

Brazilian Chronic Dialysis Survey 2016

Inquérito Brasileiro de Diálise Crônica 2016

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ABSTRACT

Introduction: National chronic dialysis data are important for 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 2016. **Methods:** A survey based on data of dialysis centers from the whole country. The data collection was performed by using a questionnaire filled out on-line by the dialysis centers. **Results:** 309 (41%) of the dialysis units in the country answered the questionnaire. In July 2016, the total estimated number of patients on dialysis was 122,825. The estimated prevalence and incidence rates of chronic maintenance dialysis were 596 (range: 344 in the North region and 700 in the Southeast) and 193 patients per million of population (pmp), respectively. The annual incidence rate of patients with diabetic nephropathy was 79 pmp. The annual gross mortality rate was 18.2%. For prevalent patients, 92% were on hemodialysis and 8% on peritoneal dialysis, and 29,268 (24%) were on a waiting list of renal transplant. A venous catheter was the vascular access for 20.5% of the hemodialysis patients. The prevalence rates of positive serology for hepatitis B and C showed a tendency to reduce from 2013 (1.4% and 4.2%, respectively) to 2016 (0.7% and 3.7%, respectively). **Conclusion:** The absolute number and the prevalence and incidence rates of patients on dialysis continue to rise steadily; the gross mortality rate remained stable. Regional inequities are evident in these rates.

Keywords: kidney failure, chronic; renal dialysis; census data; epidemiology.

RESUMO

Introdução: Dados nacionais sobre diálise crônica são fundamentais no planejamento do tratamento. **Objetivo:** Apresentar dados do inquérito da Sociedade Brasileira de Nefrologia sobre os pacientes com doença renal crônica em tratamento dialítico em julho de 2016. **Métodos:** Levantamento de dados de unidades de diálise do país. A coleta de dados foi feita utilizando questionário preenchido 'on-line' pelas unidades de diálise. **Resultados:** 309 (41%) das unidades responderam ao questionário. Em julho de 2016, o número total estimado de pacientes em diálise foi de 122.825. As estimativas nacionais das taxas de prevalência e de incidência de pacientes em tratamento dialítico por milhão da população (pmp) foram 596 (variação: 344 na região norte e 700 na sudeste) e 193, respectivamente. A taxa de incidência de nefropatia diabética na população em diálise crônica foi de 79 pmp. A taxa anual de mortalidade bruta foi de 18,2%. Dos pacientes prevalentes, 92% estavam em hemodiálise e 8% em diálise peritoneal, 29.268 (24%) estavam em fila de espera para transplante. Cateter venoso era usado como acesso em 20,5% dos pacientes em hemodiálise. As taxas de prevalência de sorologia positiva para hepatite B e C mostram tendência para redução de 2013 (1,4% e 4,2%, respectivamente) para 2016 (0,7% e 3,7%, respectivamente). **Conclusão:** O número absoluto de pacientes e as taxas de incidência e prevalência em diálise continuam a aumentar de forma constante; a taxa de mortalidade ficou estável. Há discrepâncias regionais e estaduais evidentes nessas taxas.

Palavras-chave: falência renal crônica; diálise renal; dados censitários; epidemiologia.

INTRODUCTION

One of the assignments of the Brazilian Society of Nephrology (SBN) is to perform an annual national survey to collect basic information concerning patients with chronic kidney disease undergoing dialysis in registered renal care centers. Online data submission, an innovative aspect of the survey, has been in use for the past eight years and significantly facilitated the collection of data in a country of continental proportions with over 750 dialysis centers in 2016.

The main purpose of the survey is to gather basic epidemiologic and technical information from renal care centers and learn more about the population on dialysis, in order to inform conversations with the Government and other providers of renal replacement therapy and ultimately improve patient care. Despite the troubles inherent to surveys based on voluntary data submission, a significant portion of the renal care centers in Brazil joined the effort.

This paper describes the characteristics of patients on outpatient chronic dialysis in Brazil on July 1, 2016. It also features trend data from chronic dialysis programs in Brazil in the 2013-2016 period, including the incidence of patients on chronic dialysis with baseline diseases related to *diabetes mellitus*. And, for the first time, the prevalence of dialysis per State in 2016 has been estimated.

METHODS

A survey was conducted on the second half of 2016 to collect data from patients with chronic kidney disease on dialysis in outpatient settings seen in all centers registered with the SBN. From August to December 2016, the survey was available on the website of the SBN and all dialysis centers were invited by letter and e-mail to answer the questionnaire and submit their data electronically to the SBN Secretariat.

Invitations were sent repeatedly every month to the centers that had not submitted their data until the submission deadline (Dec 31, 2016). The Chairpersons of the SBN regional chapters were asked to contact the directors of the dialysis centers in their regions to invite them to fill out the survey. In December 2016, the SBN Secretariat called the centers that had not responded to ask them to do it. The questions concerning most of the sociodemographic, clinical, workup, and treatment variables reflected the realities of patients on dialysis on July 1, 2016. Data

concerning death rates and new patients starting dialysis were collected in July 2016 and were estimated for the year.

The SBN had 834 registered dialysis centers in July 2016, of which 747 had active chronic dialysis programs; of these, 309 (41.4%) responded the survey and had their data analyzed. The data submitted by the 309 participating centers covered 50,807 patients on dialysis. The data sets submitted by the centers were grouped so as not to portray individual patient information; they should, therefore, be interpreted as the representation of the average patient and average treatment present in each dialysis center.

National data were estimated based on the numbers expected for non-participating centers and their locations. Non-participating centers were assigned the mean number of patients expected for their respective regions, and their numbers were thus included in the national estimates.

The estimates for the Brazilian population and the numbers for each region of the country updated for July 2016 used in the prevalence and incidence calculations were borrowed from the Brazilian Institute of Geography and Statistics (IBGE). Grouped data were used to estimate the proportion of patients failing to meet the recommended targets^{1,2} for dialysis dose (Kt/V or urea reduction ratio) and serum levels of albumin, phosphorus, PTH, and hemoglobin. Most of the data were shown in descriptive form and refer to 2016; they were compared to data from previous years and 2015 in particular.^{3,4}

CALCULATIONS PERFORMED IN ESTIMATIONS

Total estimated number (N) of patients on July 1: N of patients in the sample/participating centers. Estimated global prevalence: Total estimated N of patients on July 1/Brazilian population on July 1, 2016, expressed in per million population.

In the regional and State estimations of N and ratios, the data considered were restricted to specific regions or States. Estimated total N of patients initiating treatment in 2016: (informed N of individuals starting treatment in July x 12)/proportion of active participating centers. Estimated global incidence: estimated total N of patients starting treatment in 2016/Brazilian population on July 1, 2016, expressed in per million population.

The prevalence rates concerning demographic, clinical, workup, and medication variables were

expressed in relation to the totals derived from the answers related to each of the investigated factors among the 50,807 patients seen in the 309 participating centers. Estimated total N of deaths in 2016: (N of deaths reported in July x 12)/proportion of active participating centers. Gross death rate: total estimated N of deaths in 2016/estimated N of patients on dialysis on July 1, 2016.

RESULTS

The total number of active dialysis centers increased from 2015 to 2016 (726 to 747). Participating centers were distributed as follows within the five geographic regions of Brazil: 22% were in the South; 49% in the Southeast; 7% in the Midwest; 18% in the Northeast; and 4% in the North. Forty-one percent of the registered dialysis centers responded the survey (n = 309/747). The proportion of participating centers in relation to the total number of active centers in each region ranged from 30% to 42%; the highest response rates were seen in the Southeast and South regions (42%) and the lowest in the Brazilian Midwest (30%).

A total of 50,807 patients were receiving treatment in the 309 participating centers. Eighty-three percent of them had their treatments paid for by the Brazilian public health care system (SUS) and 17% were covered by private health insurance. The dialysis centers had an occupation rate of 84%. Forty-seven percent of the centers were located in hospitals and 53% were outpatient clinics. Eighty-one percent of the centers had patients with chronic kidney disease under conservative management and 72% had patients with acute kidney injury. The reported number of nephrologists working at the participating centers indicated that each of them saw a mean of 29 patients on dialysis.

The total number of patients on dialysis in Brazil on July 1, 2016 was estimated at 122,825. This number indicates an increase of approximately 31,500 patients within the last five years (91,314 in 2011) and an annual growth of 6.3% in the number of patients. Half of the patients were treated in centers in the Southeast.

The prevalence of dialysis in 2016 was 596 patients per million population (pmp), with rates ranging from 344 in the North to 700 patients pmp in the Southeast (Figure 1). Global prevalence increased in

relation to 2015 (544/pmp), and trend analysis indicates growth will continue. Table 1 shows the estimates for absolute numbers and prevalence per State on July 1, 2016. Most patients were on dialysis in the States of São Paulo, Minas Gerais, Rio de Janeiro, and Bahia; prevalence > 700 patients pmp was observed in Roraima, Minas Gerais, Rio de Janeiro, and Distrito Federal.

The number of patients starting treatment in 2016 in Brazil was estimated at 39,714, which yields an incidence of 193 patients pmp (Figure 2). The incidence estimated for 2016 was 193 patients pmp. Forty-eight percent of the new patients started treatment in the Southeast, followed by 19% in the Northeast, 17% in the South, 10% in the Midwest, and 5% in the North.

Annual incidence of dialysis ranged from 111 pmp in the North to 259 pmp in the Midwest (Figure 2). More people were estimated to have started dialysis in 2016 than in 2015 (n = 36,571), and incidence has been on the rise since 2012. A total of 16,309 new patients with diabetic nephropathy started dialysis, yielding a rate of 79 individuals pmp (41% of incident patients).

Fifty-seven percent of the patients were males. Patients on dialysis aged 12 years and younger, aged 13-19 years, 20-64 years, 65-74 years, and ≥ 75 years accounted for 0.3%, 0.9%, 65.7%, 21.8%, and 11.2% of the group, respectively. On July 1, 2016, 92.1% of the patients on chronic renal replacement therapy were on hemodialysis and 7.9% were on peritoneal dialysis, the majority of whom on automated peritoneal dialysis (APD).

Table 2 shows the distribution of patients in relation to the type of dialysis and payer. A greater proportion of patients served by private health insurance underwent daily hemodialysis and peritoneal dialysis - APD in particular - when compared to patients

Figure 1. Estimated prevalence of patients on dialysis in Brazil per region, 2013-2016

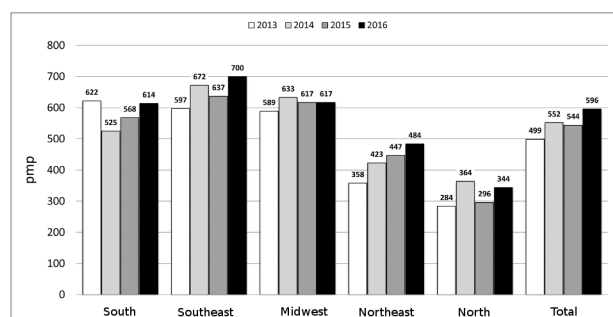
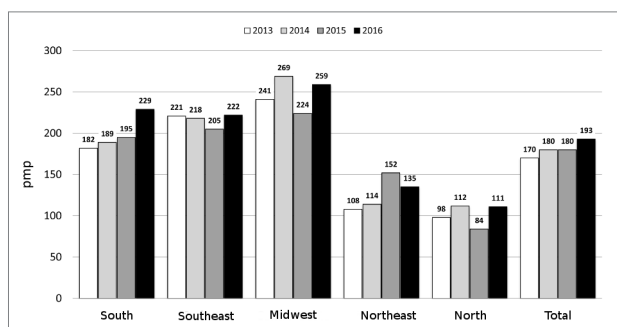


TABLE 1 NUMBER OF PATIENTS ON CHRONIC DIALYSIS AND ESTIMATED PREVALENCE PER STATE ON JULY 1, 2016

State	Number of patients	Prevalence per million population
Acre	68	83
Alagoas	1606	478
Bahia	8227	539
Ceará	4551	508
Distrito Federal	2172	730
Espírito Santo	2141	539
Goiás	3969	593
Maranhão	1855	267
Minas Gerais	16499	786
Mato Grosso do Sul	1818	678
Mato Grosso	1776	537
Pará	3120	377
Paraíba	1227	307
Pernambuco	5152	548
Piauí	1674	521
Paraná	7299	649
Rio de Janeiro	12694	763
Rio Grande do Norte	2003	576
Rondônia	1148	742
Roraima	408	793
Rio Grande do Sul	6695	593
Santa Catarina	3285	475
São Paulo	28716	642
Sergipe	1013	447
Tocantins	625	408

Estimates could not be drawn for the States of Amazonas and Amapá due to lack of data.

Figure 2. Estimated incidence of patients on dialysis in Brazil per region, 2013-2016.

supported by the Brazilian public health care system (SUS). Peritoneal dialysis was the mode of treatment for 7.7% of the patients served by the SUS *versus* 9.0% of the individuals covered by private health insurance.

The most frequent primary causes of CKD in 2016 were hypertension (34%) and diabetes (30%), followed by chronic glomerulonephritis (9%) and polycystic kidney disease (4%); other conditions accounted for 12% and undefined conditions for 11% of the causes. No significant change has been observed in these proportions over the last few years.

Figure 3 shows a decrease in the prevalence of positive serologic tests for hepatitis C and B among patients on chronic dialysis in Brazil, from a respective 4.2% and 1.4% in 2013 to 3.7% and 0.7% in 2016. The prevalence of HIV-positive chronic dialysis patients was 0.7% in 2013 and 1.0% in 2016.

The estimated proportion of patients on hemodialysis with a central venous catheter has increased in recent years to 20.5% in 2016 (short-term catheters: approximately 9.4%; long-term catheters: 11.2%). In 2016, 2.2% of the patients on hemodialysis used vascular grafts. The hospitalization rate of the patients analyzed in July 2016 was 5.2%.

In regards to the cutoff levels recommended for individuals on dialysis,^{1,2} 21% of the patients on hemodialysis had Kt/V < 1.2 or urea reduction ratios < 65%; 14% had serum albumin levels < 3.5 g/dl; 33% had serum phosphorus levels > 5.5 mg/dl; 18% had PTH levels > 600 pg/ml; and 16% had PTH levels < 100 pg/ml. Twenty-seven percent had hemoglobin levels < 10 g/dl and 13% had hemoglobin levels > 13 g/dl.

Figure 4 shows the use of select medications by individuals on dialysis: 74% were on erythropoietin, 53% on intravenous iron, 31% on calcitriol, 2% on paricalcitol, 4% on cinacalcete, 41% on sevelamer, and 26% on calcium carbonate/acetate.

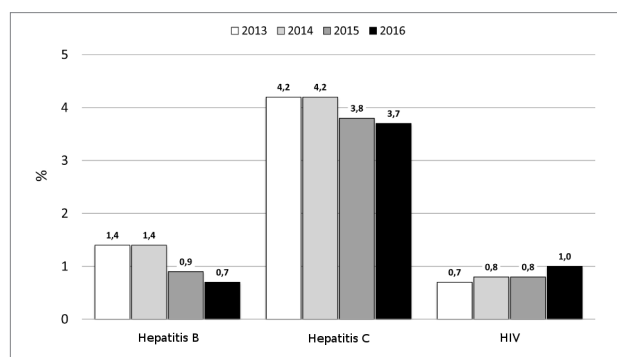
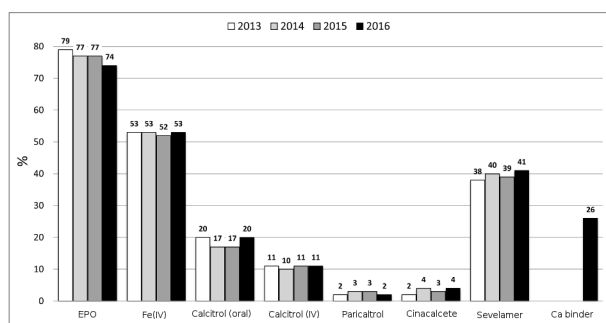
An estimated 29,268 patients (24%) were on the transplant waiting list in July 2016.

The estimated number of deaths in 2016 was 22,337, yielding a gross death rate of 18.2% for the year.

TABLE 2 DISTRIBUTION OF PATIENTS BASED ON MODE OF DIALYSIS AND PAYER, 2016 CENSUS

Mode of dialysis	SUS N (%)	Non-SUS N (%)	Total N (%)
Conventional HD	38,437 (91.4)	7,279 (83.0)	45,716 (90.0)
Daily HD (> 4x/week)	359 (0.9)	708 (8.1)	1,067 (2.1)
CAPD	933 (2.2)	140 (1.6)	1,073 (2.1)
APD	2,281 (5.4)	637 (7.3)	2,918 (5.7)
IPD	25 (0.1)	8 (0.1)	33 (0.1)
Total	42,035 (100)	8,772 (100)	50,807 (100)

HD = hemodialysis; CAPD = continuous ambulatory peritoneal dialysis; APD = automated peritoneal dialysis; IPD = intermittent peritoneal dialysis; SUS = Brazilian public health care system

Figure 3. Prevalence of positive serologic test for hepatitis B, C, and HIV.**Figure 4.** Proportion of patients taking select medications, 2013-2016.

DISCUSSION

Similarly to what happened in the past three years,^{3,4} 41% of the active dialysis centers in Brazil joined the survey in 2016. This is a substantial percentage of active centers, particularly since participation in the survey is voluntary. Most regions had participation rates similar to the national average, with responding centers accounting for 41-42% of all centers, except in the North (35%) and the Midwest (30%).

The estimates indicated increases in incidence (4.5% a year since 2013) and prevalence (6.5% a year) and a continuous increase in the absolute number of patients on dialysis (6.3% a year since 2013). These annual estimates must be interpreted with caution due to the variation in the proportion of responding centers and the need to further validate the way in which the questions were answered. Therefore, there is greater value in observing the trends manifesting in recent years.

Broad variation has been consistently reported in prevalence and incidence between the regions of the country. Rates have been higher in the Southeast, South, and Midwest and lower in the Northeast and North regions. This year's report includes the prevalence estimated for each State, with contrasting figures

such as 730-789 patients pmp in Minas Gerais, Rio de Janeiro, and Distrito Federal, and 83-307 patients pmp in Acre, Maranhão, and Paraíba.

In the United States and other developed nations in Europe and Asia prevalence has increased steadily, although since the mid-2000s the incidence of patients on renal replacement therapy has flattened or grown marginally.^{3,4} For example, in the 2008-2013 period prevalence increased by about 3% a year in the US.⁵

The actual prevalence of renal replacement therapy is the summation of the global prevalence of dialysis (596/pmp) and the prevalence of patients with functioning renal grafts (approximately 230/pmp), which yields a rate close to 826/pmp in 2016. This number is still lower than the prevalence reported in Chile (1294/pmp), Uruguay (1127/pmp), Western Europe (1000-1200/pmp), and the United States (2043/pmp) in 2016.⁵

However, since there is great variation between the regions (and States) in Brazil, the rates concerning renal replacement therapy in the Southeast and South are probably higher than 950/pmp and, therefore, closer to the numbers seen in developed nations. Estimates indicated that 40,000 patients (193/pmp) started chronic dialysis in 2016, surpassing the numbers reported in recent years.^{3,4}

Similarly to prevalence, incidence varied significantly (111-259 pmp) between the Brazilian regions. The actual rate of incident patients must include preemptive transplant recipients. The estimated global incidence of patients with chronic kidney disease on dialysis in Brazil was similar to the numbers seen in many European countries, albeit lower than the rates observed in the US (363/pmp) and Japan (286/pmp).⁵

Forty-one percent of the new patients starting dialysis had kidney disease reportedly because of diabetes, a proportion greater than the numbers described for several European countries and close to the levels found in the US (44%).⁵ Although subject to further validation, this finding may indicate an increase in the contribution of diabetes among the causes of advanced chronic kidney disease, as also indicated in previous reports.^{3,4}

The proportion of children/adolescents on dialysis in 2016 (1.2%) has not changed much in relation to the percentages seen in recent years. Thirty-three percent of the elderly patients (age ≥ 65 years) were on chronic dialysis in 2016. The proportion of patients on maintenance hemodialysis (92.1%) was relatively unaltered in relation to previous years.^{3,4} The number of patients covered by private health insurance on APD and daily hemodialysis has grown steadily, though they accounted for only 2% of the patients on chronic dialysis.

The proportion of patients using venous catheters in hemodialysis grew considerably from 15.4% in 2013 to 20.5% in 2016.⁶ The data indicated that the growth was primarily related to increased use of long-term catheters (11.2%).

Hypertensive nephropathy (34%) and diabetes (30%) still are the main baseline diseases in prevalent patients. Trend analysis indicated that positive serologic tests for hepatitis B (0.7%) and C (3.7%) are declining. No significant change was observed in workup results and performance vis-à-vis international recommendations.³

In regards to prescribed medication, erythropoietin has been less used, although $\frac{3}{4}$ of the patients still

took it in 2016. Calcium-based phosphate binders were cited for the first time and were taken by 26% of the patients. The gross death rate has been stable for the last four years^{3,4} at 18.2% per annum. The percentages of patients with diabetic nephropathy and elderly individuals were unaltered in relation to 2013, indicating overall mortality has not been affected by these factors. The gross death rate seen in Brazil has been lower than the rate described for patients on dialysis in the US.³⁻⁵

The voluntary nature of the survey, the grouping of patient data by dialysis center, and the lack of validation of the submitted answers require that inferences from this study be drawn with caution.

CONCLUSIONS

The latest issue of the report revealed a trend toward global increases in the number of patients on chronic dialysis, and on the incidence and prevalence of treatment in recent years. Variations between regions and States cannot be disregarded. Death rates remained relatively unchanged. The use of venous catheters in hemodialysis has grown remarkably. Positive serologic tests for hepatitis B and C are declining. Our data may be used to inform possible improvements in the care provided to patients with advanced chronic kidney disease and as input in the development of national policies for chronic dialysis in Brazil.

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