



ORIGINAL ARTICLE

HOSPITALIZATIONS, DEATHS AND HOSPITAL COSTS DUE TO DIALYTIC INTERCORRENCES

INTERNAÇÕES, ÓBITOS E CUSTOS HOSPITALARES PELAS INTERCORRÊNCIAS DIALÍTICAS
HOSPITALIZACIONES, MUERTES Y COSTOS HOSPITALARIOS POR INTERCURRENCIAS DIALÍTICAS

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ABSTRACT

Objective: to describe hospitalizations, deaths and hospital costs due to dialysis complications in chronic renal patients in the Northeast. **Method:** this is a quantitative, descriptive and ecological study, focused on the analysis of data from the Hospital Information System, organized in absolute and relative frequencies, using tables built using Excel software. **Results:** 14,052 hospitalizations and 987 deaths were reported in the Northeast. As a result, the public coffers cost over R \$ 19.6 million, with an average hospitalization value of R \$ 1,543.09 and an average length of stay of 9.1 days. The states of Alagoas stood out, with the prevalence of hospitalizations (38.2%), and Bahia, in relation to deaths (40%), hospital costs (61.4%), average length of stay (14.4 days) and average value of hospitalization (R \$ 2,794.42). **Conclusion:** it is pointed out that hospitalizations and deaths due to dialysis complications are an important problem in Nephrology, causing direct damage to public financial resources, especially in the states of Bahia and Alagoas, as they show the majority of cases. **Descriptors:** Public Health; Nephrology; Kidney Diseases; Peritoneal Dialysis; Renal Dialysis; Health Care Costs.

RESUMO

Objetivo: descrever as internações, óbitos e custos hospitalares pelas intercorrências dialíticas em pacientes renais crônicos no Nordeste. **Método:** trata-se de um estudo quantitativo, descritivo e ecológico, voltado para a análise de dados do Sistema de Informações Hospitalares, organizados em frequências absolutas e relativas, a partir de tabelas construídas no software Excel. **Resultados:** notificaram-se 14.052 internações e 987 óbitos no Nordeste. Gerou-se, como consequência, um custo superior a R\$ 19,6 milhões aos cofres públicos, com um valor médio de internação de R\$ 1.543,09 e uma média de permanência de 9,1 dias. Destacaram-se os Estados de Alagoas, com a prevalência das internações (38,2%), e Bahia, em relação aos óbitos (40%), custos hospitalares (61,4%), média de permanência (14,4 dias) e valor médio de internação (R\$ 2.794,42). **Conclusão:** aponta-se que as internações e óbitos pelas intercorrências dialíticas constituem um importante problema na Nefrologia, causando prejuízos diretos aos recursos financeiros públicos, especialmente, nos Estados da Bahia e Alagoas, por evidenciarem a maioria dos casos. **Descritores:** Saúde Pública; Nefrologia; Nefropatias; Diálise Peritoneal; Diálise Renal; Custos de Cuidados de Saúde.

RESUMEN

Objetivo: describir las hospitalizaciones, muertes y costos hospitalarios por las intercorrencias dialíticas en pacientes renales crónicos en el noreste. **Método:** se trata de un estudio cuantitativo, descriptivo y ecológico, destinado a analizar los datos del Sistema de Informaciones del Hospital, organizado en frecuencias absolutas y relativas, a partir de tablas construidas en el software Excel. **Resultados:** se reportaron 14.052 hospitalizaciones y 987 muertes en el noreste. Se generó como resultado de eso, un costo en exceso de R \$ 19,6 millones para el gobierno, una hospitalización con costo promedio de R\$1,543.09 y una estadía promedio de 9.1 días. Entre los estados, Alagoas tuvo una mayor prevalencia de hospitalizaciones (38,2%) y Bahía en las muertes (40%), costos hospitalarios (61,4%), duración media de la estancia (14,4 días) y media hospitalización (R \$ 2.794,42). **Conclusión:** se observa que las hospitalizaciones y muertes debidas a las intercorrencias dialíticas se constituyen un problema importante en la nefrología, lo que implica directamente en los cofres públicos, especialmente en los Estados de Bahía y Alagoas, como evidencia de una mayor prevalencia de casos. **Descritores:** Salud Pública; Nefrología; Enfermedades Renales; Diálisis Peritoneal; Diálisis Renal; Costos de la Atención en Salud. **Descritores:** Salud Pública; Nefrología; Enfermedades Renales; Diálisis Peritoneal; Diálisis Renal; Costos de la Atención en Salud.

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INTRODUCTION

The kidneys are physiologically presented in paired form through the peritoneum in the upper portion of the abdomen, positioned on each side of the vertebral column.¹ It is reported that, in general, the kidneys have endocrine, tubular and glomerular functions and play an essential role in the excretion of nitrogenated slag, guaranteeing the hydroelectrolytic balance and executing other actions that promote and maintain body homeostasis.²

Due to the increase in life expectancy and, consequently, the population aging, there is a significant increase in the incidence rates of chronic diseases, such as systemic arterial hypertension (SAH) and Diabetes Mellitus (DM)³⁻⁴ which constitute the two main pathologies involved in the genesis of chronic kidney failure (CKF),^{3,5} a pathological condition in which slow, progressive and irreversible loss of renal function occurs.^{2,6}

It is mentioned that when the individual is diagnosed with end-stage CRF, it is necessary to submit it to one of the dialysis modalities to promote body homeostasis and, consequently, the maintenance of life. Among the modalities, hemodialysis (HD) and peritoneal dialysis (PD) stand out.^{2,5-6}

It is reported that in HD, filtration and blood clearance occurs extracorporeally through a semipermeable membrane that integrates the hemodialysis device.^{3,7} In PD, these processes are performed by infusing specific solutions in the peritoneal cavity that, through the peritoneum membrane, promotes diffusion, ultrafiltration and convection. These modalities have a significant impact on public health,¹ in social and economic terms,⁸ although there are reasons that PD has low cost in relation to HD.⁹

Although dialysis provides organic homeostasis, and despite technological and professional advancements in the field of Nephrology, dialysis therapies can generate complications during and after treatment.^{5,9-11} In this sense, it is considered that dialytic patients need redoubled care and observations in order to identify such complications early,⁵ which can be serious¹² and therefore, there is a need for hospitalizations to stabilize the clinical picture.⁷

It is defined as intercurrents or adverse events, any events that compromise the physical, social or psychological integrity of the patients, among which are mentioned pathologies, injuries, sufferings, deaths or disabilities.¹¹ It is also mentioned that in dialysis, intercurrents may be

inherent in dialysis therapy itself,⁷ to errors in professional interventions¹² and the organic responses of each patient to the treatment.⁷ It is emphasized that, as a result, the dialysis population presents a mortality rate 3.5 times higher than the general population, considering some factors such as age group and presence of comorbidities.⁵

Given this context, this study is justified due to the need to disseminate knowledge about the epidemiology of dialysis complications and its financial repercussions for the Unified Health System (UHS), which is based on universality, equity and comprehensiveness, covers the entire Brazilian territory and on which about 80% of the national population depend.¹³

It is argued, however, that, with the scientific dissemination of public expenditures, it is possible to strengthen health promotion and disease prevention actions, especially those that favor CKD and, therefore, lead to the need for dialysis therapies.

OBJECTIVE

- To describe hospitalizations, deaths and hospital costs due to dialytic intercurrents in chronic renal patients in the Brazilian Northeast between 2012 and 2017.

METHOD

It is a quantitative, descriptive and ecological study built using electronic data belonging to the Hospital Information System (HIS). HIS is indexed to the Department of Informatics of the Unified Health System (DATASUS) and is an important tool for health planning and management actions.¹⁴⁻⁵

It should be noted that, in HIS, data on hospital admissions financed by the public health system throughout the national territory are recorded through the Hospitalization Authorizations, configured as a documentary document with a significant level of reliability that is made official at the time of admission of the patient in the institution.¹⁴⁻⁵

It is revealed that, the Brazilian Northeast consists of one of the regions with the highest population quantification, expressing a contingent of over 56.7 million inhabitants,¹⁶ distributed in nine Federative Units (FU) according to table 1.

Table 1. Population and territorial extension of the Brazilian Northeast according to the Federative Units. Jequié (BA), Brazil, 2018.

Federative Units	Population	Territorial extension
Maranhão	7,035,055	331,936,949 km ²
Piauí	3,264,531	251,611,929 km ²
Ceará	9,075,649	148,887,633 km ²
Rio Grande do Norte	3,479,010	52,811.107 km ²
Paraíba	3,996,496	56,468,435 km ²
Pernambuco	9,496,294	98,076,021 km ²
Alagoas	3,322,820	27,848,140 km ²
Sergipe	2,278,308	21,918,443 km ²
Bahia	14,812,617	564,732,450 km²

Source: Brazilian Institute of Geography and Statistics ¹⁷

In the HIS platform, the option of “treatment of complications in chronic renal patients under dialytic treatment” was selected, cataloged throughout the national territory under code 03.05.01.017-4, configuring as a medium complexity procedure. Then, the following variables were adopted: hospitalizations; deaths; values of hospital services; average value of hospitalization and average stay.

Data was collected in September 2018, tabulating them in the Microsoft Office Excel program, in which a descriptive analysis was performed, whose results were presented by absolute and relative frequencies. Only cases reported between January 2012 and December 2017 were considered. Records were found in categories A419, A499, E870 to E876, E878, N180,

N188, N189 and R509 of the 10th International Classification of Diseases and Problems. Health Related (ICD-10).

This study is based on Resolution 466/2012 of the National Health Council, and due to its methodological outline, there was no need for approval by the Research Ethics Committee.

RESULTS

During the study period, there were 14,052 hospitalizations and 987 deaths, as shown in table 2. It is also noted that the State of Alagoas had the most hospitalizations, with 5,373 (38.2%), and that Bahia stood out in the deaths, with 394 (40%).

Table 2. Hospitalizations and deaths due to the treatment of dialysis in the Northeast of Brazil. Jequié (BA), Brazil, 2012-2017.

Variables	2012	2013	2014	2015	2016	2017	Total	%
HOSPITALIZATIONS								
Maranhão	-	1	5	7	13	24	50	0.4
Piauí	20	696	484	309	235	243	1,987	14.1
Ceará	10	141	103	97	67	96	514	3.7
Rio Grande do Norte	1	34	33	32	47	56	203	1.4
Paraíba	-	35	93	119	170	149	566	4.0
Pernambuco	8	138	216	112	93	45	612	4.4
Alagoas	70	1,057	1,129	1,076	1,026	1,015	5,373	38.2
Sergipe	-	2	-	10	9	4	25	0.2
Bahia	82	796	627	848	1,448	921	4,722	33.6
Total	191	2,900	2,690	2,610	3,108	2,553	14,052	100
DEATHS								
Maranhão	-	-	-	-	1	-	1	0.1
Piauí	3	38	15	12	17	26	111	11.2
Ceará	-	4	6	6	11	8	35	3.5
Rio Grande do Norte	-	10	14	-	2	2	28	2.8
Paraíba	-	-	6	7	9	6	28	2.8
Pernambuco	-	1	4	1	-	2	8	0.8
Alagoas	5	61	93	79	73	67	378	38.4
Sergipe	-	1	-	2	-	1	4	0.4
Bahia	7	84	48	68	116	71	394	40
Total	15	199	186	175	229	183	987	100

Source: Ministry of Health - UHS Hospital Information System (HIS / UHS) Numeric data equal to 0 not resulting from rounding

Regarding the values of hospital services, dialysis complications generated a financial impact of over R \$ 19.6 million to public coffers in the

Brazilian Northeast. In addition, Bahia accounted for 61.4% of expenses.

Table 3. Values of hospital services for the treatment of dialysis in the Northeast of Brazil. Jequié (BA), Brazil, 2012-2017.

Federative Units	2012	2013	2014	2015	2016	2017	Total (RS)	%
Maranhão	-	85	1.675	838	1,527	22,097	26,222	0.1
Piauí	11,598	378,155	236,922	136,037	150,392	261,677	1,174,781	6.0
Ceará	11,877	135,994	145,883	139,055	136,251	186,439	755,499	3.8
Rio Grande do Norte	85	71,266	69,232	49,125	157,808	164,329	511,846	2.6
Paraíba	-	9,592	43,309	117,929	201,877	151,193	523,900	2.7
Pernambuco	676	38,788	102,397	46,525	27,539	37,172	253,096	1.3
Alagoas	49,824	595,207	987,550	778,529	833,170	1,044,480	4,288,760	21.8
Sergipe	-	450	-	36,446	20,196	312	57,405	0.3
Bahia	188,461	1,402,705	1,190,010	1,931,715	4,785,173	2,561,558	12,059,621	61.4
Total	262,522	2,632,242	2,776,977	3,236,2003	6,313,932	4,429,257	19,651,131	100

Source: Ministry of Health - UHS Hospital Information System (HIS / UHS) Numeric data equal to 0 not resulting from rounding

Table 4 shows that the average length of stay of users in hospital institutions was approximately 9.1 days, with an average hospitalization value of R\$ 1,543.09. In the State of Bahia, the highest

average length of stay, with 14.4 days, and the highest average value of hospitalization were R\$ 2,794.42.

Table 4. Mean of stay and mean value of hospitalization for the treatment of dialysis in the Northeast of Brazil. Jequié (BA), Brazil, 2012-2017.

Federative Units	Average of permanence	Average hospitalization value (r\$)
Maranhão	9.3	587.43
Piauí	5.5	664.38
Ceará	11	1,626.90
Rio Grande do Norte	10.6	2,750.92
Paraíba	6.6	1.017,43
Pernambuco	2.2	455.35
Alagoas	6.6	898.63
Sergipe	10.8	2,445.63
Bahia	14.4	2,794.42
Total	9.1	1,543.09

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

DISCUSSION

It is evident that the number of occurrences associated with individuals with CKD has been growing in Brazil. This is a major public health problem as the disease affects millions of distinct individuals, regardless of racial groups, and is responsible for high morbidity and mortality rates.¹⁸

PD is constituted in a simple treatment that can be conducted at home. Thus strictly aseptic techniques are required which, if not performed, can cause serious complications.¹⁹ Among the required care, corporal hygiene in general, the antisepsis of the dwelling, the existence of a space reserved only to the PD and the technical ability of the patient and the relatives responsible for the handling of the components.

PD is performed by infusion, retention and drainage of a solution appropriate to the body temperature inside the abdominal cavity with the use of a catheter. It is reported that this process occurs through a highly vascularized membrane at the capillary and lymphatic levels, the

peritoneum, responsible for covering the organs and the abdominal wall.²⁰ It is characterized this dialytic modality by having a demanding routine and often, it favors the occurrence of errors during the techniques.⁹

The nursing team is responsible for selecting the individuals eligible or not for this treatment. It is emphasized that, individuals are evaluated with regard to the strength they demonstrate to possess, functionality of pathophysiology and their socioeconomic situations. It is decided after this analysis whether there will be adherence to the dialytic program, which mainly covers the exchange of scholarships in their respective residences.²⁰

It is stated that the determination in choosing this treatment needs to induce, in the individual, a sense of responsibility, as the demand for care is fundamental in the process performed. However, it is warned that many complications are generated due to the lack of adequate support for the therapy. It is also mentioned that the lack of knowledge generates ineffectiveness in the handling of materials, even if early guidance is offered to individuals. As a result, there is a

recurring increase in complications, including peritonitis and sepsis,⁹ responsible for the increase in morbidity and mortality rates.

Likewise, HD-adept patients experience numerous changes in daily life that require the adaptation of the individual and family to the context in which they are inserted. Thus, as CKD progresses, some characteristics become intrinsic to these people, such as the limitations that cause social, psychic, functional, physical and individual problems.¹⁸

It is noteworthy that, being the most used treatment,¹⁸ HD may cause some implications that, in the vast majority of cases, occur sporadically, however, they are often harmful or even fatal. It is clear that hemodynamic changes are the most prevalent complications in patients undergoing HD, due to the removal of large amounts of fluid in a short period of time, to maintain filtration.²¹

It is also estimated that about 30% of the hemodialysis sessions show other complications such as infections in double lumen catheters, hypothermia, muscle spasms, hypotension or arterial hypertension, changes in heart rhythm, headache, hypoxemia, pruritus, thoracic algia and lumbar, allergic reactions, nausea, emesis, fever, chills, gas embolism, among others.²²

It is pointed out that, in spite of this, the HD machines have a guarantee beneficial to the safety of the users, because they have equipment coming from alarms that activate when there is, minor that is, some type of alteration in the patient.²¹ It should be noted that, in Brazil, this system is supplied by water strictly purified by the process of deionization and reverse osmosis. It is emphasized that the second process is capable of retaining 95 to 99% of chemical contaminants, fungi, bacteria, algae, viruses, among others.¹² It is, however, reported that the method is not 100% safe so that the interurrences become non-existent.

In a cross-sectional study carried out in Alfenas (MG), 96.6% of the complications did not appear in the first HD session, which shows that avoiding and even intervening early in these events is something that is possible.²³ It is stated, then, that through various adversities, users need an adequate supervision of the nursing team, so that they are stoned with information and orientations capable of encouraging changes in habits that facilitate the acceptance of these individuals with the pathology and a better way to deal with the mechanisms of treatment.¹⁸

It is thus evident that health professionals need permanent education and training in order to reduce the number of accidents in the procedures performed and to maintain vigilance during the sessions. Therefore, it is stated that, in this way, skilled professionals will achieve more positive

results and will provide lower damages to the users, directly reflecting the improvement of the assistance.¹⁸

A total of 14,052 hospitalizations and 987 hospital deaths were found through the findings, due to the dialectical interurrences in the Brazilian Northeast, according to table 2. It is a region that has a certain peculiarity with regard to poverty. This particularity is related to the deprivation of food resources, inaccessibility to water networks and above all, difficulties in access to public health services.²⁴

This is corroborated by a study²⁵ conducted through the National Database on Renal Replacement Therapy, which revealed a lower proportion of users who started dialysis treatment in the Northeast region. In addition, the authors emphasize that in the Northeast there is a prevalence of deaths caused by dialysis, estimated at 39.2%, in relation to other regions of the country. It is inferred, therefore, that these results may reflect the insufficiency of care activities, since most complications were preventable.²⁵

It is estimated that, worldwide, adverse events in hospital institutions have high rates of magnitude. It is reported that, in Brazil, these indices are in agreement with those found in international studies, however, when dealing with avoidable adverse events, Brazil occupies a prominent position in proportional terms.²⁵

In this sense, it is cautioned that low-income places, such as the Northeastern territory, have the biggest problems related to public policies based on interventions to improve social determinants.²⁶ Thus, dialectical interurrences are facilitated by this scenario.

The State of Alagoas was identified as having the highest number of hospitalizations of people with CKF, with 5,373 hospitalizations (38.2%). It is known that there are about 3,400 people with CKD and 11 nephrological clinics in the state.²⁷ Regarding deaths, Bahia stands out, with 394 (40%) deaths in the surveyed period. It is noteworthy that this State has, as a characteristic, marked inequalities in social areas and in the health sector. Furthermore, it is reported that resource transfers are hampered by the existing financing policy, where there is the highest concentration of investments in the few cities with the highest Human Development Index (HDI) and the lowest financial contribution to cities that show the greatest need for health.²⁸

It is also noted that the findings show a financial impact of over R\$ 19.6 million to the public coffers, according to table 3. It is emphasized that the region, which already has financial limitations, requires a high cost to maintain dialysis resources and cover complications. Of these expenditures, 61.4%

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originated in Bahia, the region with the prevalence of deaths and needs greater support to ensure the early diagnosis and treatment of complications.

It was revealed that the average value of hospitalization for each individual was R\$ 1,543.09, spent on an individual average of 9.1 days of stay in the hospital, as shown in Table 4. Most chronic renal failure patients are elderly,²⁹ prolonged hospital stay significantly increases the risk of infections due to immunodeficiency and organic weaknesses imposed by CKD. In addition, the increase in hospital costs and the absence of family life are mentioned.³⁰

CONCLUSION

In this study, it was identified that hospitalizations and deaths due to dialysis complications still constitute an important problem in Nephrology, directly implying burdens on public coffers, especially in the states of Bahia and Alagoas, as they highlight the prevalence of cases. It is cautioned that this study provides elements to promote reflection on the theme and strengthen the prevention and control of the disease and its etiological factors.

There is a scarcity in the literature about the costs of dialysis complications at the hospital level, since most studies report only the costs of outpatient treatments for CKF.

It is exposed, therefore, that it was difficult to discuss the results found. Therefore, the development of other researches on the subject is instigated, with the purpose of disseminating economic knowledge, developing strategies of diagnostic and therapeutic precocity, and enabling the improvement in health management for the rationalization and allocation of resources.

Moreover, as a limitation of the study, the inability of HIS to make available the stratified data organized by the type of dialysis occurrence is such that the presented data represent the complications in general. It is noteworthy that stratification would help to identify, with greater sensitivity, the area where preventive health actions should focus to reduce the values presented.

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