Epidemiological profile of deaths in renal replacement therapy and cost of treatment

Perfil epidemiológico dos óbitos em terapia renal substitutiva e custo do tratamento

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Abstract

Objective: Determine the epidemiological profile of patient deaths related to renal replacement therapy and the cost of treatment.

Methods: Cross-sectional retrospective study carried out with data from the National Renal Replacement Therapy Database. It included 2009 deaths due to renal failure. Data were analyzed using statistical inference and nonparametric statistics.

Results: A greater number of deaths was observed among white, male patients. The cost of treatment increased 6.7% in the state and 45.3% in the city.

Conclusion: The highest number of deaths occurred among white males; there were marked variations in hospital mortality rates; and the cost of treatment increased over the past three years.

Resumo

Objetivo: Descrever o perfil epidemiológico dos óbitos de pacientes em terapia renal substitutiva e o custo do tratamento.

Métodos: Estudo transversal e retrospectivo realizado com os dados da Base Nacional de Terapia Renal Substitutiva. Foram incluídos 2029 óbitos por insuficiência renal. Os dados foram analisados por inferência estatística e estatística não paramétrica.

Resultados: Houve maior número de óbitos entre os pacientes do sexo masculino e da raça branca. O custo do tratamento aumentou 6,7% nos gastos do estado e 45,3% no município.

Conclusão: O maior número de óbitos ocorreu no sexo masculino, raça branca, variações bruscas nas taxas de mortalidade hospitalar e aumentou o custo do tratamento nos últimos três anos.

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Conflicts of interest: no conflicts to report.

Introduction

Over the past few decades there has been an increase in life expectancy and quality of life for individuals suffering from chronic renal failure on renal replacement therapy, due to the development of new biomaterials, new technologies and the control of comorbidities. The Brazilian Nephrology Census reveals that there are currently around 92,000 patients on dialysis in Brazil.[1]

In the last ten years, the number of dialysis patients in the country grew by 115% and is expected to increase at a rate of 500 cases per million inhabitants each year. The Brazilian Society of Nephrology estimates that ten million people suffer from some degree of chronic kidney disease in the country, if a prevalence of renal failure estimated at 50/100,000 inhabitants is taken into account.[2] According to the United States Renal Data System, which provides international data, the prevalence of renal failure noted in Brazil is much lower than in other Latin American countries, which suggests underdiagnosis.[3]

From the time renal replacement therapies started expanding in Brazil in the 1970s, the provision of therapies for patients with chronic kidney disease has been advancing. Initially, however, the framework for organizing a joint funding project between providers and the government was insufficient. This situation had a significant social and economic impact and slowly gave rise to a process that was fragmented in terms of regulation. It was only in 2004 that a care policy for chronic kidney disease patients was instituted, as well as new technical regulations for dialysis services.[4]

After two years of research by a group from the Ministry of Health to create a profile regarding kidney disease in Brazil, a regulatory policy for the Provision of Care to Chronic Kidney Disease Patients was established, which constituted a universal public and institutional policy, set within the principles of the Unified Health System (SUS, as per its acronym in Portuguese), and replaced the unstructured system that had been provided to kidney disease patients over the last forty years.[4]

With the notable growth of the elderly population and the prevalence of obesity in the world population, Brazil is clearly undergoing an epidemiological transition, which also signals a transformation in the disease profile of the population. This profile, wherein infectious diseases had been predominant, is now characterized by the prevalence of non-communicable chronic diseases, which reflects a significant increase of chronic diseases, such as hypertension and diabetes, which are a major cause of renal failure worldwide.[5-7] Within this context, a progressive increase is observed over the years in the incidence of renal failure, its development and the need to start treatment with renal replacement therapies increasingly earlier. This has been a point of concern for government agencies due to the high cost of the treatment and highlights the urgent need to adopt preventive measures and work on early detection in order to prevent the progression of the condition.[4,8]

Poor knowledge is found regarding the actual public investments in renal replacement therapies. Nevertheless, it is essential to change the standard of health services provided, since the state has failed to develop and employ strategies for the effective prevention and treatment of chronic-degenerative diseases and their complications. This has led to a loss of independence and quality of life for patients, resulting in problems up until the present due to the lack of a unified policy that is able to organize investments in prevention, diagnosis and therapy.[9,10]

The treatment of patients with chronic renal failure is based on hemodialysis, peritoneal dialysis and kidney transplant programs, with hemodialysis currently being the most widespread therapy. Brazilian epidemiological data is recorded in a computerized system of the Ministry of Health called DATASUS.[11]

The Ministry of Health uses five national information systems that are able to identify and monitor the health status of the population and analyze the results of measures to promote health, care, prevention and control of diseases and illnesses. In particular, this study used the Hospital Information System that has a subsystem for

Authorization of High Complexity Procedures, created in 1996, whose primary focus is the registration, production, collection and payment of these procedures in the public health system. This system is different from other health information systems because of the thoroughness of the records and epidemiological and demographic data of clinical interest, in addition to the way patients are identified, which requires the individual taxpayer registration number.[12]

Renal replacement therapies, which include hemodialysis, peritoneal dialysis and kidney transplant monitoring, used in the treatment of chronic kidney disease, represent the main controlled and billed medical procedures.[12] The information supplied by this subsystem makes it possible to gain knowledge regarding the epidemiological profile of diseases, monitor the surveillance of non-communicable chronic diseases, as well as generate improvements through the results obtained via this information.[13,14]

The objective of this study was to chart the epidemiological profile of deaths and expenditures related to renal failure in the city of Londrina and in the state of Paraná, located in the south of Brazil, between 2008 and 2011.

Methods

This is a cross-sectional retrospective study, which used the National Renal Replacement Therapy Database as data source. This database was developed through the deterministic-probabilistic matching technique, using the administrative subsystems database, to enable following the cohort.[3,14]

Data were collected in September 2012, with an investigation of the files available in the system and subsystems. Patients were selected in the studied location, which comprises 181 municipalities, belonging to the morbidity list from the International Classification of Diseases (ICD) 10 - Renal Failure, covering an age range from 12 months to over 80 years old and whose deaths were linked to renal failure during the period between January 2008 and December 2011. The cost of hospital services ac-

cording to the ICD-10 Morbidity List was added to the research. The study was comprised of 2,029 patients, grouped according to the following variables: gender, race, mortality rate, death and hospital cost.

Data were analyzed using the statistical package SPSS, version 15.0. The results were presented in frequencies and percentages and the inferential statistical Chi-square test was used, with a significance level set at p<0.05.

The development of the study complied with national and international ethical standards for studies involving human beings.

Results

Renal failure deaths were analyzed according to the gender variable, in period from 2008 to 2011 (Table 1), and results were closer in the city of Londrina, where women accounted for 46.7% of the deaths and men 53.2%, totaling 107 deaths, whereas in the state of Paraná, 46.3% of the deaths corresponded to women and 56.3% to men, totaling 2,029 deaths. In terms of race, taking into account only the white, brown and black races, there was a high death rate from renal failure among white patients, with 75% in Londrina and 66.6% in Paraná, followed by the brown race with 4.7% in Londrina and 5.3% in Paraná, and the black race with 4.7% in the city and 2.7% in the state.

Table 1. Profile of deaths due to renal failure

	Londrina (n=107)		Paraná (n=2029)	
	F	%	F	%
Deaths by gender				
Female	50	46.7	886	43.6
Male	57	53.2	1143	53.3*
Deaths by race				
White	75	70.0	1352	66.6
Brown	05	4.7**	107	5.3*
Black	05	4.7**	55	2.7*

Legend: *Significant difference between genders for p<0.05 (chi-square test); **Significant difference compared with the white group for p<0.01 (chi-square test with Yates correction); #Significant difference for p<0.001 compared with the white group (chi-square test with Yates correction)

Table 2. Deaths and hospital mortality rates due to renal failure

	Deaths 2008 – 2011		Hospital Mortality Rate			Variation % 2008-2011
	Male	Female	2008	2011	2008-2011	
Paraná	1143	886	10.50	10.08	9.83	- 4
Londrina	57	50	10.67	11.91	10.81	+ 11.7

Source: Ministry of Health; Hospital Information System of the Unified Health System (SIH- SUS); 2004 (Internet); 2004 [cited Sept 13, 2012]. Available at: http://sna.saude.gov.br/download/Manual%20do%20SIH%20SUS%20DEZ%202004.pdf

Table 3. Cost of hospital services for renal failure

	Cost of hospital services			Variation % 2008 to 2011
	2008	2011	2008 - 2011	
Paraná	6,691,190.44	11,825,995.26	35,866,945.24	+ 76.7
Londrina	597,954.27	868,595.81	2,825,029.49	+ 45.3

Source: Ministry of Health; Hospital Information System of the Unified Health System (SIH- SUS); 2004 (Internet); 2004 [cited Sept 13, 2012]. Available at: http://sna.saude.gov.br/download/Manual%20do%20SIH%20SUS%20DEZ%202004.pdf

In the analysis of table 2, there is a larger number of male deaths in Paraná and a more even number between men and women in the city of Londrina, with similar hospital mortality rates in the city (9.83%) and state (10.81) and marked variations in the mortality percentage for the three year period, with -4% in Paraná and +11.7% in Londrina.

Table 3 presents the expenditures of the state in hospital services for renal failure patients between 2008 and 2011, indicating a 76.7% increase in expenditures over the last three years in the state, totaling R$ 35,866,945.24, and a 45.3% increase in Londrina, totaling R$ 2,825,029.49, which reflects the progression of kidney disease and the high costs required for treatment.

Discussion

The periodic evaluation of health information systems enables relevant information to be collected regarding the quality and usefulness of the data generated by them and should be integrated into routine monitoring services. Health information systems emerged in order to evaluate health services through the data generated and to ensure a faster implementation of measures that aid improvements resulting from this monitoring, such as actions focusing not only on treatment, but also on the control of diseases and illnesses, and especially, on prevention methods. The analysis of this subsystem reveals a substantial application of health services for treating this disease, commensurate to its high morbidity and mortality rate, which demonstrates the valuable use of this subsystem in monitoring.[15]

This study substantiates another important advantage of the subsystem, noted in the analysis process, namely how fast the systems are fed with information. New patients are entered into the state and national databases within 30 to 60 days. This leads the authors to recommend the use of data at the national and regional level; the development of studies to identify the actual underlying diagnoses responsible for the progression of chronic kidney disease in Brazil; periodic review and evaluation of the subsystem; validation of data entry quality and inclusion of the race/skin color variable and others, as per risk factors; and the construction of monitoring indicators. To accelerate the implementation of these recommendations, it is essential to frequently integrate and update the files in the databases, as well as broaden the access to these databases.[15]

The control and organization of records has assumed great importance in the public health sphere, and it is highly beneficial to integrate the data from these subsystems to determine the epidemiological profiles of a population.

The impact of renal replacement therapy treatments on the total spending of national health systems is considerably high when graded against other diseases. Regardless of the care model adopted by the national health system, extensive financial

resources are spent on dialysis, ranging from 0.7% to 1.8% of health budgets, corresponding to partial coverage of the population. It is estimated that dialysis expenses, worldwide, exceed the 200 billion U.S. dollars spent in 1990, reaching over 1 trillion in 2010.[16]

Studies have noted that the gross mortality rate from renal failure in Brazil is relatively lower than that of many developed countries, such as the United States. Nonetheless, there is still room for improvement in the survival of patients on renal replacement therapy in Brazil, since the percentage of patients aged over 59 (36%) is still less than that reported in the United States, and even though the disease has been appearing increasingly earlier it is possible to invest in prevention in order to reduce its incidence and prolong life. In addition, statistics can fluctuate due to the different characteristics of patients undergoing treatment in different countries.[17,18]

Among the administrative and demographic variables, the study revealed that gender, hospital costs and mortality rates were highly reliable. Although the research is based on the individualization of patients, the number of records stemming from the same individual, especially when it comes to chronic diseases, can complicate the process and increase the possibilities of information loss and lessen its reliability. Even in face of obstacles, the number of deaths and hospital expenditures on treatment in the city of Londrina and in the state of Paraná over the last three years, illustrated, with very significant figures, the situation faced by the public health system with respect to this disease, both structurally and financially, which highlights the need to broaden the knowledge regarding these patients to help create specific policies that will intensify the care provided at the preventive and therapeutic level, in order to avoid costly treatments for irreversible renal failure cases.

Conclusion

The epidemiological profile indicated that the highest number of deaths occurred among white males;

marked variations were observed in hospital mortality rates; and the cost of treatment has increased over the past three years.

Collaborations

Borges PRR; Bedendo J and Fernandes CAM contributed with the study concept and design, data analysis and interpretation, writing of the article, relevant critical review of the intellectual content and final approval of the version for publication.

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