft is sometimes a simple estimate. Finally, this registry has several strengths, most importantly upkeeping of records by continuous and periodic updates since 1991 and its contribution to the development of National Registries allowing local, regional and international comparisons. This will also enable developing guidelines for the treatment of CKD in LA.

In conclusion, diagnostic and prevention programs for hypertension and diabetes; appropriate policies promoting the expansion of PD and organ procurement as well as transplantation as cost-effective forms of RRT are needed in the region. Regional cooperation among LA countries allowing that the more advanced countries guide and train others to start their registries and CKD programs may be one of the key initiatives to be carried-out.

Conflict of interest

The authors declare they have no conflict of interest.

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