https://doi.org/10.5205/1981-8963.2019.240825

Journal of Nursing
UFPE On Line
ISSN: 1981-8963

ORIGINAL ARTICLE

ACUTE KIDNEY FAILURE IN NORTHEAST BRAZIL: MORBIMORTALITY AND PUBLIC COSTS

INSUFICIÊNCIA RENAL AGUDA NO NORDESTE BRASILEIRO: MORBIMORTALIDADE E CUSTOS PÚBLICOS

INSUFICIENCIA RENAL AGUDA EN EL NORESTE BRASILEÑO: MORBIMORTALIDAD Y COSTOS PÚBLICOS

Edison Vitório de Souza Júnior[1], Diego Pires Cruz[2], Gabriel Aguiar Nunes[3], Giovanna Maria Nascimento Caricchio[4], Sávio Luiz Ferreira Moreira[5], Laís Ramos Santos[6], Helder Caldas Torres[7], Uanderson Silva Pirôpo[8]

ABSTRACT

Objective: to describe hospital morbidity and mortality and public costs related to acute renal failure in northeastern Brazil. ***Method:*** this is a quantitative, ecological and descriptive study conducted with data from the Hospital Information System. The following variables were collected: hospitalizations; deaths; mortality; values of hospital services; average values spent on hospitalizations and average hospital stay. Data was analyzed with descriptive statistics and presented in tables prepared by Excel software. ***Results:*** 21,100 hospitalizations, 4,460 deaths and 21.1% mortality were registered. Bahia stood out in hospitalizations (28.6%) and deaths (28.7%) and Sergipe in lethality (35.6%). It generated a public cost over R $ 37.6 million and Bahia accounted for 32.1%. An average value of R $ 1,969.97 was revealed for each hospitalization and the average hospital stay was 10.2 days. ***Conclusion:*** it is concluded that the epidemiological variables were more prevalent in the states of Bahia and Sergipe. In addition, the increasing behavior of hospitalizations was evidenced, implying an increase in public costs. ***Descriptors:*** Public Health; Nephrology; Kidney Diseases; Epidemiology; Health Care Costs; Information Systems.

RESUMO

Objetivo: descrever a morbimortalidade hospitalar e custos públicos relacionados à insuficiência renal aguda no Nordeste brasileiro. ***Método:*** trata-se de estudo quantitativo, ecológico e descritivo realizado com dados do Sistema de Informações Hospitalares. Coletaram-se as variáveis: internações; óbitos; mortalidade; valores dos serviços hospitalares; valores médios gastos com as internações e média de permanência hospitalar. Analisaram-se os dados com estatística descritiva, apresentando-os em tabelas elaboradas pelo *software Excel*. ***Resultados:*** registraram-se 21.100 internações, 4.460 óbitos e mortalidade de 21,1%. Destacaram-se a Bahia nas internações (28,6%) e óbitos (28,7%) e Sergipe na letalidade (35,6%). Gerou-se custo público superior a R$ 37,6 milhões e a Bahia responsabilizou-se por 32,1%. Revelou-se valor médio de R$ 1.969,97 para cada internação e a média de permanência hospitalar foi de 10,2 dias. ***Conclusão:*** conclui-se que as variáveis epidemiológicas apresentaram maior prevalência nos Estados da Bahia e Sergipe. Evidenciou-se, além disso, comportamento crescente das internações, implicando o incremento dos custos públicos. ***Descritores:*** Saúde Pública; Nefrologia; Nefropatias; Epidemiologia; Custos de Cuidados de Saúde; Sistemas de Informação.

RESUMEN

Objetivo: describir la morbimortalidad hospitalaria y los costos públicos relacionados con la Insuficiencia Renal Aguda en el Noreste de Brasil. ***Método:*** se trata de un estudio cuantitativo, ecológico y descriptivo realizado con datos del Sistema de Informaciones Hospitalarias. Se recogieron las siguientes variables: hospitalizaciones; muertes, mortalidad, valores de los servicios hospitalarios; promedio de valores gastados en admisiones y promedio de permanencia hospitalaria. Los datos se analizaron con estadísticas descriptivas y se presentaron en tablas elaboradas por el software *Excel*. ***Resultados:*** se registraron 21.100 admisiones, 4.460 muertes y 21.1% de mortalidad. Bahía se destacó en hospitalizaciones (28.6%) y muertes (28.7%), y Sergipe en letalidad (35.6%). Se generó un costo público de más de R$ 37,6 millones y Bahía fue responsable del 32.1%. El valor medio de R $ 1,969.97 se reveló para cada hospitalización y la permanencia hospitalaria con promedio de 10,2 días. ***Conclusión:*** se concluye que las variables epidemiológicas presentaron mayor prevalencia en los Estados de Bahía y Sergipe. Además, hubo evidencia de un mayor comportamiento de hospitalización, lo que implica un aumento en los costos públicos. ***Descriptores:*** Salud Pública; Nefrología; Enfermedades Renales; Epidemiología; Costos de la Atención en Salud; Sistemas de Información.

[1,2,3,4,5,7,8]State University of Southwest Bahia / UESB. Jequié (BA), Brazil. ORCID: http://orcid.org/0000-0003-0457-0513 ORCID: http://orcid.org/0000-0001-9151-9294 ORCID: http://orcid.org/0000-0002-8738-2990 ORCID: http://orcid.org/0000-0002-4631-9530 ORCID: http://orcid.org/0000-0001-8170-1180 ORCID: http://orcid.org/0000-0001-6467-8580 ORCID: http://orcid.org/0000-0002-4476-4315 [6]College of Technology and Sciences / FTC. Jequié (BA), Brazil. ORCID: http://orcid.org/0000-0001-9947-9119

How to cite this article

Souza Júnior EV de, Cruz DP, Nunes GA, Caricchio GMN, Moreira SLF, Santos LR, *et al*. Acute kidney failure in northeast Brazil: morbimortality and public costs. J Nurs UFPE on line. 2019;13:e240825 DOI: https://doi.org/10.5205/1981-8963.2019.240825

https://doi.org/10.5205/1981-8963.2019.240825

INTRODUCTION

It is reported that the renal system performs functions of extreme relevance for the maintenance of body homeostasis. Among the functions, the excretion of toxins resulting from metabolism through glomerular filtration is cited. This function is performed through a multiplicity of events such as blood flow self-regulation in response to pressure changes and release of vasoconstrictors and vasodilators. It is revealed, however, that the renal system remains at constant risk of suffering some kind of injury and / or insufficiency.[1]

There is a clinical condition called acute kidney failure (AKF) when sudden loss of glomerular filtration occurs for a few hours or more slowly for a few days.[2] As a consequence, nitrogen slag accumulation and electrolyte imbalance in the organism of the individual are mentioned.[3-4] AKF is directly related to the increase in short- and long-term hospital morbidity and mortality rates, and may even evolve to the chronic form of the disease,[3] in addition to generating greater impacts on care costs[5-6] and clinical outcome.[7]

AKF is confirmed in the laboratory, based on Kidney Disease Improving Global Outcomes (KDIGO) when serum creatinine ≥ 0.3 mg / dL is increased within 48 hours or serum creatinine ≥ 1.5 times from baseline or when diuresis production <0.5 ml / kg / h for six hours.[8]

Worldwide, it is estimated that two million people die from AKF and those who survive have a higher risk of chronic kidney disease (CKD) in the future.[3] This is a complication present in about 5% of hospitalizations and up to 30% in intensive care units (ICU). It is pointed out that there are several etiologies of AKF. However, in 50% of the cases of hospitalized patients, such injury is due to acute tubular necrosis.[9]

According to the Brazilian Society of Nephrology (BSN), it is evident that the therapeutic management will be focused on the etiology of AKF and, consequently, there may be variations in treatment due to the multifactorial character of the disease. As an example, the patient may need to restore blood flow to the kidneys, permanently or temporarily suspend all medicines that may be related to the problem or require a clearing of the urinary tract.[2]

However, it is noteworthy that there are general recommendations for the treatment of AKF with the adherence of dietary, drug and dialysis treatments.[2] It is noteworthy that, even though it is a reversible and treatable clinical condition, individuals with AKF significantly burden more resources and need longer hospitalization. This is partly justified by the negative impacts of AKF throughout the body, the slow pace of renal injury reversal and volume overload, which have a significant capacity to increase mortality rates due to the syndrome.[3]

In this perspective, it is revealed that epidemiological studies that address public costs and morbidity and mortality due to diseases and their treatments are essential for the direction and improvement of health strategies for the qualification of care. Moreover, it is reported that the health economy has gained worldwide prominence as a relevant object of study in recent years, especially due to technological evolution, which broadens the range of therapeutic options and, especially, the lack of resources in the public sector.[10]

OBJECTIVE

- To describe hospital morbidity and mortality and public costs related to acute renal failure in the Brazilian Northeast between 2013 and 2017.

METHOD

This is a quantitative, ecological and descriptive study conducted through data contained in the hospital production section of the Hospital Information System (HIS). HIS is a tool processed by the Department of Informatics of the Unified Health System (DATASUS) and managed by the Brazilian Ministry of Health in conjunction with state and municipal health secretariats.[11]

The Northeast region, one of the five regions of Brazil, was chosen as the study scenario. The region is presented with a population contingent of approximately 56.8 million inhabitants distributed in nine Federative Units (FU) listed below with their respective populations: Maranhão (7,035,055 inhabitants); Piauí (3,264,531 inhabitants); Ceará (9,075,649 inhabitants); Rio Grande do Norte (3,479,010 inhabitants); Paraíba (3,996,496 inhabitants); Pernambuco (9,496,294 inhabitants); Alagoas (3,322,820 inhabitants); Sergipe (2,278,308 inhabitants) and Bahia (14,812,617 inhabitants).[12]

Data was collected and tabulated in September 2018. Data was collected considering the option “treatment of acute kidney failure” nationally registered as a medium complexity therapeutic procedure under code 0305020048. In addition, all were selected. data, according to chapter XIV of the 10th International Classification of Diseases and Related Health Problems (ICD-10), covering the category N17 to N17.9.

The time limit between January 2013 and December 2017 was adopted for data collection upon approval of the Hospitalization Authorizations (HA). It is reported that the following variables were collected: data on morbidity and mortality (hospitalizations, deaths and mortality rate); values of health services offered to users undergoing AKF treatment in hospitals; mean hospitalization value and mean

https://doi.org/10.5205/1981-8963.2019.240825

hospital stay related to AKF. It is noteworthy that mortality was defined based on the ratio between deaths and hospitalizations multiplied by 100.

Data was analyzed using simple descriptive statistics (absolute and relative frequencies) to present the results. This study is supported by the ethical and legal aspects for the development of scientific research and, as it was a study whose data were obtained through a public domain Information System, there was no need for approval by the Ethics Committee in Research, in compliance with Resolution No. 466/2012 of the National Health Council.

RESULTS

In the Northeast of Brazil, 21,100 hospitalizations for patients with AKF were recorded, according to table 1. It was evidenced that of these 4,460 (21.1%) people died, which corresponded to a mortality rate. 21.1%. It is noteworthy that Bahia had a higher prevalence of hospitalizations and deaths, with 6,026 (28.6%) and 1,278 (28.7%), respectively. It is also mentioned that the state of Sergipe showed higher mortality, with 35.6%.

Table 1. Hospital morbidity and mortality due to acute renal failure in Northeastern Brazil. Jequie (BA), Brazil, 2018.

Variables	2013	2014	2015	2016	2017	TOTAL	%
Hospitalizations							
Maranhão	30	561	616	721	945	2.873	13.6
Piauí	42	485	494	461	516	1.998	9.5
Ceará	80	904	932	877	935	3.728	17.7
Rio Grande do Norte	39	210	243	296	281	1.069	5.1
Paraíba	13	140	166	179	143	641	3.0
Pernambuco	49	821	802	854	894	3.420	16.2
Alagoas	1	143	172	155	152	623	3.0
Sergipe	18	119	211	209	165	722	3.4
Bahia	108	1,177	1,628	1,600	1,513	6,026	28.6
Total	380	4,560	5,264	5,352	5,544	21,100	100
Deaths							
Maranhão	10	99	96	112	98	415	9.3
Piauí	7	84	96	70	53	310	7.0
Ceará	22	201	202	222	223	870	19.5
Rio Grande do Norte	8	48	55	74	70	255	5.7
Paraíba	4	36	43	54	33	170	3.8
Pernambuco	7	176	199	182	168	732	16.4
Alagoas	0	34	47	42	50	173	3.9
Sergipe	6	33	76	73	69	257	5.8
Bahia	25	255	364	327	307	1,278	28.7
Total	89	966	1,178	1,156	1,071	4,460	100
Mortality							
Maranhão	33.3	17.7	15.6	15.5	10.4	14.4	14.4
Piauí	16.7	17.3	19.4	15.2	10.3	15.5	15.5
Ceará	27.5	22.2	21.7	25.3	23.9	23.3	23.3
Rio Grande do Norte	20.5	22.9	22.6	25.0	24.9	23.9	23.9
Paraíba	30.8	25.7	25.9	30.2	23.1	26.5	26.5
Pernambuco	14.3	21.4	24.8	21.3	18.8	21.4	21.4
Alagoas	0	23.8	27.3	27.1	32.9	27.8	27.8
Sergipe	33.3	27.7	36.0	34.9	41.8	35.6	35.6
Bahia	23.2	21.7	22.4	20.4	20.3	21.2	21.2
Total	23.4	21.2	22.4	21.6	19.3	21.1	21.1

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

Table 2 shows that the AKF generated a financial impact of over R $ 37.6 million to the public coffers. It is worth mentioning Bahia, among the Northeastern States, which showed greater burden, totaling R$ 12,097,684.22 (32.1%).

Table 2. Values of hospital services for treatment of acute renal failure in Northeast Brazil. Jequie (BA), Brazil, 2018.

Federative units	2013	2014	2015	2016	2017	Total	%
Maranhão	45,470.72	494,546.83	492,448.80	717,794.20	832,291.72	2,582,552.27	6.9
Piauí	46,162.25	574,159.66	565,931.12	503,990.36	528,696.70	2,218,940.09	5.9
Ceará	205,524.26	1,942,891.78	2,176,565.94	1,868,032.33	1,884,369.01	8,077,383.32	21.5
Rio G. do Norte	51,048.88	237,049.03	360,872.34	462,681.13	387,441.52	1,499,092.90	4.0
Paraíba	12,838.73	186,661.92	209,893.59	283,504.18	244,233.11	937,131.53	2.5
Pernambuco	99,514.17	1,549,937.96	1,830,491.99	2,211,504.17	2,115,092.72	7,806,541.01	20.7
Alagoas	398.31	193,128.41	183,594.02	137,839.66	158,080.67	673,041.07	1.8
Sergipe	61,678.21	176,703.43	406,171.05	675,803.10	424,293.52	1,744,649.31	4.6
Bahia	282,966.35	2,073,042.82	3,587,998.62	3,109,409.83	3,044,266.60	12,097,684.22	32.1
Total	805,601.88	7,428,121.84	9,813,967.47	9,970,558.96	9,618,765.57	37,637,015.72	100

Rio G. do Norte – Rio Grande do Norte
Source: Ministry of Health - UHS Hospital Information System (HIS / UHS)

https://doi.org/10.5205/1981-8963.2019.240825

Table 3 shows that the average value of hospitalizations in the Northeast was R $ 1,969.97 and that the region had an average hospital stay of 10.2 days of hospitalization. It is evident that the state of Sergipe stood out with the highest average value of hospitalizations and hospital stay, with R $ 2,675.26 and 14.6 days, respectively.

Table 3. Average value of hospitalization and average length of hospital stay for treatment of acute renal failure in Northeast Brazil. Jequie (BA), Brazil, 2018.

Federative units	Average value of hospitalization	Average length of stay
Maranhão	1,015.45	6.6
Piauí	1,200.10	7.8
Ceará	2,357.25	11.7
Rio Grande do Norte	1,554.10	9.9
Paraíba	1,670.93	9.6
Pernambuco	2,495.77	10.8
Alagoas	1,214.88	6.0
Sergipe	2,675.26	14.6
Bahia	2,241.45	11.6
Total	1,969.97	10.2

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

DISCUSSION

Three therapeutic modalities are available for the treatment of AKF: dietary modification, medication use and renal replacement therapy (RRT). It is noteworthy that such modalities have the objective of maintaining the metabolic stability of the user in order to prevent complications and, consequently, to recover renal function.[9]

The goal of the dietary change is to promote water and food restriction and, consequently, to reduce the accumulation of toxic products that are physiologically eliminated by the renal system. It is usually recommended to offer a high carbohydrate, hypoproteic, hyposodium and hypopotassic diet.[2] It is noteworthy that patients with AKF have a high nutritional risk, as they are always hypercatabolism and reduced nutritional intake.[13] It is also warned that care should be intensified if the user is elderly due to physiological changes associated with underlying diseases that compromise their nutritional status.[14]

Antibiotics may be used to target medications to promote the prevention or treatment of possible infectious agents that are causing or aggravating AKF. Drugs with diuretic properties are also prescribed to enable the production and elimination of diuresis, as well as the use of calcium and insulin to prevent severe hyperkalemia.[2]

It is reported that the current KDIGO guidelines for AKF users requiring RRT above all recommend obtaining an ultrafiltrate volume of 20-25 ml / kg / hr for continuous mode or a weekly Kt / V of at least 3.9 for intermittent or prolonged modalities. However, it is noteworthy that peritoneal dialysis (PD) is also one of the therapeutic modalities for AKF, especially in developing countries, as it is a simple, safe, effective and low cost modality.[3]

It is also emphasized that RRT is not always necessary for the treatment of AKF, [2] besides being a modality that can cause complications during sessions of varying magnitudes, including fatality.[9] From this perspective, it is evident that the prognosis of AKF users in continuous dialysis treatment is puzzling and has a high mortality rate.[13] It is cautioned that the patient's clinical conditions need to be incompatible with organic homeostasis, such as hypervolemia, metabolic acidosis, refractory heart failure, hypermagnesemia, uremia, hyperkalemia, and other electrolyte and platelet disorders.[2,13]

Bahia had a higher prevalence of hospitalizations, with 6,026 (28.6%), and deaths, with 1,278 (28.7%), as shown in table 1. It is reported that these results may reflect the largest contingent. population among the northeastern states or even by the largest number of black people.[15] It is evident from the literature that blacks are at increased risk for the development of acute kidney injury when compared to white ethnicity.[16] Several arguments are raised to explain this association, such as higher prevalence of diabetes mellitus in this population, in addition to behavioral, biological, social and health factors.[17]

It is defined, in terms of financial costs, primarily terms used in any economic analysis: expenses, expenses and costs. Expenses are defined as sacrifices or economic commitments made to purchase any product or service. Expenses refer to expenditures that are essential for obtaining revenues. Finally, costs are considered as the values of all resources employed in health actions and services.[18]

Costs are divided into two categories: direct and indirect. It is revealed that the first division may be of medical and non-medical origin[18] and reflects the values applied directly to users or care,[10] such as medicines, medical equipment, diagnostic and therapeutic methods, consultations, hospitalizations, among others, such as this study. It is clear, however, that indirect costs are those employed when there is loss of functionality and productivity resulting from health problems,[18] such as sick leave, social security admission, pensions, among others.[19-20]

In this study, there were costs with treatment of AKF greater than R$ 37.6 million to public coffers, and Bahia stood out with the highest burden, totaling R$ 12,097,684.22 (32.1%), according to Table 2. It is noteworthy that during hospitalization, the user goes through various sectors responsible for contributing to their recovery, demanding different costs for each procedure performed.[21]

It is warned that the higher prevalence in morbidity and mortality variables observed in the State of Bahia may have influenced the higher burden on public coffers, corroborating a study[18] that showed higher cost (71.6%) in hospitalizations when the clinical outcome was death. This financial increase results from the treatment of users with end-stage diseases that are usually more costly.[18]

Table 3 shows that the state of Sergipe obtained the highest average hospital stay (10.2 days) and average hospitalization (R$1,969.97). These results corroborate a study that shows that the longer the patient's length of stay in hospital institutions, the higher the costs to health services.[22]

In a nationwide study, the costs of CKD in 2015 in Brazil through UHS were demonstrated. Costs were charged at R $ 57,892,010.54 by serum creatinine test; at R $ 1,801,647.28 for creatinine clearance; at R $ 49,998,226.18 per serum urea; R $ 32,148.24 for renal and urinary tract ultrasound; R $ 1,886,073.27 per 24-hour proteinuria, among other costs.[23]

Thus, the high values of financial resources for the treatment of CKD in Brazil are found. In this perspective, it is warned that the disease presents an increasing behavior annually, due to the higher survival rate and, consequently, the emergence of non-communicable chronic diseases, such as systemic arterial hypertension and Diabetes Mellitus.[24-6]

It is also reported that AKF is common, deleterious, with therapeutic availability and, in most cases, is a condition that can be prevented. However, due to the many factors that permeate the lives of users and the multiplicity of clinical situations in which AKF is diagnosed, there is a challenge to standardize an evaluative and therapeutic approach to users with the syndrome. It is also ensured that some preventive measures are adopted, such as adequate hematocrit, hemodynamic and oxygenation control, increased water supply, elimination of nephrotoxic drugs, among others.[3]

CONCLUSION

It was concluded that the epidemiological variables were more prevalent in the states of Bahia and Sergipe. In addition, the increasing behavior of hospitalizations was evidenced, implying an increase in public costs. Thus, the indispensability of strengthening health promotion and protection actions in order to prevent pathological and external events that develop kidney injury is disclosed. It also warns of the need to intensify care during hospitalizations in order to reduce the evolution and mortality from the disease.

This study was constructed using secondary data from an information system. In this perspective, the data presented may contain underreporting and, therefore, the inaccuracy of the results. However, HIS is an indispensable tool for the monitoring of diseases and diseases at the national level and, consequently, the directing of control, preventive and therapeutic actions for the Brazilian population.

REFERENCES

1. Amorin F, Altino RC, Saranholi TL. Principais causas para o desenvolvimento de lesão renal aguda em pacientes internados em unidade de terapia intensivarevisão integrativa. Rev Salusvita (Online) [Internet]. 2017 [cited 2018 Sept 18];36(2):615-28. Available from: https://secure.usc.br/static/biblioteca/salusvita/salusvita_v36_n2_2017_art_16.pdf

2. Sociedade Brasileira de Nefrologia. Insuficiência Renal. [Internet] [cited 2018 Sept 23]. Available from: https://sbn.org.br/publico/doencas-comuns/insuficiencia-renal-aguda/

3. Li PKT, Burdmann EA, Mehta RL. Injúria renal agudaum alerta global. J Bras Nefrol. 2013 Mar;35(1)1-5. Doi: http://dx.Doi:.org/10.5935/01012800.20130001

4. Schmidt L, Wiese LPL, Pereira EM, Possamai KS, Santos E, Fernandes FM. Lesão renal aguda em pacientes críticosperfil clínico e relação com processos infecciosos graves. Rev Bras Farm Hosp Serv Saúde [Internet]. 2016 July-Sept [cited 2018 Sept 18];7(3):19-24. Available from: http://www.sbrafh.org.br/rbfhss/public/artigos/2016070303000956BR.pdf

5. Meersch M, Schmidt C, Zarbock A. Perioperative Acute Kidney InjuryAn Under Recognized Problem. Anesth Analg. 2017 Oct;125(4):1223-32. Doi: https://Doi: .org/10.1213/ANE.0000000000002369

6 Doi K. Role of kidney injury in sepsis. J Intensive Care. 2016 Mar;4:17. Doi: http://dx.Doi: .org/10.1186/s40560-016-0146-3

7. Sood MM, Shafer LA, Ho J, Reslerova M, Martinka G, Keenan S et al. Early reversible acute kidney injury is associated with improved survival in septic shock. J Crit Care. 2014 Oct;29(5):711-7. Doi: http://dx.Doi: .org/10.1016/j.jcrc.2014.04.003

8. Ram P, Mezue K, Pressman G, Rangaswami J. Acute kidney injury post–transcatheter aortic valve replacement. Clin Cardiol. 2017 Dec;40(12):1357-62. Doi: http://dx.Doi: .org/10.1002/clc.22820

9. Silva CMS, Silva DAN, Silva GGP, Maia LFS, Oliveira TS. Insuficiência renal agudaprincipais causas e a intervenção de enfermagem em UTI. Revista Recien [Internet]. 2016 [cited 2018 Sept 18];6(16):48-56. Available from: https://www.recien.com.br/index.php/Recien/article/view/134

10. Silva DG, Reis LA, Marinho Chrizóstimo M, Carvalho Alves EM. La concepción del enfermero sobre gerenciamiento del costo hospitalário. Eglobal [Internet]. 2010 June [cited 2018 Sept 26];9(2). Available from: http://revistas.um.es/eglobal/article/view/107231

11. Brasil. Departamento de Informática do Sistema Único de Saúde. Procedimentos Hospitalares do SUS por local de internação – a partir de 2008 Notas Técnicas. [Internet] [cited 2018 Sept 18]. Available from: http://tabnet.datasus.gov.br/cgi/sih/Proced_hosp_loc_int_2008.pdf

12. Brasil. Instituto Brasileiro de Geografia e Estatística (IBGE). Estimativas da população residente no Brasil e unidades da federação com data de referência em 1º de julho de 2018 [Internet]. 2018 [cited 2018 Sept 19]. Available from: ftp://ftp.ibge.gov.br/Estimativas_de_Populacao/Estimativas_2018/estimativa_dou_2018.pdf

13. Nunes TF, Brunetta DM, Leal CM, Pisi PCB, Roriz-Filho JS. Insuficiência renal aguda. Medicina [Internet]. 2010 [cited 2018 Sept 23];43(3):272-82. Available from: http://revista.fmrp.usp.br/2010/vol43n3/Simp6_insufic%20renal%20aguda.pdf

14. Cavalcanti CL, Gonçalves MCR, Asciutti LSR, Cavalcanti AL. Prevalência de doenças crônicas e estado nutricional em um grupo de idosos Brasileiros. Rev Saúde Pública. 2009 Dec;11(6)865-77. Doi: http://dx.org/10.1590/S0124-00642009000600003

15. Fundação sistema estadual de análise de dados. Maior população negra do país. [Internet] [cited 2018 Sept 30]. Available from: http://produtos.seade.gov.br/produtos/idr/download/populacao.pdf

16. Moura SLF de, Duarte TTP, Magro MCS. Severity and outcome of patients with acute kidney injury in the intensive care unit. J Nurs UFPE on line. 2017 Nov;11(11):4319-25. Doi: http://dx.Doi: .org/10.5205/reuol.23542-49901-1-ED.1111201707

17. Mathioudakis NN, Giles M, Yeh HC, Haywood C Jr, Greer RC, Golden SH. Racial differences in acute kidney injury of hospitalized adults with diabetes. J Diabetes Complicat. 2016 Aug;30(6):1129-36. Doi: http://dx.Doi: .org/10.1016/j.jdiacomp.2016.03.031

18. Piuvezam G, Freitas MR, Costa JV, Freitas PA, Cardoso PMO, Medeiros ACM et al. Fatores associados ao custo das internações hospitalares por doenças infecciosas em idosos em hospital de referência na cidade do Natal, Rio Grande do Norte. Cad saúde colet. 2015 Jan-Mar;23(1)63-8. Doi: http://dx.Doi: .org/10.1590/1414-462X201500010011

19. Azevedo VF, Rossetto CN, Lorencetti PG, Tramontin MY, Fornazari B, Araújo DV. Custos diretos e indiretos do tratamento de pacientes com espondilite anquilosante pelo sistema público de saúde brasileiro. Rev Bras Reumatol. 2016 Mar-Apr;56(2):131-7. Doi: http://dx.Doi: .org/10.1016/j.rbre.2015.08.009

20. Silva EM, Silva MT, Pereira MG. Identificação, mensuração e valoração de custos em saúde. Epidemiol Serv Saúde. 2016 Apr-June;25(2)437-9. Doi: http://dx.Doi: .org/10.5123/S1679-49742016000200023

21. Bonacim CAG, Araujo AMP. Gestão de custos aplicada a hospitais universitários públicosa experiência do Hospital das Clínicas da Faculdade de Medicina de Ribeirão Preto da USP. Rev Adm Pública. 2010 July-Aug;44(4):903-31. Doi: http://dx.Doi: .org/10.1590/S0034-76122010000400007

22. Izaias ÉM, Dellaroza MSG, Rossaneis MA, Belei RA. Custo e caracterização de infecção hospitalar em idosos. Ciênc saúde coletiva. 2014 Aug;19(8)3395-402. Doi: http://dx.Doi: .org/10.1590/1413-81232014198.12732013

23. Alcalde PR, Kirsztajn GM. Gastos do Sistema Único de Saúde brasileiro com doença renal crônica. J Bras Nefrol. 2018 Apr-June;40(2):122-9. Doi: http://dx.Doi: .org/10.1590/2175-8239-JBN-3918

24. Cruz CF, Cunha GOD, Souza SRP. Custo do tratamento dos pacientes com insuficiência renal crônica em estágio terminal no município de São Paulo, no período de 2008 a 2012. Science in Health [Internet]. 2014 Jan-Apr [cited 2018 Sept 26];5(1):6-11. Available from: http://arquivos.cruzeirodosuleducacional.edu.br/principal/new/revista_scienceinhealth/13_jan_abr_2014/Science_05_01_6-11.pdf

25. Souza Júnior EV, Brito SA, Rosa RS, Boery EN, Boery RNSO. Impacto de los factores asociados a los síntomas depresivos sobre la salud en ancianos en hemodiálisis. Enferm Actual Costa Rica. 2018 July-Dec;(35):159-72. Doi: http://dx.Doi: .org/10.15517/revenf.v0i35.31519

26. Cunha RM, Souza COS, Silva JF, Silva MA. Nível de atividade física e índices antropométricos de hipertensos e/ ou diabéticos de uma cidade do Brasil. Rev Salud Pública [Internet]. 2012 June [cited 2018 Sept 17];14(3):427-35. Available from: https://revistas.unal.edu.co/index.php/revsaludpublica/article/view/27762/40262

Submission: 2019/05/02
Accepted: 2019/06/23
Publishing: 2019/08/05

Corresponding author

Edison Vitório de Souza Júnior
Email: edison.vitorio@gmail.com