

Renal replacement therapy in Latin American end-stage renal disease

Guillermo Rosa-Diez¹, Maria Gonzalez-Bedat^{1,2}, Roberto Pecoits-Filho¹, Sergio Marinovich³, Sdenka Fernandez⁴, Jocemir Lugon⁵, Hugo Poblete-Badal⁶, Susana Elgueta-Miranda⁶, Rafael Gomez⁷, Manuel Cerdas-Calderon⁸, Miguel Almaguer-Lopez⁹, Nelly Freire¹⁰, Ricardo Leiva-Merino¹¹, Gaspar Rodriguez¹², Jorge Luna-Guerra¹³, Tommaso Bochicchio¹⁴, Guillermo Garcia-Garcia¹⁴, Nuria Cano¹⁵, Norman Iron¹⁵, Cesar Cuero¹⁶, Dario Cuevas¹⁷, Carlos Tapia¹⁸, Jose Cangiano¹⁹, Sandra Rodriguez²⁰, Haydee Gonzalez²¹ and Valter Duro-Garcia²²

¹Sociedad Latinoamericana de Nefrología e Hipertensión, Executive Board of the Latin American Dialysis and Transplant Registry (LADTR), Buenos Aires, Argentina, ²Sociedad Uruguaya de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Uruguay, Montevideo, Uruguay, ³Sociedad Argentina de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Argentina, Santa Fe, Argentina, ⁴Sociedad Boliviana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Bolivia, La Paz, Bolivia, ⁵Sociedade Brasileira Nefrologia, Delegates to the LADTR from National Societies of Nephrology, Niterói, Brazil, ⁶Sociedad Chilena de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Chile, Santiago, Chile, ⁷Sociedad Colombiana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Colombia, Bogota, Colombia, ⁸Sociedad Costarricense de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Costa Rica, San Jose de Costa Rica, Costa Rica, ⁹Sociedad Cubana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Cuba, La Habana, Cuba, ¹⁰Sociedad Ecuatoriana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Ecuador, Quito, Ecuador, ¹¹Sociedad Salvadoreña de Nefrología, Delegates to the LADTR from National Societies of Nephrology from El Salvador, San Salvador, El Salvador, ¹²Sociedad Hondureña de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Honduras, Tegucigalpa, Honduras, ¹³Sociedad Guatemalteca de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Guatemala, Guatemala, Guatemala, ¹⁴Sociedad Mexicana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Mexico, Mexico, Mexico, ¹⁵Sociedad Nicaraguense de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Nicaragua, Managua, Nicaragua, ¹⁶Sociedad Panameña de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Panama, Panama, Panama, ¹⁷Sociedad Paraguaya de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Paraguay, Asuncion, Paraguay, ¹⁸Sociedad Peruana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Peru, Lima, Peru, ¹⁹Sociedad Portorriqueña de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Puerto Rico, San Juan, Puerto Rico, ²⁰Sociedad Dominicana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Republica Dominicana, Santo Domingo, Dominican Republic, ²¹Sociedad Venezolana de Nefrología, Delegates to the LADTR from National Societies of Nephrology from Venezuela, Caracas, Venezuela and ²²Sociedad Latinoamericana y Caribeña de Trasplante, Delegates to the LADTR from National Societies of Nephrology, Porto Allegre, Brazil

Correspondence and offprint requests to: Guillermo Rosa Diez; E-mail: guillermo.rosadiez@hospitalitaliano.org.ar, grosadiez@yahoo.com

Abstract

The Latin American Dialysis and Renal Transplant Registry (RLADTR) was founded in 1991; it collects data from 20 countries which are members of Sociedad Latinoamericana de Nefrología e Hipertensión. This paper presents the results corresponding to the year 2010. This study is an annual survey requesting data on incident and prevalent patients undergoing renal replacement treatment (RRT) in all modalities: hemodialysis (HD), peritoneal dialysis (PD) and living with a functioning graft (LFG), etc. Prevalence and incidence were compared with previous years. The type of renal replacement therapy was analyzed, with special emphasis on PD and transplant (Tx). These variables were correlated with the gross national income (GNI) and the life expectancy at birth. Twenty countries participated in the surveys, covering 99% of the Latin American. The prevalence of end stage renal disease (ESRD) under RRT in Latin America (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). HD proportionally increased more than PD, and Tx HD continues to be the treatment of choice in the region (75%). The kidney Tx rate increased from 3.7 pmp in 1987 to 6.9 pmp in 1991 and to 19.1 in 2010. The total number of Tx's in 2010 was 10 397, with 58% deceased donors. The total RRT prevalence correlated positively with GNI (r^2 0.86; $P < 0.05$) and life expectancy at birth (r^2 0.58; $P < 0.05$). The HD prevalence and the kidney Tx rate correlated significantly with the same indexes, whereas the PD rate showed no correlation with these variables. A tendency to rate stabilization/little growth was reported in the most regional countries. As in previous reports, the global incidence rate correlated significantly only with GNI (r^2 0.63; $P < 0.05$). Diabetes remained the leading cause of ESRD. The most frequent causes of death were cardiovascular (45%) and infections (22%). Neoplasms accounted for 10% of the causes of death. The prevalence of

RRT continues to increase, particularly in countries with 100% public health or insurance coverage for RRT, where it approaches rates comparable to those displayed by developed countries with a better GNI. The incidence also continues to increase in both countries that have not yet extended its coverage to 100% of the population as well as in those that have an adequate program for timely detection and treatment of chronic kidney disease (CKD) and its associated risk factors. PD is still an underutilized strategy for RRT in the region. Even though renal Tx is feasible, 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. 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 Latin American countries, allowing the more developed to guide and train others in starting registries and CKD programs, may be one of the key initiatives to address this deficit.

Keywords: peritoneal dialysis; hemodialysis; kidney transplantation; chronic renal failure; Latin America

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 characterized by the use of Roman-derived languages (Spanish and Portuguese) and a wide ethnic diversity. In this true melting pot, the original immigrants from Spain and Portugal are now admixed with European immigrants who escaped from the World Wars, Native Americans (now the majority in Bolivia and in very high numbers in Guatemala, Peru and Mexico) and the descendants of the slaves migrating from Africa (very high numbers in Brazil; fewer in Colombia and Uruguay). The racial admixture in Brazil is so big that genetic studies arrived at the conclusion that skin color cannot identify the race. Most of them are mulattos (pardos in the vernacular); in Uruguay, the mix with predominantly Spaniards is the rule. Usually, the father genes are Spanish or Portuguese [1, 2].

The region is going through a fast demographic and epidemiologic transition process, characterized by a reduction in mortality and birth rates, accompanied by rapid lifestyle changes. This is associated with the population's movements from rural areas to big cities, with an increase in chronic non-communicable diseases, including chronic kidney disease (CKD). However, the fight against infections continues, especially emerging, such as HIV, and re-emerging diseases such as dengue and Chagas disease. From the socioeconomic point of view, significant improvements have occurred in the last 10 years, such as an increasing gross national income (GNI), from 3683 USD in the year 2001 to 7821 USD in 2010, and an increased life expectancy at birth from 71.6 (2000) to 74 (2010) [3–5]. CKD represents a major challenge for the region, due to its epidemic proportions and high burden to the population affected and to public health systems. Epidemiological information to guide the planning of CKD care is scarce in the region.

The Latin American Dialysis and Renal Transplant Registry (RLADTR) was founded in 1991; it collects data from 20 countries, all members of the Sociedad Latinoamericana de Nefrología e Hipertensión. It has published several reports [6–11] and its continuity has implied a sustained effort of the entire Latin American nephrology community.

This paper presents the results corresponding to the year 2010.

Methods

Our methods have previously been reported [6–11]. The participant countries complete an annual survey requesting

data on incident and prevalent patients undergoing renal replacement treatment (RRT) in all modalities: hemodialysis (HD), peritoneal dialysis (PD), living with a functioning graft (LFG) and number of dialysis and transplant (Tx) centers, etc. Based on these data, prevalence and incidence rates are determined by December 31 and reported in patients per million population (pmp). Prevalence and incidence were compared with previous years. The type of renal replacement therapy was analyzed, with special emphasis on PD and Tx. These variables were correlated with the GNI and the life expectancy at birth. The causes of admission to dialysis and death were described.

For the statistical analysis, the Pearson (r) and determination (r^2) coefficients were applied and a P-value <0.05 was considered significant.

Results

Twenty countries participated in the surveys, covering 99% of the Latin American. Table 1 describes the most prominent variables analyzed.

The prevalence of end stage renal disease (ESRD) under RRT in LA increased from 119 patients pmp in 1991 to 660 pmp in 2010 (HD 413 pmp, PD 135 pmp and LFG 111 pmp; Figure 1). The highest rates were reported by Puerto Rico (1355); Argentina, Mexico, Uruguay and Chile reported rates between 777 and 1136.

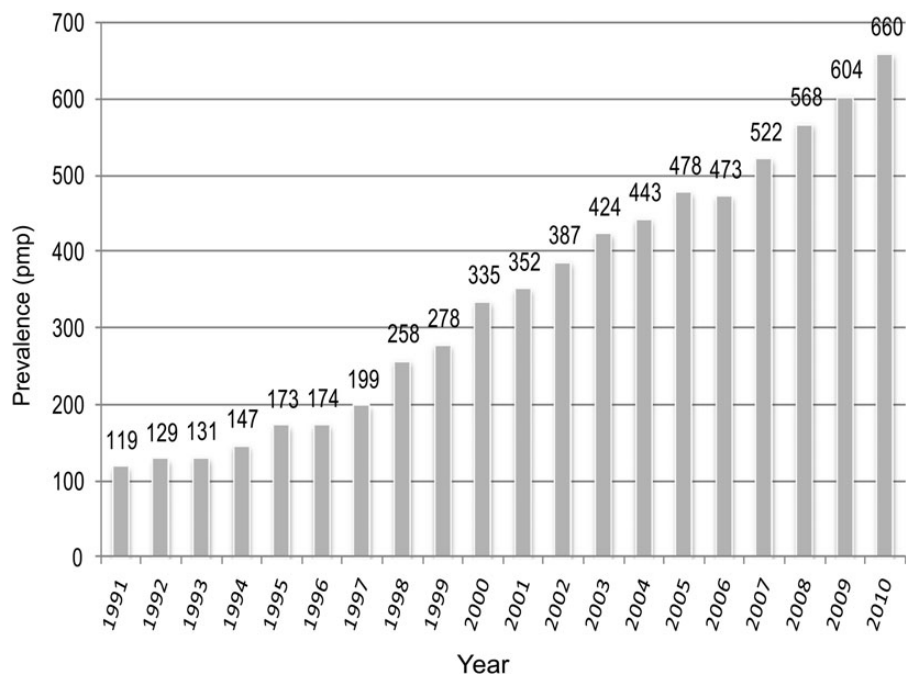
Although the increase of RRT patients has occurred in all modalities, HD proportionally increased more than PD and Tx (Figure 2). The growth rate for these modalities compared with 2008 was 20, 14 and 5% for HD, PD and Tx, respectively. HD continues to be the treatment of choice in the region (75%), 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 decreased the percentage of PD patients (8.1%), according to a significant increase in the number of patients on HD in the last 2 years. In the remaining countries, between 1.2 and 41.6% of the patients were on PD; 73% of the PD patients were located in Mexico.

The kidney Tx rate increased from 3.7 pmp in 1987 to 6.9 pmp in 1991 and to 19.1 in 2010 (Figure 3), although it showed remarkable variations in that year, from 28.2 pmp in Argentina to 0.5 pmp in Honduras. Owing to the higher population, numerically, a higher number was registered in Brazil, with 4630 kidney Tx's. A total of 197 double kidney-pancreas Tx's were performed (Brazil 129, Argentina 58,

Table 1. LADTR: population, socioeconomic indexes, prevalence and incidence rates by country

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	9740	76	616.3	27.2	643.5	134.3	777.8	152.5	1140	28.2
Bolivia	9 995 000	2040	66	103.9	17.7	121.7	33.0	153.1	ND	82	8.2
Brazil	165 153 000	9540	73	530.8	22.1	552.9	155.8	708.7	173.7	4630	28.0
Chile	17 149 000	10 750	79	901.6	39.1	940.8	195.9	1136.7	174.9	233	13.6
Colombia	46 448 000	5520	73	306.5	139.5	446.1	87.0	533.1	141.9	886	19.1
Costa Rica	4 669 000	6860	79	29.1	20.8	49.9	288.9	338.8	ND	123	26.3
Cuba	11 298 000	5460	79	222.6	10.2	232.8	71.2	303.9	99.0	117	10.4
Ecuador	14 490 000	3850	75	352.0	34.5	386.5	19.5	405.9	127.7	79	5.5
El Salvador	6 218 000	3370	72	161.0	335.2	496.1	66.3	562.4	ND	28	4.5
Guatemala	14 334 000	2740	71	76.9	17.6	94.5	28.8	123.3	10.7	45	3.1
Honduras	7 619 000	1870	73	167.1	16.3	183.4	3.8	187.2	197.1	4	0.5
Mexico	112 364 000	8930	77	381.9	485.0	866.9	108.0	974.9	458.0	2290	20.4
Nicaragua	5 813 000	1100	74	29.2	2.6	31.8	5.2	37.0	ND	11	1.9
Panama	3 474 000	7010	76	340.0	96.7	436.7	80.6	517.3	ND	35	10.1
Paraguay	6 458 000	2730	72	126.2	1.5	127.7	20.9	148.7	33.3	30	4.6
Peru	29 272 000	4900	74	230.7	39.1	269.8	65.5	335.3	34.3	176	6.0
Puerto Rico	3 998 000	15 500	79	1096.5	85.5	1182.1	173.1	1355.2	368.9	87	21.8
Dominican Republic	9 907 000	5020	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	1031.1	161.0	93	27.6
Venezuela	31 267 000	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	7821	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.

**Fig. 1.** Latin American Dialysis and Renal Transplantation Registry 1991–2010. RRT prevalence, all modalities.

Uruguay 4, Colombia 3, Cuba 1, Chile 1 and Peru 1). The total number of Tx's in 2010 was 10 397, with 58% deceased donors [the highest percentages were observed in Uruguay (96.8%), Cuba (94.9%), Colombia (92%) and Argentina (78.7%); [Figure 4](#)].

The total RRT prevalence correlated positively with GNI (r^2 0.86; $P < 0.05$) and life expectancy at birth (r^2 0.58; $P < 0.05$; [Figure 5](#)). The HD prevalence and the kidney Tx rate correlated significantly with the same indexes,

whereas the PD rate showed no correlation with these variables.

Data from incidence were sent by 13 countries comprising 87% of the Latin American population ([Table 1](#)). A wide rate variation in incidence is 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 pmp in 2010). As in previous

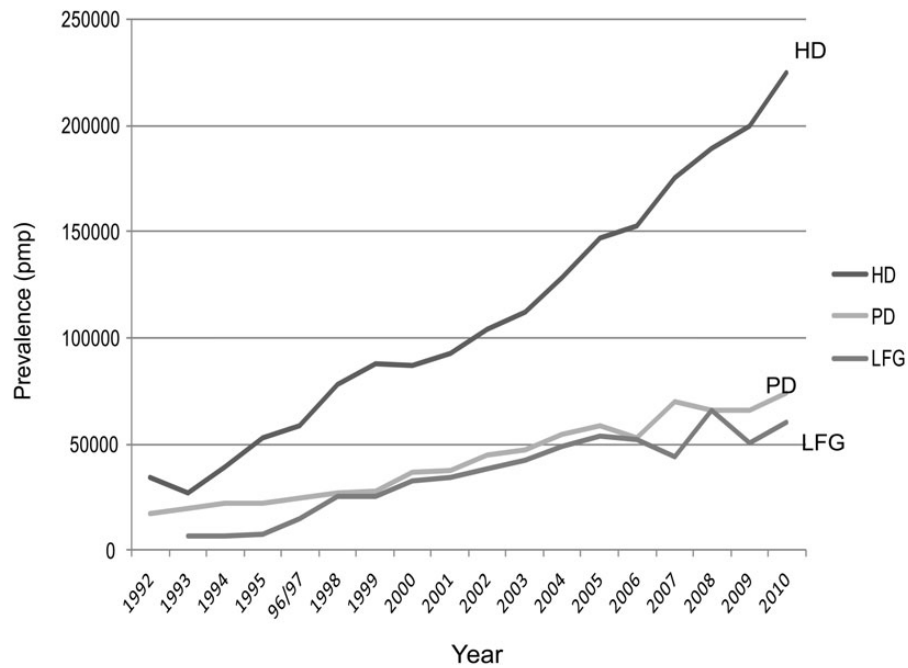


Fig. 2. Evolution of the number of RRT patients in LA by treatment modality (1991–010). HD, PD and functional kidney grafts (FKG).

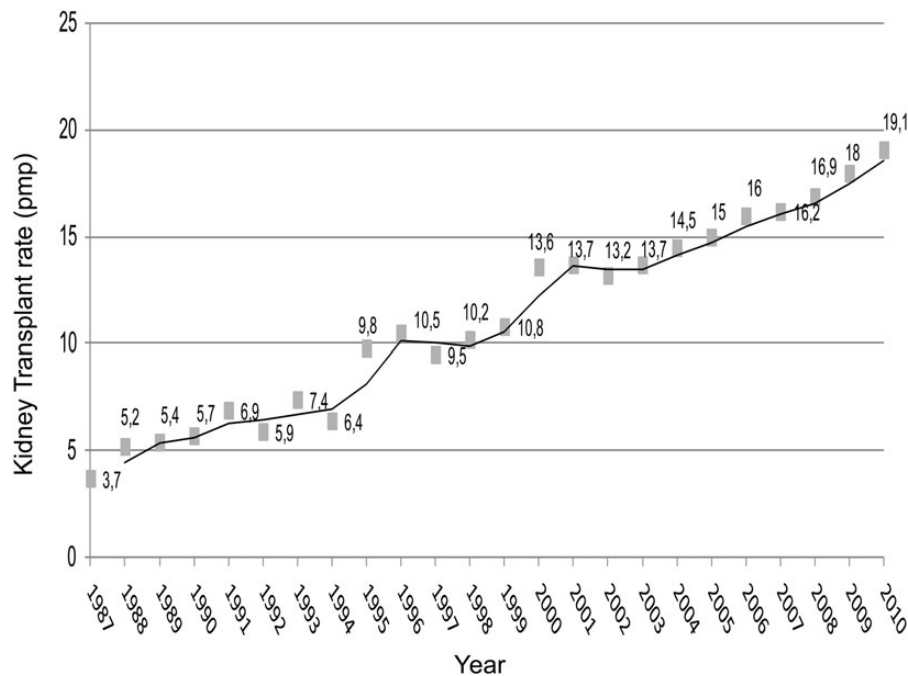


Fig. 3. Evolution of kidney transplant rate (pmp of inhabitants) in LA (1987–2010).

reports, the global incidence rate correlated significantly only with GNI (r^2 0.63; $P < 0.05$).

Diabetes remained the leading cause of ESRD, the highest incidence reported by Puerto Rico (66.8%), Mexico (61.8%) and Colombia (42.5%), and the lowest by Cuba (26.2%) and Uruguay (23.2%). The incidence of diabetes showed no correlation with GNI and life expectancy at birth.

The most frequent causes of death were cardiovascular (45%) and infections (22%). Neoplasms accounted for 10% of the causes of death.

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 it approaches rates comparable to those displayed by developed countries with a better GNI.

In these countries where the incidence shows a tendency to stabilize and/or to a slower growth ratio, the

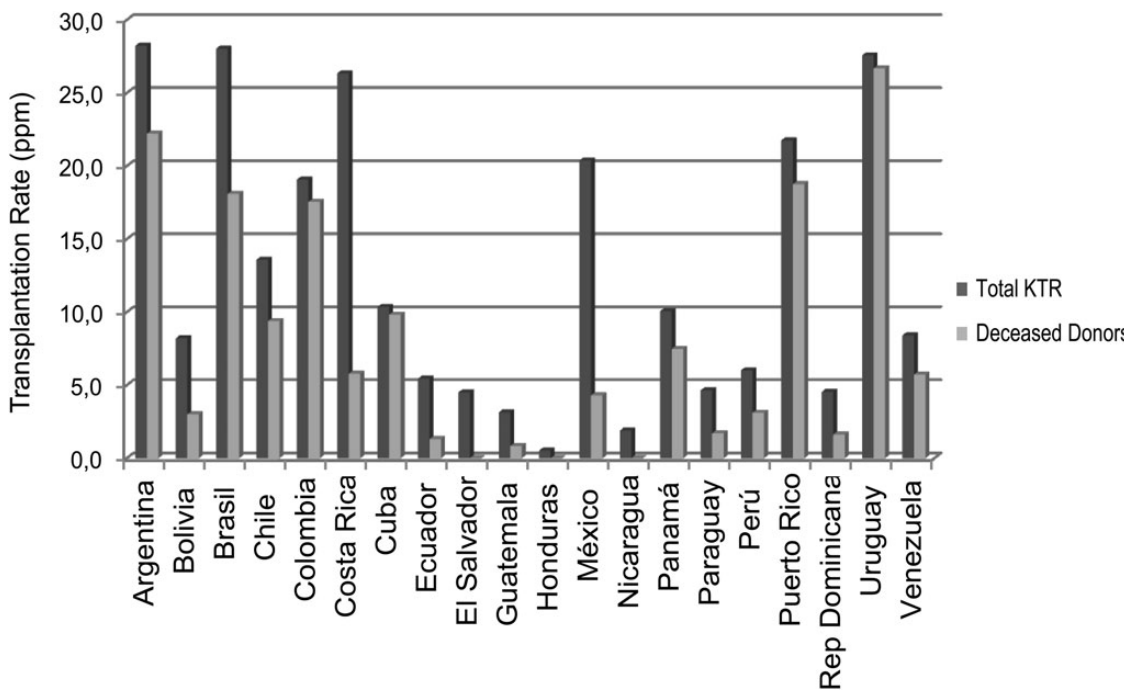


Fig. 4. Deceased donors and kidney transplant rate (pmp of habitants) by country (2010).

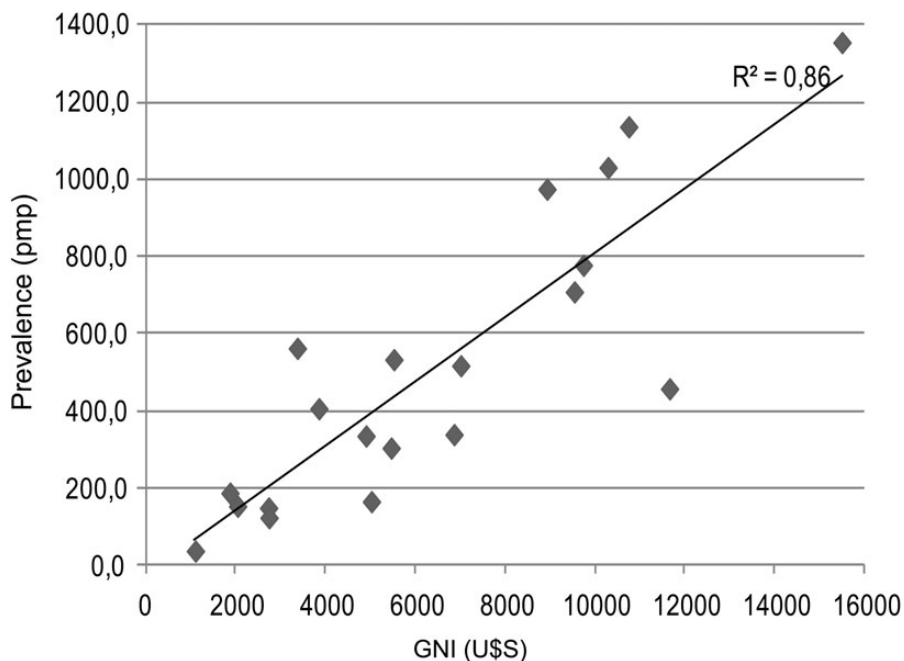


Fig. 5. GNI (USD) per capita and correlation with the prevalence of RRT patients (2010).

increase in prevalence is likely the result of improving life expectancy of the general population and survival of those individuals undergoing RRT.

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

PD is still an underutilized strategy for RRT in the region; this fact particularly contrasts with the continued expansion

of HD. 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 some specific regions. The chance that dialysis solutions can be produced in the area should be considered cost effective.

Even though renal Tx is feasible, available and an increasingly used modality for RRT in all Latin American

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 ratifies the necessity to consider Tx programs and procurement of suitable organs.

Diabetes and hypertension are the leading causes of admission to dialysis; prevention programs for chronic kidney disease should include early diagnosis and treatment of these conditions. Cardiovascular and infectious complications are still the major causes of death in patients undergoing renal replacement therapy.

In most of the regional countries, reporting is voluntary; therefore, the Latin American 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. Among them, its continuity (conducted since 1991), its contribution to the development of National Registries allowing comparisons among different countries and other records along with the generation of trends for the treatment of CKD in LA must be emphasized.

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 Latin American countries, allowing the more developed to guide and train others in starting registries and CKD programs may be one of the key initiatives to address this deficit.

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