Characterization of hospital admissions for Chronic Kidney Disease in the state of Acre, 2020 – 2022

Caracterização das internações hopitalares por Doença Renal Crônica no estado do Acre, 2020 – 2022

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ABSTRACT | INTRODUCTION: Characterize hospital admissions for Chronic Kidney Disease (CKD) in the public health system in the state of Acre, from 2020 to 2022. **MATERIALS AND METHOD:** This is a descriptive study carried out using data from the Hospital Information System of the Unified Health System (SIH-SUS) available on the website of the Information Technology Department of the Unified Health System. People aged ≥18 years treated in public hospitals in the state of Acre in the period described with CID N18-0 and N18-9. **RESULTS:** During the period, 1002 hospitalizations were reported. A higher frequency was observed in males (61.0%) and in the age group between 50 and 69 years old. Regarding lethality, 96 deaths were recorded, with a prevalence of males (66.7%) in the age group of 70 to 79 years, and predominant up to the 2nd day of hospitalization (27.1%). There was a predominance of hospitalizations of people residing in the capital, Rio Branco. The amounts spent show a reduction in the period. **CONCLUSION:** Hospitalization cases were higher for older adults, there was a reduction in the number of cases in the period, and the number of annual deaths from the disease remained unchanged, highlighting the need to develop public policies aimed at older adults.

KEYWORDS: Hospitalization. Chronic Renal Failure. Health Information System.

RESUMO | INTRODUÇÃO: Caracterizar as internações hospitalares por Doença Renal Crônica (DRC) no sistema público de saúde no estado do Acre, nos anos de 2020 a 2022. **MATERIAIS E MÉTODO:** Trata-se de um estudo descritivo realizado a partir dos dados do Sistema de Informações Hospitalares do Sistema Único de Saúde (SIH-SUS) disponíveis no site do Departamento de Informática do Sistema Único de Saúde. Foram incluídas pessoas em idade ≥18 anos atendidas em hospitais públicos do estado do Acre no período descrito com os CID N18-0 e N18-9. **RESULTADOS:** No período, notificaram-se 1002 internações. Observou-se maior frequência no sexo masculino (61,0%) e faixa etária entre 50 a 69 anos. Quanto ao quesito letalidade, foram registrados 96 óbitos, com prevalência para gênero masculino (66,7%) em faixa etária de 70 a 79 anos, e predominante até o 2° dia de hospitalização (27,1%). Predominaram internações de pessoas que residem na capital, Rio Branco. Os valores gastos mostram redução no período. **CONCLUSÃO:** Os casos de internações foram maiores para adultos em idade avançada, houve redução no número de casos no período, manteve-se o número de óbitos anuais pela doença, alertando para a necessidade de elaboração de políticas públicas direcionadas ao público de idade avançada.

PALAVRAS-CHAVE: Hospitalização. Insuficiência Renal Crônica. Sistema de Informações em Saúde.

1. Introduction

Chronic Kidney Disease (CKD) is a condition characterized by the progressive and irreversible deterioration of the endocrine and exocrine functions of the kidneys for a period equal to or greater than three months. The kidneys play a fundamental role in the production of erythropoietin, which regulates the production of red blood cells, responsible for filtering the blood and eliminating toxins from the body, thus contributing to the maintenance of homeostasis. Patients with CKD experience complete loss of these kidney functions, as well as other functions associated with the organ.[1]

Its diagnosis is often associated with pre-existing comorbidities, such as diabetes, obesity and systemic arterial hypertension that is not adequately controlled.[2] This prevalence is related to aging, low education, smoking, lack of attention to health assessment and a significant increase in levels of cholesterol.[3] Therefore, it emphasizes the need to adopt dietary restrictions, control weight, exercise regularly, manage diabetes and stop smoking, with the aim of controlling blood pressure (BP) and reducing cardiovascular risks.[2]

CKD is classified into five stages, determined based on the glomerular filtration rate (GFR) and taking into account associated risk factors. In stages 1, 2 and 3, treatment is conducted in Unidades Básicas de Saúde – UBS (Basic Health Units), focusing on intervention in risk factors to prevent disease progression and the implementation of a strict diet. Individuals in stages 4 and 5 receive monitoring from a specialized multidisciplinary team, with the possibility of starting Renal Replacement Therapy (RRT) according to each patient's needs.[4]

The asymptomatic evolution until reaching the most advanced stages, corroborates late diagnosis, causing compromise in control and treatment.[3] According to the Ministry of Health, the most used treatments are hemodialysis, peritoneal dialysis and kidney transplantation.[4]

CKD is widely recognized as a public health problem, both in Brazil and internationally, due to the high number of cases and significant mortality rates.

In the period between 2008 and 2017, Brazil recorded 61,378 deaths related to CKD. Furthermore, a constant increase in hospitalization and mortality rates was observed over these years. This worrying trend was confirmed by data from the 2020 Brazilian Dialysis Census, which revealed a 3.6% increase in the number of CKD cases between July 2019 and the same period in 2020, totaling 144,779 thousand cases.[5]

Given the considerable volume of hospitalizations related to CKD, the substantial costs associated with materials and treatments, as well as the disruptions and changes in the daily lives of patients and their families due to uncertainty regarding the future, there are few studies on its epidemiology, making It is imperative to develop research that supports education, prevention and improvement strategies in the treatment of kidney patients. Therefore, this study aims to characterize hospital admissions due to chronic kidney disease, in the public health system, in the state of Acre, from 2020 to 2022.

2. Materials and method

This article is a cross-sectional, retrospective and descriptive study. Information regarding hospitalizations, mortality and associated costs was obtained through the Hospital Information Sistema de Informações Hospitalares do Sistema Único de Saúde - SIH-SUS (System of the Unified Health System), available on the website of the Departamento de Informática do SUS – DATASUS (SUS Information Technology Department).

The information taken from the SIH was collected taking into account the 10th Revision of the International Classification of Diseases (ICD-10) with codes N18-0 and N18-9. The study defined inclusion criteria that involved hospitalizations with these codes and an analysis period covering 2020 to 2022. The sample consists of the total number of hospital admissions registered in units of the public health network, between the years 2020 and 2022, hospitalizations of patients under 18 years of age were excluded.

Data collection from the SIH-SUS was conducted through the statistical program R, using the Microdatasus package, in the period between February and March 2022. This program simplifies the process of obtaining information available in the DATASUS, allowing direct download into the R environment.

The variables included in the study include age, gender, city of residence, nature of hospitalization, place of treatment, outcome, admission to an intensive care unit, duration of hospitalization, number of deaths and costs associated with hospitalizations related to CKD.

After extracting the raw data, the variables to be included in the study were identified, followed by a cut that separated only the variables adopted for the analysis. Subsequently, these data were subjected to analysis using both Microsoft Excel® 2013 software and R software.[6]

To analyze continuous variables, measures of central tendency were used, including mean, standard deviation, minimum and maximum. For categorical variables, relative and absolute frequencies were calculated.

To calculate the coefficient of annual hospitalizations of CKD cases in the period, the following formula was used:

$$\frac{\text{Number of annual hospitalizations}}{\text{Resident population estimate}} \times 100.000$$

Information on the resident population estimate was obtained from the Tabnet platform, specifically in the Demographic and Socioeconomic Data section.

The present study describes and analyzes data in the public domain; therefore, it was not necessary to submit it to the Ethics and Research Committee/CEP as provided for in Resolution of the National Health Council No. 466/201.

3. Results

During the analysis period, 1002 hospital admissions related to Chronic Kidney Disease (CKD) were recorded in the state of Acre. Among the cases investigated, there was a clear predominance of males, representing 61.0% (n=611), while the female portion corresponded to 39.0% (n=391).

With regard to age group, the highest incidence of cases occurred in individuals aged between 50 and 69 years, representing 48% of hospitalizations. Of this group, 23.9% (n=239) were between 50 and 59 years old, and 24.2% (n=242) were between 60 and 69 years old. Of the total number of hospitalizations recorded (n=1002), 90.4% (n=906) resulted in hospital discharge, while 9.6% (n=96) resulted in death (Table 1).

Table 1. Characterization of hospitalizations for CKD according to data from the hospital information system (SIH), in the state of Acre, 2020-2022 (n=1002)

Variables	n	%
Hospitalizations	1002	100
Competence year		
2020	355	35,4
2021	365	36,4
2022	282	28,1
Outcome		
High	906	90,4
Death	96	9,6
Age range		
18 to 29	81	8,1
30 to 39	77	7,7
40 to 49	171	17,1
50 to 59	239	23,9
60 to 69	242	24,2
70 to 79	140	14,0
≥80	52	5,2
Sex		
Masculine	611	61,0
Feminine	391	39,0
Total	1002	100

Source: Own elaboration based on SIH-SUS data (2023).

When analyzing the distribution of hospitalizations related to CKD based on places of residence, as shown in Table 2, it is noted that the city with the highest number of hospitalizations is the capital, Rio Branco, with 67.6% (n= 677) of the records. Next come the municipalities of Brasiléia, with 4.6% (n=46), and Epitaciolândia, with 4.0% (n=40) of hospitalizations. Furthermore, the data indicate that 4.0% (n=40) of hospitalizations involve residents of other states, such as Amazonas and Rondônia (data not shown).

Regarding the nature of hospitalizations, elective hospitalizations predominated, representing 82.9% (n=831), while urgent and emergency care totaled 17.1% (n=171). The health unit that served the most patients was the Fundação Hospitalar Estadual do Acre (FUNDHACRE), with a percentage of 78.8% (n=790). Followed by the Hospital Geral das Clínicas de Rio Branco (HGCRB), with 13.8% (n=138). The municipalities of Brasiléia and Epitaciolândia, together, represent the second and third highest volumes of CKD cases. However, only 1.5% (n=15) of hospitalizations were registered at Hospital das Clínicas Raimundo Chaar, which is a reference in the health region. With regard to admissions to intensive care units (ICU), 5.2% (n=52) of them were recorded.

Table 2. Distribution of Hospitalizations due to CKD according to municipalities of residence, location and nature of care, according to data from the hospital information system (SIH), Acre, 2022-2023 (n=1002)

Variables	n	%
Municipality of residence		
Rio Branco	677	67,6
Brasiléia	46	4,6
Epitaciolândia	40	4,0
Cruzeiro do Sul	25	2,5
Plácido de Castro	25	2,5
Tarauacá	22	2,2
Senador Guiomard	18	1,8
Sena Madureira	16	1,6
Xapuri	15	1,5
Porto Acre	15	1,5
Boca do Acre	15	1,5
Bujarí	11	1,1
Capixaba	11	1,1
Acrelândia	9	0,9
Porto Velho	8	0,8
Feijó	8	0,8
Pauini	7	0,7
Jordão	6	0,6
Assis Brasil	5	0,5
Mâncio Lima	5	0,5
Santa Rosa do Purus	4	0,4
Envira	4	0,4
Manoel Urbano	3	0,3
Porto Alegre	2	0,2
Rodrigues Alves	1	0,1
Eirunepé	1	0,1
Ipixuna	1	0,1
Ourém	1	0,1
Campo Grande	1	0,1
Character of hospitalization		
Elective	831	82,9
Urgency and emergency	171	17,1
Health Establishment		
FUNDHACRE	790	78,8
Hospital Geral das Clínicas of Rio Branco	138	13,8
Hospital Regional do Juruá	26	2,6
Hospital Santa Juliana	24	2,4
Hospital das Clínicas Raimundo Chaar	15	1,5
Hospital Dr Sansão Gomes	5	0,5
Hospital Epaminondas Jacome	3	0,3
Maternidade e Clínica de Mulheres Barbara Heliodora	1	0,1
ICU admission		
Yes	52	5,2
No	950	94,8

Source: Own elaboration based on data from SIH-SUS and IBGE (2023).

Table 3 displays the characterization of death cases registered in the hospital information system. A higher mortality rate related to the disease was observed in males, corresponding to 66.7% (n=64), compared to the total number of deaths in females, which was 33.3% (n=32). It is notable that the most affected age group was the elderly between 70 and 79 years old, representing 31.3% (n=30) of total deaths, although this is not the age group with the highest number of hospitalizations.

When carefully examining mortality records, it is relevant to note that 22.9% (n=22) of deaths occurred in the Intensive Care Unit (ICU), while the vast majority, equivalent to 77.1% (n=74), occurred outside this environment. It is noteworthy that the year 2020 recorded the highest percentage of deaths, representing 38.5% (n=37) of the total. With regard to the time interval between hospitalization and death, it was identified that the highest rate of deaths occurred in the first days of hospitalization, mainly between the 2nd and 14th day of hospitalization (Table 3).

Table 3. Characterization of cases of Deaths due to Chronic Kidney Disease (CKD) based on records in the hospital information system (SIH), in the state of Acre, 2020-2022 (n=96)

Variables	n	%
Competence year		
2020	37	38,5
2021	33	34,4
2022	26	27,1
Sex		
Masculine	64	66,7
Feminine	32	33,3
Age range		
18 to 29	2	2,1
30 to 39	2	2,1
40 to 49	6	6,3
50 to 59	16	16,7
60 to 69	28	29,2
70 to 79	30	31,3
≥80	12	12,5
Age viability (mean and standard deviation)	66,51±13,25	
ICU admission		
Yes	22	22,9
No	74	77,1
Length of hospitalization until death		
Death within the 2nd day of hospitalization	26	27,1
Death from the 3rd to the 7th day of hospitalization	20	20,8
Death from the 8th to the 14th day of hospitalization	23	24,0
Death from the 15th to the 21st day of hospitalization	12	12,5
Death from the 22nd to the 28th day of hospitalization	6	6,25
Death after 28th day of hospitalization	9	9,4

Source: Own elaboration based on SIH-SUS data (2023).

Analysis of the prevalence of hospitalizations per population in the state, as detailed in Table 4, reveals a reduction over the period considered. In 2020, the prevalence was 39.69 per 100,000 inhabitants, while in 2021 it increased slightly to 40.25 and, in 2022, it decreased to 33.98. The global analysis of the data shows that the average prevalence over the three years was 114.25 per 100,000 inhabitants, with the year 2021 showing the highest prevalence (40.25).

Table 4. Distribution of the proportion of hospitalization cases due to Chronic Kidney Disease (CKD), based on records in the hospital information system (SIH), in the state of Acre, 2020-2021 (n=720)

Competence year	Number of hospitalizations	Estimated population	Proportion for each 100,000 inhabitants
2020	355	894.470	39,69
2021	365	906.876	40,25
2022	282	829.780	33,98
Total per year	1002	877.042	114,25

Source: Own elaboration based on SIH-SUS data (2023).

During the period analyzed, total expenses totaled R$967,217.29, of which R$120,439.42 were allocated to professional services and R$846,777.87 to hospital services. It is important to note that the year 2020 recorded the highest volume of expenses, totaling R$355,459.94, to meet the needs of 355 patients. In the subsequent year, in 2021, expenses totaled R$341,511.39, intended to serve 365 patients. In 2022, total expenses were R$270,245.96, of which R$34,269.60 were attributed to professional services and R$235,976.36 to hospital services, as indicated in Table 5.

Table 5. Distribution of hospitalizations for Chronic Kidney Disease according to the resident population over the years 2020-2023 based on records in the hospital information system (SIH) according to the variables expenditure (R$) and discharge/death outcomes, in state of Acre, 2020-2022 (n=1002)

Corresponding year	2020	2021	2022	total
N of hospitalizations	355	365	382	1002
Estimated population	894.470	906.876	829.780	877.042 (average)
Proportion for every 100,000 inhabitants	39,69	40,25	33,98	114,25
Value in R$				
Value of Services professionals	44.550,69	41.619,13	34.269,60	120.439,42
Service Values Hospital	310.909,25	299.892,26	235.976,36	846.777,87
Total values	355.459,94	341.511,39	270.245,96	967.217,29
Number of deaths in ICU	20	15	19	52
Death in the period	9 (40,9%)	6 (27,3%)	7 (31,8)	22 (100,0%)
High	10 (33,3%)	9 (30,0%)	11 (36,7%)	30 (100,0%)

Source: Own elaboration based on SIH-SUS data (2023).

Analysis of admissions to Intensive Care Units (ICU) during the period in question reveals a total of 52 cases. Among these cases, 2020 recorded the highest number, with 19 hospitalizations, of which 40.9% (n=9) resulted in death. Then, the year 2022 presented 18 ICU admissions, with a death rate of 31.8% (n=7), as indicated in Table 5.

4. Discussion

The present study revealed the occurrence of 1,002 records of hospital admissions for the treatment of Chronic Kidney Disease (CKD) in the state of Acre, covering the period from 2020 to 2022. There is a notable predominance of hospitalizations among male individuals. These findings are in line with a global trend observed in previous studies.[3] Among the non-modifiable risk factors associated with disease progression, sex plays an important role, as it presents a greater risk of CKD progression.[7]

Furthermore, gender differences in access to health services in primary care also contribute to this disparity, as women tend to seek health services more for preventive consultations compared to men.8 In this sense, the actions developed by nurses in the prevention and control of CKD are of great relevance to health services aimed at this disease. It is worth highlighting the role of nurses in carrying out nursing consultations, in education and diagnosis programs, self-care guidelines, advice on lifestyle changes regarding healthy eating, physical exercise, smoking cessation, considering that these factors are associated with the progression and complications of the disease.[4]

In relation to places of residence, there was a significant concentration of services in the capital, Rio Branco, with 677 of the 1002 records. The state has three Health regions (Alto Acre, Baixo Acre and Purus and Juruá and Tarauacá/Envira) and 953 of the 1002 hospitalizations occurred in hospitals located in the capital, belonging to the Baixo Acre and Purus region. This concentration highlights the dependence on other hospital units to address chronic issues, such as CKD. In the state of Acre, the installed capacity for health services is highly centralized in the capital, due to the limited availability of beds and nephrology specialists in the interior regions of the state.[9]

According to the Federal Council of Medicine, Rio Branco has a proportion of 1.99 doctors per thousand inhabitants, while in the interior municipalities, this proportion is 0.51 doctors per thousand inhabitants. This discrepancy in medical availability between the capital and the interior results in an inequality indicator above the national average in the state of Acre (Acre=3.89 vs. Brazil=3.80).10 Compared to other Brazilian states, such as Amazonas, which records an inequality indicator of 12.29, Acre has a lower inequality index in medical availability. However, it is important to highlight that Acre faces a shortage of doctors both in the capital and in the interior, an issue that is also observed in Rondônia.[10]

Hospitalization rates revealed a higher occurrence in adults aged between 60 and 69 years, followed by individuals aged 50 to 59 years. This trend is in line with national data on hospitalizations for this disease,

observed from 2014 to 2019, which indicate an increase in the prevalence of hospitalizations as the Brazilian population ages.[5,11] It is worth noting that elderly patients require special attention from the multidisciplinary health team due to the greater risk of disease progression, which is often aggravated by the presence of other chronic conditions common in this age group, such as systemic arterial hypertension (SAH).[12] Hospitalizations are more frequent among elderly people who have multiple health conditions.[13]

Although hospitalizations were more common among people aged 50 to 69 years, the fatality rate was higher in the group of adults in older age groups (70 to 79 years). Similar results were found, the highest percentage of deaths occurred in individuals with an average age of 75 years.[5,14] The author also describes the increase in the mortality rate in more advanced age groups, which is associated with the aging process of the population, and the presence of hypertension and DM.[14]

In 2020, the highest death rate was observed, which subsequently showed a reduction in the following years. Other studies indicated that the incidence of COVID-19 was relatively high, with 684 cases per 10,000 records, of the crude death rate for people being treated for CKD, 4.2% were attributed to COVID-19 in 2020. Those patients who died were significantly older and had a greater predisposition to developing heart and respiratory diseases.[15]

Globally, CKD had a higher prevalence in women in stages 1 to 3, while mortality was more significant among men, suggesting that disease progression is faster in males.[16] The Ministry of Health has set a goal of reducing premature mortality (between 30 and 69 years old) due to Chronic Non-Communicable Diseases (NCDs) by the year 2030, with a decrease of 2% per year.[17] Emphasizing the continued importance of conducting studies that address the progression of CKD, as well as the care and management of risks associated with this condition. In this sense, the nurse performs functions in the management of the disease18, with guidance on treatment modalities, interventions in the development of diseases secondary to CKD such as anemia, metabolic disorders, care with vascular or peritoneal access.[4,17]

Regarding the length of hospitalization until the date of death, there was a higher prevalence of mortality in hospitalizations in the first days of hospitalization. The outcome of hospitalizations of patients with CKD is associated with a longer period of hospitalization with greater morbidity resulting from the disease.[19] Institutional mortality is a fundamental criterion for evaluating hospital quality, considering the number of deaths after the first 24 hours of hospital admission20, the increase in in-hospital mortality is related to the lack of beds in Intensive Care Units (ICU), resulting in less specific care.[21] Mortality is more common for patients referred by Ponto Socorro, UBS and ICU when compared to those referred by a nephrologist.[22] In this context, it suggests that the insufficient number of nephrologist specialists in the state, combined with the lack of ICU, establishes a relationship with the short length of hospital stay until death.

Regarding gender, the highest mortality rate among males, which is in line with other studies carried out in the states of Amazonas and Espírito Santo.[23] It is essential to highlight that higher mortality rates are linked to factors such as advancing age, lack of seeking specialized medical care in nephrology, the presence of diabetes and hospitalizations that occur in the first months of hemodialysis treatment.[24]

With regard to expenses, a decrease was observed in parallel with the reduction in the number of annual hospitalizations, in contrast to the increase in both annual hospitalizations and expenses, which demonstrates an increasing trend in the national average.[11] The highest peak in expenses and hospitalizations was recorded in 2020, which suggests a correlation with complications resulting from COVID-19 and the delay in immunizing these patients. This has led to greater demand for professional services and hospital support and is possibly the main factor behind this finding. An assessment of spending related to the disease in Taiwan revealed an increase over the years, being more significant for outpatient consultations than for hospital admissions. Furthermore, the analysis detailed that the majority of expenses are related to hospitalizations of individuals aged between 65 and 75 years, followed by those aged 75 and over.[25]

Among the limitations of this study, the use of secondary data deserves to be highlighted, which may result in the incomplete representation of the epidemiological situation of the disease in the state, due to the possibility of under-reporting. Furthermore, it was not feasible to assess the presence of COVID-19 in these CKD patients due to the unavailability of data.

5. Conclusions

During the period covered by this study (2020 to 2022), the rate of hospitalizations due to the disease was 114.25 hospitalizations per 100,000 inhabitants. CKD mainly affects older men, both in terms of incidence of cases and deaths. The number of hospitalizations decreased over this period, as did the expenses associated with these hospitalizations. Mortality was notably higher in hospitalizations that occurred in the first two days, remaining at high levels until the 14th day.

Therefore, this information highlights the urgency of implementing public policies that promote health, improve care infrastructure and strengthen the response due to the high incidence in the state. The data instigates the need to decentralize care to other health regions, as it would represent less financial costs with treatment outside the home, as well as reducing the stress on patients caused by traveling long distances to receive specialized care. They also urge health professionals to adopt preventive and disease control approaches, applying best practices to ensure personalized and continuous care for this population.

Authors' contributions

Lomeu SS, Pinto VC and Pinto VC participated in the conception of the research question, methodological design, search and statistical analysis of research data, interpretation of results, writing of the scientific article. All authors reviewed and approved the final version and are in agreement with its publication. Lopes WF participated in the conception of the research question, methodological design, search and statistical analysis of research data, interpretation of results, writing of the scientific article, guiding the other participants in the article for its execution.

Conflicts of interest

No financial, legal, or political conflicts involving third parties (government, private corporations and foundations, etc.) have been declared for any aspect of the submitted work (including, but not limited to, grants and financing, advisory board participation, study design, preparation manuscript, statistical analysis, etc.).

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References

1. Odya E, Norris M. Anatomia & Fisiologia Para Leigos. 3rd. ed. Rio de Janeiro: Editora Alta Books; 2020.

2. Kidney Disease: Improving Global Outcomes (KDIGO) Glomerular Diseases Work Group. KDIGO 2021 Clinical Practice Guideline for the Management of Glomerular Diseases. Kidney Int. 2021;100(4S):S1-S276. https://doi.org/10.1016/j.kint.2021.05.021

3. Aguiar LK, Prado RR, Gazzinelli A, Malta DC. Factors associated with chronic kidney disease: epidemiological survey of the National Health Survey. Rev Bras Epidemiol. 2020;23:e200044. https://doi.org/10.1590/1980-549720200044

4. Ministério da Saúde (Brasil), Secretaria de Atenção à Saúde, Departamento de Atenção Especializada e Temática. Diretrizes Clínica para o cuidado ao Paciente com Doença Renal Crônica – DRC no Sistema Único de Saúde [Internet]. Brasília: Ministério da Saúde; 2014. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/diretrizes_clinicas_cuidado_paciente_renal.pdf

5. Nerbass FB, Lima HN, Thomé FS, Neto OMV, Lugon JR, Sesso R. Brazilian Dialysis Survey 2020. J Braz Nephrol. 2022;44(3):349-57. https://doi.org/10.1590/2175-8239-JBN-2021-0198

6. Saldanha RF, Bastos RR, Barcelos C. Microdatasus: a package for downloading and preprocessing microdata from Brazilian Health Informatics Department (DATASUS). Cad Saúde Pública. 2019;35(9):e00032419. https://doi.org/10.1590/0102-311X00032419

7. Nahas ME, Khwaja A. Epidemiologia, história natural e fisiopatologia da doença renal crônica. In: Johnson RJ, Feehally J, Floege J. Nefrologia clínica. 5a. ed. Rio de Janeiro: Elsevier; 2016. p. 903-18.

8. Cobo B, Cruz C, Dick PC. Gender and racial inequalities in the access to and the use of Brazilian health services. Ciênc Saúde Coletiva. 2021;26(9):4021-32. https://doi.org/10.1590/1413-81232021269.05732021

9. Governo do Estado do Acre, Secretaria de Estado da Saúde. Plano Estadual de Saúde 2020 – 2023 [Internet]. Rio Branco: Governo do Estado do Acre; 2020. Available from: https://www.conass.org.br/wp-content/uploads/2016/04/PLANO-ESTADUAL-DE-SAUDE-PES-2020-2023-VF.pdf

10. Scheffer M, coordenação. Demografia Médica no Brasil 2020 [Internet]. São Paulo: Conselho Federal de Medicina; 2020. Available from: https://www.gov.br/saude/pt-br/composicao/sgtes/acoes-em-educacao-em-saude/cfm-e-usp/07-relatorio-demografia-medica-no-brasil_2020-5.pdf/view

11. Souza ACSV, Alencar KC, Landim NLMP, Oliveira PMS, Leite CMC. Epidemiological profile of morbimortality and public expenditure by Renal Insufficiency in Brazil. Res Soc Develop. 2020;9(9):e510997399. http://dx.doi.org/10.33448/rsd-v9i9.7399

12. Chronic kidney disease in the elderly patients. [Internet]. J Bras Nefrol. 2009;31(1 suppl 1):59-65. Available from: https://www.bjnephrology.org/article/doenca-renal-cronica-em-pacientes-idosos/

13. Nunes BP, Soares UM, Wachs LS, Volz PM, Saes MO, Duro SMS, et al. Hospitalization in older adults: association with multimorbidity, primary health care and private health plan. Rev Saúde Pública. 2017;51:43. https://doi.org/10.1590/S1518-8787.2017051006646

14. Andrade CM, Andrade AMS. Morbidity and mortality chronic kidney disease in Brazil. Rev Baiana Saúde Pública. 2020;44(2):38-52. https://doi.org/10.22278/2318-2660.2020.v44.n2.a2832

15. Branco CG, Duarte I, Gameiro J, Costa C, Marques F, Oliveira J, et al. Presentation and outcomes of chronic kidney disease patients with COVID-19. J Bras Nefrol. 2022;44(3):321-8. https://doi.org/10.1590/2175-8239-JBN-2021-0071

16. GBD Chronic Kidney Disease Collaboration. Global, regional, and national burden of chronic kidney disease, 1990-2017: a systematic analysis for the Global Burden of Disease Study 2017. Lancet. 2020;395(10225):709-33. https://doi.org/10.1016/S0140-6736(20)30045-3

17. Ministério da Saúde (Brasil), Secretaria de Vigilância em Saúde, Departamento de Análise em Saúde e Vigilância de Doenças Não Transmissíveis. Plano de ações estratégicas para o enfrentamento das doenças crônicas e agravos não transmissíveis no Brasil 2021-2030 [Internet]. Brasília: Ministério da Saúde; 2021. Available from: https://www.gov.br/saude/pt-br/centrais-de-conteudo/publicacoes/svsa/doencas-cronicas-nao-transmissiveis-dcnt/09-plano-de-dant-2022_2030.pdf

18. Portaria nº 1.168, de 15 de junho de 2004 (Brasil). Institui a Política Nacional de Atenção ao Portador de Doença Renal, a ser implantada em todas as unidades federadas, respeitadas as competências das três esferas de gestão [Internet]. Diário Oficial da União. 2004 jun. 15. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/gm/2004/prt1168_15_06_2004.html

19. Pinho NA, Silva GV, Pierin AMG. Prevalence and factors associated with chronic kidney disease among hospitalized patients in a university hospital in the city of São Paulo, SP, Brazil. J Bras Nefrol. 2015;37(1):91-7. https://doi.org/10.5935/0101-2800.20150013

20. Ministério da Saúde (Brasil), Agência Nacional de Saúde Complementar. Média de Permanência em UTI adulto [Internet]. Brasília: Ministério da Saúde; 2013. Available from: https://www.gov.br/ans/pt-br/arquivos/assuntos/prestadores/qualiss-programa-de-qualificacao-dos-prestadores-de-servicos-de-saude-1/versao-anterior-do-qualiss/e-efi-07.pdf

21. Ministério da Saúde (Brasil), Agência Nacional de Saúde Complementar. Consórcio de indicadores de Qualidade Hospitalar-painel geral [Internet]. Brasília: Ministério da Saúde; 2020. Available from: https://www.gov.br/ans/pt-br/assuntos/prestadores/qualiss-programa-de-qualificacao-dos-prestadores-de-servicos-de-saude-1/consorcio-de-indicadores-de-qualidade-hospitalar

22. Bialeski AB, Lopes CM, Iser BPM. Factors related to clinical outcomes and survival time in chronic kidney disease patients on hemodialysis. Cad Saúde Colet. 2022;30(1):115-26. https://doi.org/10.1590/1414-462X202230019308

23. Biazi BL, Bezerra IMP, Abreu LC, Morais MJD, Silva LG, Silva RPM. Mortality and incidence of hospital hospitalization for chronic kidney disease between Brazil and the states of Amazon and Espírito Santo, 2008 to 2017. REASE. 2022;8(3):671-87. https://doi.org/10.51891/rease.v8i3.4625

24. Bersan SAL, Amaral CFS, Gomes IC, Cherchiglia ML. Fatality and hospitalization in hemodialysis patients in a health plan. Rev Saúde Públ. 2013;47(3):624-33. https://doi.org/10.1590/S0034-8910.2013047004016

25. Lee CC, Hsu CC, Lin MH, Sung JM, Kuo TH. Healthcare utilization and expenditure among individuals with end-stage kidney disease in Taiwan. J Formos Med Assoc. 2022;121(suppl 1):S47-S55. https://doi.org/10.1016/j.jfma.2021.12.010