ORIGINAL ARTICLE

MORBIDITY AND PUBLIC HOSPITAL COSTS FOR CHRONIC KIDNEY FAILURE
MORBIDADE E CUSTOS PÚBLICOS HOSPITALARES PELA INSUFICIÊNCIA RENAL CRÔNICA
MORBILIDAD Y COSTOS PÚBLICOS HOSPITALARIOS POR LA INSUFICIENCIA RENAL CRÓNICA

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ABSTRACT

Objective: to describe morbidity and public hospital costs for chronic renal failure in Northeastern Brazil, between 2013 and 2017. **Method:** this is a quantitative, ecological and descriptive study based on secondary data from the Hospital Information System. The following variables were studied: hospitalizations, deaths, hospital costs, average hospitalization value and average hospital stay, analyzed using simple descriptive statistics. **Results:** 47,882 hospitalizations and 6,919 deaths from chronic renal failure were registered in the Brazilian Northeast. In addition, hospital costs for the disease were higher than R\$ 79 million, with an average hospitalization value of R\$1,816.11 and an average length of stay of 10.4 days in the hospital unit. **Conclusion:** it can be concluded that morbidity due to chronic renal failure is still a serious public health problem, directly affecting the increase and ascendancy of hospital costs. It is warned that this study reveals data capable of arousing the self-care of the population and strengthening the actions of primary care in the prevention and control of the disease and its etiological factors, in order to reduce hospitalizations and reduce burdens. **Descriptors:** Public Health; Epidemiology; Nephrology; Kidney Diseases; Health Care Costs; Information Systems.

RESUMO

Objetivo: descrever a morbidade e os custos públicos hospitalares pela insuficiência renal crônica no Nordeste brasileiro entre 2013 e 2017. **Método:** trata-se de estudo quantitativo, ecológico e descritivo elaborado com dados secundários do Sistema de Informações Hospitalares. Estudaram-se as variáveis internações, óbitos, custos hospitalares, valor médio de internação e média de permanência hospitalar, analisando-as com estatística descritiva simples. **Resultados:** registraram-se 47.882 internações e 6.919 óbitos pela insuficiência renal crônica no Nordeste brasileiro. Informa-se, além disso, que os custos hospitalares pela doença foram superiores a R\$ 79 milhões, com valor médio de internação de R\$ 1.816,11 e média de permanência de 10,4 dias na unidade hospitalar. **Conclusão:** conclui-se que a morbidade pela insuficiência renal crônica ainda consiste em sério problema de saúde pública, implicando diretamente o incremento e a ascendência dos custos hospitalares. Adverte-se que este estudo revela dados capazes de despertar o autocuidado da população e de fortalecer as ações da atenção básica na prevenção e controle da doença e de seus fatores etiológicos no intuito de reduzir as hospitalizações e diminuir as onerações. **Descritores:** Saúde Pública; Epidemiologia; Nefrologia; Nefropatias; Custos de Cuidados de Saúde; Sistemas de Informação.

RESUMEN

Objetivo: describir la morbilidad y los costos públicos hospitalarios por la insuficiencia renal crónica en el noreste de Brasil, entre 2013 y 2017. **Método:** se trata de un estudio cuantitativo, ecológico y descriptivo basado en datos secundarios del Sistema de Información Hospitalaria. Se estudiaron las siguientes variables: hospitalizaciones, defunciones, costos hospitalarios, valor promedio de hospitalización y estadía hospitalaria promedio, se analizaron mediante estadísticas descriptivas simples. **Resultados:** 47.882 hospitalizaciones y 6.919 muertes por insuficiencia renal crónica se registraron en el noreste de Brasil. Además, los costos hospitalarios por la enfermedad fueron superiores a R\$ 79 millones, con un valor de hospitalización promedio de R\$ 1.816,11 y una estadía promedio de 10,4 días en la unidad hospitalaria. **Conclusión:** se puede concluir que la morbilidad debida a insuficiencia renal crónica sigue siendo un grave problema de salud pública, que afecta directamente el aumento y la ascendencia de los costos hospitalarios. Se advierte que este estudio revela datos capaces de despertar el autocuidado de la población y fortalecer las acciones de atención primaria en la prevención y control de la enfermedad y sus factores etiológicos, para reducir las hospitalizaciones y las cargas. **Descriptores:** Salud Pública; Epidemiología; Nefrología; Enfermedades Renales; Costos de la Atención en Salud; Sistemas de Información.

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INTRODUCTION

Chronic Kidney Failure (CKF) is defined as a pathology that presents a complex clinical picture, characterized by the slow, progressive and irreversible behavioral lesion of all renal functions (endocrine, tubular and glomerular). As a result, the loss of body homeostasis is mainly due to the accumulation of substances resulting from metabolism.^{1,2}

It is a disease with etiological multiplicity and, in most cases, the underlying cause is chronic noncommunicable diseases (NCDs). It is mentioned that the two main etiologies of CKF are systemic arterial hypertension (SAH) and Diabetes Mellitus (DM),²⁻⁴ diseases that are closely related to population aging, an epidemiological reality that reflects the current situation in Brazil.³

CKF is considered a major global public health problem,^{2,5} affecting approximately 13% of the world's population.⁵ In the last decade, its incidence has increased in several contexts^{6,7} and, due to its complexity, it is pointed as one of the main factors of morbidity and mortality^{2,8} and great financial impact on health.^{2,8-10}

It is estimated that currently in Brazil there are over two million people with some dysfunction in the renal system, which corresponds to around 1% of the Brazilian population.² It is pointed out, in the United States, the existence of a contingent more than 20 million patients with kidney disease, of which 600,000 have CKF. It is also noteworthy, that the global incidence of kidney disease grows by about 10% per year.¹¹

It is mentioned that, in order to ensure the maintenance of life, the individual needs to undergo renal replacement therapy (RRT) in the last stage of kidney disease, especially hemodialysis (HD), peritoneal dialysis (PD) and kidney transplantation (Tx) among the therapeutic modalities.¹² It is evidenced that, annually, around 20 thousand Brazilians start some type of RRT and, from 2000 to 2013, the number of dialysis users in the country increased from 42 thousand to 100 thousand fans, corresponding to an increase of 138%.⁹

In this perspective, it is warned that the dialysis phase increases the risks of complications and morbidity and mortality among users, as well as having a direct impact on the social, family and financial costs to health systems.¹⁰ It is noted that, the values approved to ensure care for kidney patients is increasing and affecting the economic stability of the system.¹³ It is further noted that kidney disease may require expenditures of more than 8% of all health care revenue to provide treatment less than 2% of the population.¹⁴

It is stated that although there are several informative sources of dissemination on CKF at the international level, there are still many limitations on the data that hinder real knowledge for health planning.² Therefore, the development of this study is justified due to the need for new information that traces the morbidity profile and public costs of CKF in the literature. Furthermore, it is reported that studies involving financial impacts on health are essential to support decision making regarding resource allocation.⁹

OBJECTIVE

- To describe morbidity and public hospital costs for chronic renal failure in Northeastern Brazil, between 2013 and 2017.

METHOD

This is a quantitative, ecological and descriptive study, with secondary data from the Hospital Information System (HIS): an administrative tool responsible for collecting information on hospitalizations performed throughout the national territory, through the Unified Health System (UHS).¹⁵

The Northeast region of Brazil was chosen as a study scenario, which consists of nine Federative Units (UF): Maranhão, Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Sergipe and Bahia. The Northeast is the second largest region in the country in terms of population, reaching about 56.8 million inhabitants, second only to the Southeast, which shows a population of approximately 87.8 million people.¹⁶

In HIS, the option "treatment of chronic renal failure" was cataloged throughout the national territory under code 03.05.02.005-6. It is noteworthy that all data collected refer to records dated January 1, 2013 to December 31, 2017. In addition, the data presented here cover the following categories: N180 (End-stage renal disease), N188 (Other Chronic Kidney Failure) and N189 (Unspecified Chronic Kidney Failure), Chapter XIV (Genitourinary Tract Diseases), 10th International Classification of Diseases and Related Health Problems (ICD-10).

Subsequently, the collected data were correlated with hospital morbidity (hospitalizations and deaths), hospital service costs spent with hospitalizations, average hospitalization value and average length of stay in the hospital unit. It is noteworthy that, because the source of data collection is public domain, open access and without identification of participants, this study did not need to be evaluated by the Research Ethics Committee, according to Resolution 466/2012 of the National Health Council.

RESULTS

According to Table 1, there were 47,882 hospitalizations and 6,919 deaths due to CKF in

the Brazilian Northeast. The state of Bahia was the most prevalent in hospitalizations, with 10,939 (22.8%), and deaths with 1,772 (25.6%).

Table 1. Morbidity due to chronic renal failure in northeastern Brazil according to the study period. Jequié (BA), Bahia, Brazil, 2018.

Federative Units	2013	2014	2015	2016	2017	Total	%
HOSPITALIZATIONS							
Maranhão	101	1,255	1,266	1,406	1,273	5,301	11.1
Piauí	53	569	654	759	440	2,475	5.2
Ceará	191	1,804	1,751	1,806	1,618	7,170	15.0
Rio Grande do Norte	86	484	527	541	491	2,129	4.4
Paraíba	42	1,059	1,032	795	700	3,628	7.6
Pernambuco	178	2,260	2,248	2,478	2,724	9,888	20.7
Alagoas	50	1,267	1,229	1,258	1,056	4,860	10.1
Sergipe	44	379	312	429	328	1,492	3.1
Bahia	208	2,631	2,636	2,664	2,800	10,939	22.8
Total	953	11,708	11,655	12,136	11,430	47,882	100
ÓBITOS							
Maranhão	7	133	176	158	132	606	8.8
Piauí	9	109	139	108	44	409	5.9
Ceará	26	245	204	242	226	943	13.6
Rio Grande do Norte	19	104	99	93	75	390	5.6
Paraíba	5	118	117	107	95	442	6.4
Pernambuco	18	296	333	368	350	1,365	19.7
Alagoas	6	139	188	162	143	638	9.2
Sergipe	14	70	94	103	73	354	5.1
Bahia	42	420	426	440	444	1,772	25.6
Total	146	1,634	1,776	1,781	1,582	6,919	100

Source: Ministry of Health - UHS Hospital Information System (HIS/UHS)

Regarding the hospital costs in the management of CKF, there was a charge of R\$ 79,132,453.29 to the public coffers, as shown in table 2. In addition, over the years, the values presented

behavior and the state of Pernambuco generated a greater financial impact with R\$ 23,81,884.18 (30.1%).

Table 2. Hospital costs for the treatment of chronic kidney failure in northeastern Brazil according to the study period. Jequié (BA), Bahia, Brazil, 2018.

Federative Units	2013	2014	2015	2016	2017	Total	%
Maranhão	177,179.80	1,590,367.66	1,767,063.94	1,652,718.32	1,722,738.34	6,910,068.06	8.7
Piauí	56,421.05	753,639.70	830,982.35	1,114,251.45	469,186.93	3,224,481.48	4.1
Ceará	291,907.94	2,503,507.78	2,563,444.50	2,602,949.90	2,232,824.52	10,194,634.64	12.9
Rio G. Norte	128,532.42	889,881.82	1,059,883.51	966,355.76	809,760.00	3,854,413.51	4.9
Paraíba	56,297.38	990,924.48	1,109,294.89	996,559.10	946,858.01	4,099,933.86	5.2
Pernambuco	410,120.16	4,924,527.59	5,071,417.54	6,073,870.95	7,333,947.94	23,813,884.18	30.1
Alagoas	58,084.54	1,121,959.88	1,321,872.77	1,480,885.70	1,323,872.10	5,306,674.99	6.7
Sergipe	90,258.74	449,427.36	933,771.15	1,192,271.43	1,136,111.02	3,801,839.70	4.8
Bahia	407,773.75	3,792,964.26	4,169,163.91	4,162,319.95	5,394,301.00	17,926,522.87	22.7
Total	1,676,575.78	17,017,200.53	18,826,894.56	20,242,182.56	21,369,599.86	79,132,453.29	100

Source: Ministry of Health - UHS Hospital Information System (HIS/UHS)

It is verified that the average hospitalization value in the Northeast was R\$ 1,816.11 and the average length of stay in the hospital was 10.4 days. In the state of Sergipe, the highest prevalence was recorded in the two variables, respectively, with R\$ 2,795.87 and 15 days.

Table 3. Average cost of hospitalization and average stay in the Northeast of Brazil by Chronic Kidney Failure. Jequié (BA), Bahia, Brazil, 2018.

Federative Units	Average value of hospitalization	Average length of stay
Maranhão	1,473.00	11.5
Piauí	1,416.82	7.9
Ceará	1,538.89	10.6
Rio Grande do Norte	1,982.17	9.5
Paraíba	1,261.57	7.3
Pernambuco	2,614.36	11.9
Alagoas	1,220.76	5.9
Sergipe	2,795.87	15
Bahia	1,815.35	11.5
Total	1,816.11	10.4

Source: Ministry of Health - UHS Hospital Information System (HIS/UHS)

DISCUSSION

In the first instance, it is reported that, despite the fact that CKF has been a growing object of study in recent years, there is a scarcity of research on the theme in the Northeast region of the country. As a result, it was difficult to construct the discussion, making it impossible to evidence concrete justifications for arguing the results.

From this perspective, researchers draw the attention to the importance of epidemiological and economic studies in regions with low socioeconomic status, in order to scientifically disseminate the real health needs of the population and contribute to the direction of actions that reduce or eliminate health inequalities among the most vulnerable groups.

In the Northeast region, 11,308 people with HD attend the therapy in 134 active centers, representing 18% of dialysis units throughout Brazil.¹⁷ It is noted that between 2013 and 2015, there was an increase hospitalizations for all causes in the country and it was recorded that CKF and associated comorbidities represented, respectively, 1.82% and 5.79% of hospitalizations for all causes.¹⁸

It is reported that Bahia is the largest state in the Northeast and has a higher number of people of African descent (78.8%)¹⁹ and in a situation of socioeconomic vulnerability. As a consequence, the higher prevalence of individuals with risk factors for the development of CKF stands out, which may be associated with their significant hospitalization and death values, as shown in Table 1.

However, it should be noted that the Northeast of Brazil has a significant poverty rate,²⁰ potential risk factors for the development of hypertension and diabetes mellitus. In addition, the lower socioeconomic conditions are associated with the clinical presence of macroalbuminuria, reduced glomerulus filtration rate and progressive loss of nephron function.²¹

It is also warned that renal failure is associated with lower educational levels, while people with higher education have more access to RRT and / or Tx. It is reported that these results clearly demonstrate the size of health inequity in Brazil,²¹ especially in the Northeast region, by recording the highest illiteracy rates among all regions of the country,²² showing another risk factor for the development of CKF.

Regarding the hospital costs in the management of the pathology, there was a charge of R \$ 79,132,453.29 to the public coffers, as shown in table 2. It is also emphasized that over the years, the values presented a growing behavior and the State of Pernambuco generated the largest financial impact, with R \$ 23,81,884.18 (30.1%).

It is regretted that research on hospitalizations and public costs due to CKF in the state of Pernambuco is scarce. A study was conducted in an emergency department of the state, showing that, among hospitalizations admitted in July and August 2012, 38.46% of patients had renal function failure and 15.38% had end-stage CKF. Furthermore, many CKF diagnoses were given to patients who were unaware of their nephrological clinical condition.²³

It is noteworthy that this condition, reported in 2012, may have expanded over the years of this study and promoted greater burden on public health services, since the patient who receives a diagnosis of CKF, in a dialysis stage in the hospital, needs more assistance from orientation to the first dialysis procedures, when necessary, among other assistance procedures that involve greater technological resources.

It is observed, in a study conducted in Brazil with the objective of establishing the expenses with UHS hospitalizations for CKF and related diseases, that, in the period 2013-2015, such pathologies accounted for 12.97% of the total expenses with hospitalizations. in the country, considering all the causes. These results are noteworthy because they are a significant value in health prescriptions, and it is expected that these values will increase over the years.¹⁸

Please note that, as regards economic studies applied to health, consideration should be given to the approval in 2016 of Constitutional Amendment 241/2016 in Brazil. It is a new tax regime that limits Brazilian public sector spending for 20 years. It is warned that this measure will not guarantee economic growth and will significantly reduce the country's investments in public health and education.²⁴

It was found, based on economic simulations, that, with the adoption of the ceiling of public spending, the 4% of Gross Domestic Product (GDP) in 2015, destined to health and education will suffer intense reduction to 2.7% in 20 years of the new tax regime, when there will be population growth of up to 10%. Thus, it is stated that such a measure precludes any possibility of improvement in public health and education, in addition to promoting scrapping and nullifying the universality of these sectors.²⁴

However, it is reported that the new tax regime raises concerns about its impacts on the epidemiological behavior of hospitalizations due to CKF, since investments in health will not accompany the aging of the Brazilian population and, as a consequence, there may be drastic increase in prevalence and incidence of the main etiological factors of CKF, increasing hospitalizations and public costs.

Table 3 shows that the average hospitalization value in the Northeast was R \$ 1,816.11 and the average length of stay in the hospital was 10.4 days. Sergipe recorded a higher prevalence in both variables, respectively, with R\$ 2,795.87 and 15 days. However, there is a lack of data in the literature to justify such results, as Sergipe has the smallest resident population (2,278,308),²⁵ the third lowest rate of CRI carriers (447 / million inhabitants)²⁶ and fourth largest Human Development Index (0.665)²⁵ among other states in the region.

It is noteworthy that, periodically, the system must undergo reorganization in order to enable health promotion actions, prevention of diseases, early diagnosis and treatment of diseases and disabilities observed in the population.²⁷ It is also mentioned that in the primary health care, the therapeutic and control measures of DM and SAH can significantly prolong renal function and reduce risk factors for the development and progression of CKF.²¹

It is emphasized that the Brazilian context expresses great socioeconomic and cultural diversity that significantly interferes with the health needs of the population. Factors with great potential to influence lifestyle changes, vulnerability situations, political commitment and the influence of the media, pharmaceutical and industrial sectors are mentioned.²⁸

CONCLUSION

It is concluded that morbidity due to chronic renal failure is still a serious public health problem, directly implying the increase and ascendancy of hospital costs. It is cautioned that this study reveals data capable of awakening the self-care of the population and strengthening the actions of primary care in the prevention and control of the disease and its etiological factors in order to reduce hospitalizations and reduce burdens.

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