

## Brazilian Chronic Dialysis Survey 2013 - Trend analysis between 2011 and 2013

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### ABSTRACT

**Introduction:** National chronic dialysis data have had impact in the treatment planning. **Objective:** To report data of the annual survey of the Brazilian Society of Nephrology about chronic kidney disease patients on dialysis in July 2013 and compare with 2011-12. **Methods:** A survey based on data of dialysis units from the whole country. The data collection was performed by using a questionnaire filled out on-line by the dialysis units. **Results:** Three hundred thirty four (51%) of the dialysis units in the country answered the questionnaire. In July 2013, the total estimated number of patients on dialysis was 100,397. The estimated prevalence and incidence rates of chronic maintenance dialysis were 449 (range: 284 in the North region and 622 in the South) and 170 patients per million population, respectively. The estimated number of new patients starting dialysis in 2013 was 34,161. The annual gross mortality rate was 17.9%. For prevalent patients, 31.4% were aged 65 years or older, 90.8% were on hemodialysis and 9.2% on peritoneal dialysis, 31,351 (31.2%) were on a waiting list of renal transplant, 30% were diabetics, 17% had PTH levels > 600 pg/ml and 23% hemoglobin < 10 g/dl. A venous catheter was the vascular access for 15.4% of the hemodialysis patients. **Conclusion:** The absolute number of patients on dialysis has increased 3% per year. The prevalence and incidence rates of patients on dialysis leveled off, while the mortality rate tended to decrease compared with 2012. There was a trend towards a better control of the anemia and PTH levels.

**Keywords:** epidemiology; renal dialysis; renal insufficiency, chronic; survival.

### INTRODUCTION

The national survey organized by the Brazilian Society of Nephrology (SBN) has been carried out for over 10 years to collect basic information from dialysis patients with chronic kidney disease treated in centers registered with the SBN. Patient information has been collected online for the past five years, in a change that significantly facilitated the implementation of survey procedures in Brazil, a country of continental size, with over 660 dialysis centers in 2013. The survey has been designed mainly to gather basic epidemiological and technical data to further the knowledge on patients and dialysis centers and provide input for conversations with the Government and health care providers on how to improve quality of care. This initiative has relied on the voluntary participation of a significant portion of dialysis centers in the country. In addition to characterizing patients on chronic dialysis on July 1, 2013, this report also offers comparisons and remarks on the trends observed between 2011 and 2013 and long-term data on the incidence and prevalence of treatment.

### METHODS

A survey was carried out in the second half of 2013 with chronic kidney disease patients on dialysis treated at centers registered with the

SBN. A questionnaire was made available on the SBN website from August to November of 2013, and registered dialysis centers were informed in written and asked to submit their responses online to the Secretary of the Society. Centers failing to send their answers were reminded to do so monthly until the final date set for submissions (November 30, 2013). When necessary, data were obtained or confirmed over the phone in interviews with the Secretary of the SBN. The questions on most sociodemographic, clinical, workup and treatment aspects referred to patients on dialysis on July 1, 2013. Data on mortality and entry of new patients on dialysis comprised the whole month of July of 2013 and estimates for the entire year.

Six hundred and fifty-eight of 703 dialysis centers registered with the SBN in July of 2013 had active chronic dialysis programs, and 334 (50.8%) completed the questionnaire and had their data analyzed. Data from 50,961 patients on dialysis from 334 participating centers were included. Patient data sets were pooled together, rather than being kept separately for each individual. Therefore, they are to be interpreted as a representation of the more prevalent treatment practices offered to patients seen at each dialysis center. National data were estimated taking into account the numbers expected of centers that did not join the survey based on their regional locations. Non-respondents were assigned the mean number of patients observed in their region, and their totals were computed in the estimates.

The national and regional population estimates used in the calculations of prevalence and incidence derived from the updated estimates published by the Brazilian Institute of Geography and Statistics (IBGE) for July of 2013. Pooled data were used to estimate the percentage of patients outside recommended target indicators<sup>1,2</sup> for dialysis dosage (Kt/V or urea reduction ratio) and serum concentrations of albumin, phosphorus, PTH and hemoglobin. Most data were shown in a descriptive fashion

for the year of 2013, and in comparisons to 2011<sup>3</sup> and 2012.<sup>4</sup>

#### CALCULATIONS USED IN ESTIMATION

Estimated total N of patients on July 1: N of patients obtained in the sample/ratio of active respondent centers. Estimated global prevalence rate: Estimated total N of patients on July 1/Brazilian population on July 1, 2013, expressed as per million population. Only the data pertaining to each region of the country were considered in the estimation of the regional N and ratio values. Estimated total N of patients starting dialysis in 2013: N of patients informed to have started treatment in July x 12/ratio of active respondent centers. Estimated global incidence rate: estimated total N of patients starting treatment in 2013/Brazilian population on July 1, 2013, expressed as per million population. Prevalence related to demographic, clinical, workup, and medication data were expressed in relation to the responses given for each of the aspects considered for 50,961 patients enrolled from 334 respondent clinics. Total N of deaths estimated in 2013: N of deaths reported in July x 12/ratio of active respondent centers. Gross mortality rate: estimated total N of deaths in 2013/estimated N of patients on dialysis on July 1, 2013.

#### RESULTS

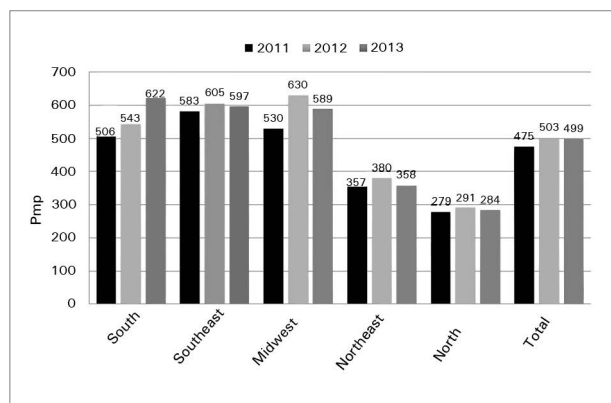
The total number of active centers in 2013 increased slightly when compared to 2012-11 (658, 651 and 643, respectively). The active centers responding to the survey were distributed as follows: 28% were located in the South of Brazil, 40% in the Southeast, 9% in the Midwest, 17% in the Northeast, and 6% in the North. Fifty-one percent of the active dialysis centers answered the survey questionnaire (n = 334/658). The participation of dialysis centers in the survey varied by region. Participation was higher in the South and North regions (68% and 59%) and lower

in the Southeast and Midwest regions (43% and 45%, respectively). The questionnaires answered by the 334 centers comprised the data of 50,961 patients. Eighty-four percent of these patients had public health insurance and 16% were covered by private health insurance. The dialysis centers included in the survey had an occupancy rate of 85%. Fifty-one percent of them were located inside a hospital. Seventy-three percent of the centers catered to patients with chronic kidney disease on conservative treatment and 67% took care of individuals with acute kidney injury. The centers included in the study had one nephrologist per 28 patients on dialysis.

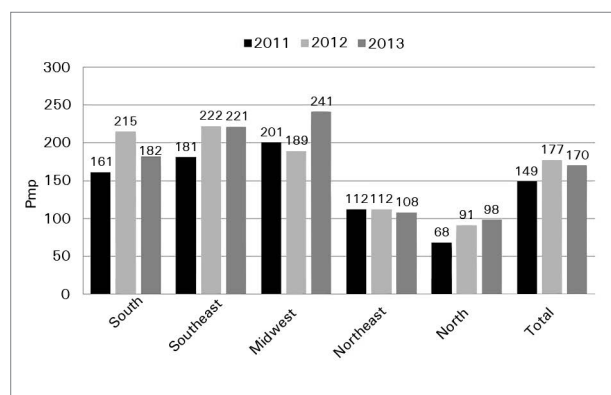
An estimated 100,397 patients were on dialysis in Brazil on July 1, 2013. This number has gradually increased over the years: 97,586 in 2012; 91,314 in 2011; and 54,523 in 2003. A mean annual increase of three percent on the number of patients has been observed within the last three years. Half of these patients were treated in Southeastern Brazil. The prevalence rate of dialysis in 2013 was 499 patients per million population (pmp), varying by region from 284 patients pmp in the North to 622 patients pmp in the South (Figure 1). The global dialysis prevalence rate was unchanged when compared to 2012 (503 pmp), despite the six-percent growth seen from 2011 (475 pmp) to 2012. An estimated 34,161 patients were started on dialysis in 2013, the equivalent to an incidence rate of 170 patients pmp (Figure 2). The estimated incidence rate in 2012 and 2011 was 177 and 149 patients pmp, respectively. Fifty-five percent of the patients ( $n = 18,700$ ) started dialysis in the Southeast, 6,019 in the Northeast, 5,249 in the South, 3,608 in the Midwest, and 1,668 in the North region. The annual incidence rate of dialysis ranged from 98 pmp in the North region to 241 pmp in the Midwest (Figure 2). The estimated number of new patients starting dialysis was similar to the number observed in 2012 ( $n = 34,366$ ) and higher than in 2011 ( $n = 26,680$ ).

Fifty-eight percent of the patients were males. The percentage of patients on dialysis

**Figure 1.** Estimated prevalence of patients on dialysis in Brazil per region, 2011-2013.



**Figure 2.** Estimated incidence of patients on dialysis in Brazil per region, 2011-2013.



aged 12 years and under, 13-18 years, 19-64 years, 65-80 years, and 80 and older was 0.4%, 5.6%, 62.6%, 26.7% and 4.7%, respectively. The percentage of patients aged 18 years and under grew substantially from 2011 (1.6% aged  $\leq 18$  years), while the percentage of elderly individuals remained unaltered (31.5%  $\geq 65$  years in 2011). In July of 2013, 90.8% of the patients on chronic dialysis were offered hemodialysis and 9.2% were on peritoneal dialysis. Most patients on peritoneal dialysis were offered automated peritoneal dialysis (APD). Table 1 shows the distribution of patients according to the type of dialysis and health insurance type; a significantly higher percentage of patients on private health insurance were on daily hemodialysis or peritoneal dialysis, particularly APD, when compared to individuals on public health insurance. Peritoneal dialysis was offered

**TABLE 1** DISTRIBUTION OF PATIENTS PER TYPE OF DIALYSIS AND HEALTH INSURANCE, 2013 CENSUS

Mode of dialysis	Public health insurance	Private health insurance	Total N (%)
	N (%)	N (%)	
Conventional HD	39,018 (90.9)	6,707 (83.6)	45,725 (89.7)
Daily HD (> 4x/week)	150 (0.3)	388 (4.8)	538 (1.1)
CAPD	1,580 (3.7)	197 (2.5)	1,777 (3.5)
APD	2,124 (4.9)	728 (9.1)	2,852 (5.6)
DPI	62 (0.1)	7 (0.1)	69 (0.1)
Total	42,934 (100)	8,027 (100)	50,961 (100)

to 8.7% of the patients on the public health insurance and to 11.7% of the patients on private health insurance.

In 2013, the most common causes of kidney disease were hypertension (35%) and diabetes (30%), followed by chronic glomerulonephritis (12%) and polycystic kidney disease (4%); 12% of the patients were diagnosed with kidney disease for other causes, and undefined causes accounted for eight percent of the cases. There was no significant change in these percentages over the last three years.

The prevalence of positive serology for hepatitis C and B in patients on dialysis in Brazil was 4.2% and 1.4%, respectively, whereas 0.7% had HIV. In 2012 and 2011, the prevalence of positive serology for hepatitis C, B, and HIV was 4.6% and 5.5%; 1.0% and 1.1%; and 0.8% and 0.8%, respectively.

The estimated percentage of patients on hemodialysis with a central venous catheter was 15.4% (short residence catheter: 9.4%, indwelling permcath: 6.0%), while 3.3% had vascular grafts. In the sample assessed in July of 2013, the monthly hospitalization rate was 5.8%, against 5.7% and 6.1% in 2012 and 2013, respectively. Figure 3 shows that, in reference to recommended workup levels,<sup>1,2</sup> 19% of the patients on dialysis had a Kt/V < 1.2 or a urea reduction ratio < 65%, 15% had serum albumin levels < 3.5 g/dL, 36% had serum phosphorus > 5.5 mg/dL, 17% had PTH values greater than 600 pg/ml, and 15% had levels below 100 pg/ml.

Thirty-three percent had hemoglobin levels < 11 g/dL and 23% had values under 10 g/dL. A trend was observed of better management of PTH and hemoglobin levels.

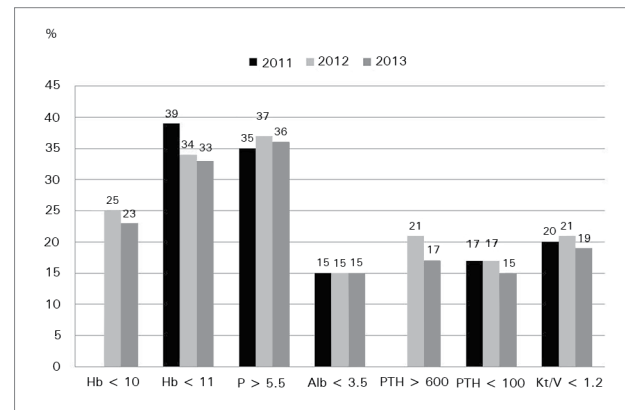
**Figure 3.** Percent of patients with workup results outside the levels recommended in international guidelines, 2011-13.

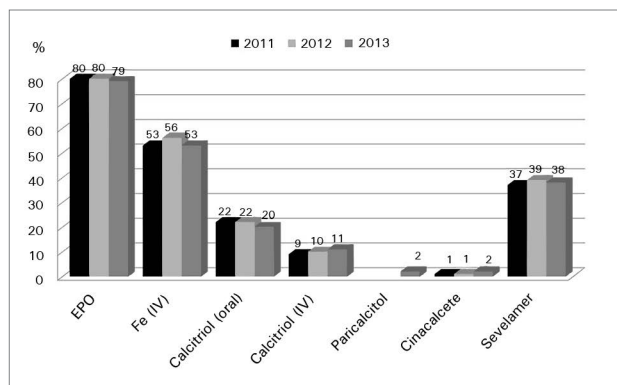
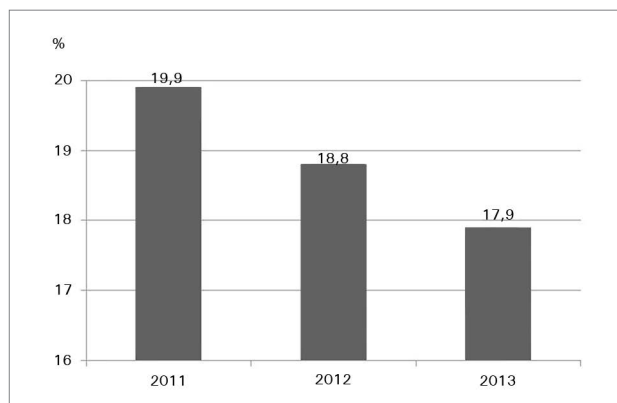
Figure 4 shows the distribution of medications used by the patients: 79% were on erythropoietin, 53% on intravenous iron, 31% on calcitriol, 2% on paricalcitol, 2% on cinacalcet, and 38% on sevelamer.

An estimated 31,351 patients were registered on the waiting list for transplantation in July 2013, or 31.2% of the individuals then on dialysis (n = 32,454 in 2011; n = 30,447 in 2012).

In 2013, an estimated 17,944 patients on dialysis died, corresponding to a gross death rate (with the dialysis population on July 1 in the denominator) of 17.9% for the year. This rate has decreased in recent years (Figure 5).

## DISCUSSION

The 2013 survey had the participation of 51% of the active dialysis centers in the country, a number greater than in 2012 and slightly lower than in 2011 (39% and 55%, respectively).<sup>3,4</sup> A substantial share of the active centers was represented, despite the voluntary nature of their participation. Although the distribution of participating centers mirrored the regional distribution of dialysis centers in Brazil, more centers located in the South and North regions (68% and 59% of active centers) joined the survey when compared to centers

**Figure 4.** Percent of patients using selected medications, 2011-13.**Figure 5.** Annual gross mortality rate of patients on dialysis, 2011-2013.

located in the Southeast and Midwest regions (43% and 45%, respectively), which may have impacted the representativeness of the results. The best way to interpret our data is by observing the trends from previous years, as done in this report. The estimates pointed out to a stabilization in incidence rates and a continued increase in the absolute number of patients on treatment, although the prevalence of patients on dialysis remained flat in 2013 when compared to 2012. In the 2010-2013 period, the number of patients on dialysis increased by a mean of 3% a year.

Our annual estimates must be interpreted with caution due to the percent participation of dialysis centers and the need to further validate the survey questionnaire. Wide variations have been reported in the prevalence and incidence rates submitted by each region of the country. This particular year, prevalence was higher in the South, tended toward stabilization in the Southeast, and was lower in the Northeast region, which may have been partly influenced by the greater contribution of the centers located in the

South to this report. In recent years, reports from the United States and other developed European and Asian countries have alluded to increases in prevalence rates, although the incidence rate of patients on renal replacement therapy has increased discreetly or displayed a tendency to flattening out.<sup>5</sup> For example, prevalence rates in the United States increased by approximately 3% a year in the 2007-2011 period.<sup>5</sup>

The global prevalence rate of dialysis (499/pmp) must be added to the prevalence rate of patients with functioning renal grafts (200/pmp) to yield the actual rate of individuals on renal replacement therapy, which should be at 700/pmp or thereabouts. This latter rate is lower than what was observed in countries such as Chile (1230/pmp), Argentina (800/pmp) and some European (900-1000/pmp) and North American nations (1920/pmp) in 2011.<sup>4</sup> However, given the large regional differences in Brazil, the rates seen in the Southeast and South regions, for example, are probably greater than 800/pmp and closer to the reality of developed nations. Similarly to 2012, approximately 34,000 patients (170/pmp) were started on chronic dialysis treatment in 2013. As observed in prevalence rates, regional variations in incidence rates varied between 100 and 240 pmp. The actual incidence rate can be obtained by including the recipients of preemptive transplants in the calculation. The yielded global incidence rate is similar to the rates observed in many European countries, although well below the rates seen in the United States (362/pmp) and Japan (295/pmp).<sup>4</sup>

An intriguingly high portion of children and adolescents were on dialysis in 2013 when compared to 2012 and 2011 (6.0%, 4.5%, and 1.6%, respectively). This finding may need confirmation. The data collection procedure utilized may have led to discrepancies in the numbers of this subgroup, and there are no apparent reasons for such an increase to have occurred within the last two years. The relative number of patients on maintenance hemodialysis - 90.2% - has remained unchanged when compared to previous years. APD and daily hemodialysis rates have remained consistently higher among patients on private health insurance, although individuals on

daily hemodialysis account for only 1% of all dialysis patients. The share of patients using venous catheters increased slightly (15.4% in 2013 *vs.* 14.5% in 2012) and, for the first time, the number of patients using indwelling (with subcutaneous tunnel) and short residence catheters (6% and 9.4% of the total, respectively) was estimated; vascular grafts were used by 3.4% of the patients.

Hypertensive nephropathy (35%) and diabetes (30%) were the main underlying diseases seen in patients on dialysis. Positive serology for hepatitis C kept on decreasing, while the number of patients with hepatitis B increased slightly. The percentage of HIV-positive patients remained unaltered. The number of patients with workup results outside the levels recommended in international guidelines revealed a trend toward reduction, as the percentage of individuals with hemoglobin < 11 g/dl dropped from 39% in 2011 to 33% in 2013. Reductions were also seen in the number of patients with hemoglobin levels below 10 g/dl (25% in 2012 *vs.* 23% in 2013), thus meeting the currently advocated target. The number of patients on erythropoietin and intravenous iron has remained high and unaltered.

The latest survey findings revealed that fewer patients had very high or very low PTH levels, which may reflect the better quality of medical care provided to individuals treated for hyperparathyroidism and the greater availability of other medications in recent years (paricalcitol and cinacalcet). A high number of patients with anemia and high phosphorus and PTH levels in relation to guideline recommendations has also been observed in European nations, the United States and Japan.<sup>6,7</sup> A significant portion of the patients had poor performance in workup indicators for mineral metabolism disorders (phosphorus and PTH), although a great deal of them had been on medications such as sevelamer (38%) and vitamin D (calcitriol - 31%), and some had been recently started on paricalcitol and cinacalcet. The latter two medications are currently not offered by the Brazilian public health care authority, as opposed to calcitriol and sevelamer. As their use increases, the management of hyperparathyroidism will be potentially improved. The gross mortality rate

decreased in relation to 2011 (17.9% *vs.* 19.9%), possibly due to improvements on treatment efficacy. The number of elderly individuals and patients with diabetic nephropathy remained unchanged, revealing that these factors were not associated with greater risk of death. The gross mortality rate for patients on dialysis in Brazil remains below the level described for the North American patient population.<sup>5</sup>

Generalizations from this study should be made with caution, due to the voluntary nature of participation in the survey, the way in which data were collected for patient groups in each center, and the need to validate survey responses.

## CONCLUSIONS

The survey revealed the number of patients on dialysis is trending up, although the incidence and prevalence of dialysis has remained stable. Mortality rate, by its turn, is trending down. Disorders such as anemia and hyperparathyroidism are apparently being better managed, although this finding requires confirmation. This survey has offered valuable information for the improvement of the care provided to patients with advanced chronic kidney disease and the enhancement of the national policies for dialysis in Brazil.

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