The Caring Costs for Patients Bearing Chronic Kidney Disease (CKD), in a Non-dialytic Phase of a University Hospital

O Custo do Atendimento aos Pacientes com Doença Renal Crônica (Drc), em Fase Não Dialítica de um Hospital Universitário

El Coste del Tratamiento a Pacientes con Enfermedad Renal Crónica (ERC), en Fase no Diálisis em um Hospital Académico

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ABSTRACT

Objective: The study's goal has been to identify the cost of care for patients bearing Chronic Kidney Disease (CKD) in a non-dialytic phase of a university hospital in Rio de Janeiro State. Conservative treatment is a therapeutic modality that aims to accompany the patient at all disease stages.

Methods: This is a retrospective cohort study with a quantitative approach and cost analysis performed at a university hospital in Rio de Janeiro State.

Results: In the study, data such as age, sex, religion, education, race, income, access type, mode of entry into dialytic therapy, exams, consultations and their specialties and medications were delimited.

Discussion: It has been discussed under scrutiny each point from observed data in order to highlight the costs of conservative treatment, and also the beneficial aspect that is closely linked to it.

Conclusion: There is a need for stimulating research regarding the topic, particularly, when it comes to epidemiological, financial and clinical aspects.

Descriptors: Chronic kidney disease, Conservative treatment, Costs and technologies in health.

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INTRODUCCIÓN

La Enfermedad renal crónica (ERC) es considerada una enfermedad adquirida de salud pública en Brasil y el mundo. Dado su complejidad, ha sido una de las causas más importantes de morbilidad y mortalidad, además de tener altos costos en los recursos de salud.1⁹

La ERC consiste en una disminución lenta y progresiva de la función renal con acumulación de productos del metabolismo en la sangre. Este tipo de lesión renal puede ser causado, en muchos casos, por hipertensión y diabetes, que causan daño irreparable al órgano renal.2⁰

En Brasil, se estima que más de dos millones de personas tienen algún grado de enfermedad renal. Este es aproximadamente 1% de la población brasileña.1⁹

La Sociedad Brasileña de Nefrología señaló un aumento en el número de casos de pacientes con ERC en todo el país, coincidiendo con la tendencia de incremento en el número de pacientes con ERC. Esto es equivalente a aproximadamente 1% de la población de más de dos millones de personas con algún grado de daño renal.2⁰

El estudio de casos de los pacientes con enfermedad renal crónica (ERC) en la fase no-dialítica de un hospital universitario en el estado de Río de Janeiro. El tratamiento conservador es una modalidad terapéutica que tiene el objetivo de acompañar a los pacientes en todas las etapas de la enfermedad. Métodos: Se realizó un estudio de cohorte retrospectivo, con un enfoque de los costos y análisis cuantitativo realizado en un hospital universitario en el estado de Río de Janeiro. Resultados: Antes del estudio se definieron los datos como la edad, el sexo, la religión, la educación, raza, ingresos, tipo de acceso, modo de entrada en tratamiento dialítico, exámenes, consultas y sus especialidades y medicamentos. Discusión: Fue discutido punto a punto de cada dato observado para fomentar la investigación en el tema cuando se discutió la necesidad de revisar el tratamiento conservador y el aspecto beneficiado que está estrechamente ligado. Conclusión: Se reitera la necesidad de fomentar la investigación en el tema cuando la epidemiológica, clínica y financiera.

DESCRITORES: Enfermedad renal crónica, Tratamiento conservador, Los costos y tecnologías sanitarias.
This research is justified by the scarcity of investigation regarding the financial costs of the technologies offered by the SUS to subsidize assistance and the choice of the best form of resource allocation in confronting the CKD as a knowledge gap that must be corrected.

METHODS

This is a descriptive study with a quantitative approach, associating the epidemiological method to a cost study. A retrospective investigation was carried out in a cohort of patients followed at a CKD care unit at a university hospital in Rio de Janeiro State. It is pointed out\(^{18,31}\) that research using the descriptive and quantitative approach has the facility to describe the complexity of a particular hypothesis or problem, to analyze the interaction of certain variables, to understand, to contribute, to understand the dynamic processes and to present contributions in the change process.

Data collection took place from April to June 2016. All patients who entered SRT were enrolled, out of a total of 18, of whom only 10 met the inclusion criteria and were followed up at the research hospital by adult patients Above 18 years old, of both sexes and have performed at least three documented medical consultations.

To perform the data collection, an instrument was used to characterize the clientele and to identify the follow-up by nephrologist prior to the onset of SRT. A second instrument was used to extract data, from the medical record, aimed at the consumption of resources used by the patient who were followed up; Were used as variables such as: numbers of consultations with health professionals, exams performed as biochemistry, serology, hematology, images exams and medications.

The variables such as the number of consumption of consultations, examinations and medicines were established according to the proposed protocol for follow-up of the clientele in the institution. The values assigned to each consumption item were derived from the SUS procedure table.

The data were entered into a Microsoft Excel\textsuperscript{\textregistered} spreadsheet and the total cost of each patient's follow-up period was calculated and then the average monthly cost was calculated. To calculate the average monthly cost, the total value was divided by the number of months of the follow-up period.

The project was submitted to the Research Ethics Committee of a university hospital in Rio de Janeiro State, approved by the Legal Opinion No. 1,517,603.

RESULTS

During the period from January to June 2016, patients were enrolled in SRT totaling 18 patients, of whom only 10 met the established inclusion criteria and all patients were treated through hemodialysis.

In this sampling, the female predominated 7 (70%), and the average age was 59.1 years old, with a standard deviation of 19.1. Regarding schooling, 6 (60%) of the interviewees attended high school, while 2 (20%) attended up to the 1st grade, 1 (10%) attended the college and 1 (10%) studied until the 5th grade.

Regarding the religion, 6 (60%) declared themselves Catholics and 4 (40%) Evangelicals. Referring to the marital situation 4 (40%) were single, 3 (30%) married and 3 (30%) claimed to be widowers. Regarding the race, there was a prevalence of individuals who declared themselves white skin color, totaling 5 (50%), while 3 (30%) declared themselves black and 2 (20%) declared themselves as brown.

We identified a population with 6 (60%) of the respondents with income between 1 and 2 minimum wages, 3 (30%) declared income of 5 or more minimum wages and 1 (10%) with income between 3 and 4 minimum wages. In this population, 6 (60%) declared to be retired. In the anthropometric measurements it was observed that the Mean Body Mass Index (BMI) was 26.20.

In the group, 9 (90%) presented Systemic Arterial Hypertension (SAH) and 1 (10%) presented Diabetes Mellitus (DM) as the underlying disease. Additionally, it was identified that 5 (50%) of the respondents had some kind of comorbidities. However, the costs of treating these injuries were not accounted for.

The patient's condition on the first dialysis was elective with 5 (50%) and the remaining 5 (50%) in dialysis emergence. The type of access for SRT onset was predominantly short-lived with 7 (70%), while the remaining 3 (30%) had a definite and better choice of Arteriovenous Fistula (AVF).

The sum of the months of patients undergoing conservative treatment was 571 months. The average follow-up period of these patients was 57.1 months, ranging from 3 to 228 months. At the time of dialysis the mean hemoglobin (Hb) was 12 g/dL, creatinine (Cr) equal to 6.5 mg/dL and the initial GFR with a mean of 7.9 mL/min.

We found records of 229 medical consultations, 10 nursing consultations, 10 nutrition consultations, 1 psychology consultation and none of social workers.

The concentration of medical consultations per patient was 4.8 consultations/year, while for the consultation of other professionals the registered offer is less than 0.1 consultations/year.

Considering the amount paid by the SUS for consultations in specialized care according to the SIGTAP website in 2016, which is R$ 10.00 (ten reais), and the total cost of medical consultations was ten thousand nine hundred and ninety two reais). [Note: the Brazilian currency format has been used over the text].

Average monthly cost of medical consultations per patient was R$ 19,25 (nineteen reais and twenty-five cents) and
average annual cost of medical consultations per patient was two hundred and thirty-one reais and one cent (R$ 231,01).

The exams performed by patients undergoing conservative treatment were quantified. The exams requested by the medical team were grouped into 8 subgroups (biochemistry, hematology, hormone, immunology, urinalysis, images, microbiology and others). Biochemistry totaled 1,821 exams, hematology 485, hormones with 62, immunology 89 exams, urinalysis 131, images with 43, microbiology 1 (antibiogram) and others (Graph 1).

The total amount paid by the SUS for these examinations was R$ 10,600,06 (ten thousand, six hundred reais and six cents). The average monthly amount was R$ 18,60 (eighteen reais and sixty cents) and R$ 223,16 (two hundred twenty-three reais and sixteen cents) in the average annual value. The average value paid by the SUS for examinations per patient/month ranged from R$ 6,01 (six reais and one cent) to 160,44 (one hundred and sixty reais and forty-four cents).

Graph 1 - Distribution of the exams subgroups by cost.

Among the drugs prescribed for patients in conservative treatment in the outpatient clinic of 59 therapeutic formulas divided into 23 drug classes (Table 1).

### Table 1 - Drug classes identified and total cost in conservative treatment in the study population.

<table>
<thead>
<tr>
<th>Drug Classes</th>
<th>Cost</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretic</td>
<td>R$ 562,50</td>
<td>3.73</td>
</tr>
<tr>
<td>Antihypertensive</td>
<td>R$ 3,771,45</td>
<td>24.99</td>
</tr>
<tr>
<td>Treatment of hyperlipidemia</td>
<td>R$ 197,10</td>
<td>1.31</td>
</tr>
<tr>
<td>Treatment of anemia</td>
<td>R$ 329,52</td>
<td>2.18</td>
</tr>
<tr>
<td>Anti-demineralizer</td>
<td>R$ 481,50</td>
<td>3.19</td>
</tr>
<tr>
<td>Acid/base correction</td>
<td>R$ 1,357,20</td>
<td>8.99</td>
</tr>
<tr>
<td>Vitamin complex</td>
<td>R$ 858,87</td>
<td>5.69</td>
</tr>
<tr>
<td>Corticoid</td>
<td>R$ 860,67</td>
<td>5.70</td>
</tr>
<tr>
<td>Gastric protector</td>
<td>R$ 25,20</td>
<td>0.17</td>
</tr>
<tr>
<td>Stimulator of the erythropoiesis</td>
<td>R$ 4,465,60</td>
<td>29.58</td>
</tr>
<tr>
<td>Antiplaquet aggregation agent</td>
<td>R$ 108,00</td>
<td>0.72</td>
</tr>
<tr>
<td>Treatment of uric acid</td>
<td>R$ 41,40</td>
<td>0.27</td>
</tr>
<tr>
<td>Anticoagulant</td>
<td>R$ 42,90</td>
<td>0.28</td>
</tr>
<tr>
<td>Immunosuppressant</td>
<td>R$ 607,50</td>
<td>4.02</td>
</tr>
<tr>
<td>Hypoglycemic</td>
<td>R$ 51,00</td>
<td>0.34</td>
</tr>
<tr>
<td>Synthetic hormone</td>
<td>R$ 9,48</td>
<td>0.06</td>
</tr>
<tr>
<td>Mineral oil</td>
<td>R$ 7,80</td>
<td>0.05</td>
</tr>
<tr>
<td>Antibiotic</td>
<td>R$ 13,60</td>
<td>0.09</td>
</tr>
<tr>
<td>Beta blockers</td>
<td>R$ 133,20</td>
<td>0.88</td>
</tr>
<tr>
<td>Antineoplastic</td>
<td>R$ 798,60</td>
<td>5.29</td>
</tr>
<tr>
<td>Treatment of gastric ulcer</td>
<td>R$ 163,20</td>
<td>1.08</td>
</tr>
<tr>
<td>Anaglicic</td>
<td>R$ 136,50</td>
<td>0.90</td>
</tr>
<tr>
<td>Antidepressant</td>
<td>R$ 71,40</td>
<td>0.47</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>R$ 15,094,19</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Note: The currency format used in this table was the Brazilian currency format.

The estimated total cost of drugs prescribed for the study population was R$ 15,094,59 (fifteen thousand, ninety-four reais and fifty-nine cents). The total cost per patient ranged from R$ 15,90 (fifteen reais and ninety cents) to R$ 3,036,49 (three thousand, thirty-six reais and forty-nine cents).

Average monthly cost per patient was R$ 26,44 (twenty-six reais and forty-four cents) and the average annual cost of medication per patient was three hundred seventeen reais and twenty-two cents (R$ 317,22). The cost of conservative treatment under the SUS perspective does not imply the sum of the custody of consultations, exams and medications.

It can be identified in Table 2, which shows that the total monthly average cost per patient was R$ 64,29 (sixty-four reais and twenty-nine cents) and the total annual cost equivalent to R$ 771,44 (seven hundred and seventy-one reais and forty-four cents).

### Table 2 - Relationship: monthly and annual average costs of the items investigated.

<table>
<thead>
<tr>
<th>Item description</th>
<th>Monthly average cost</th>
<th>%</th>
<th>Annual average cost</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical appointments</td>
<td>R$ 19,25, 29.96%</td>
<td>R$ 231,01, 29.96%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consultations to other specialties</td>
<td>R$ 0,04, 0.06%</td>
<td>R$ 0,44, 0.06%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exams</td>
<td>R$ 18,56, 28.67%</td>
<td>R$ 222,77, 28.88%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicaments</td>
<td>R$ 25,44, 41.13%</td>
<td>R$ 317,22, 41.12%</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>R$ 64,29, 100.00%</td>
<td>R$ 771,44, 100.00%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The currency format used in this table was the Brazilian currency format.

### DISCUSSION

The female sex stood out among the population studied, with a frequency of 70%, finding divergent from the national and international literature. Similar studies in Itajubá, Minas Gerais, Brazil and in the metropolitan region of Cariri Cearense, Brazil, indicate that man is the most affected. However, it is reinforced the data found and mentioned that the number of cases among the female has lower scores of life quality and thus, they present a higher risk of death compared to the men.

In this study, when the age of the sample was analyzed, an average age of 59 years old was observed, similar data were presented, which showed the involvement of CKD in people from the end of their fifth life decade. It is possible to admit that the high frequency in the elderly is due to the weakened potential of the same ones against the progressive loss of the renal function, related to the physiological alterations of the senility and associated comorbidities that lead to the development of the renal pathology.

Some authors affirm that CKD is a disease of the elderly, and that in spite of the diverse therapeutic modalities, the CKD’s treatment for this public still has many gaps; then,
suggesting achievements in actions to improve care, minimize health complications and promote the quality of life of these individuals.

The complete high school had a higher frequency among the studied population (60%). However, if we also consider those with complete and incomplete elementary education, the proportion of low schooling reaches 30%. This finding was also demonstrated in the study44 conducted in the Brazilian Northeast, where a predominance of CKD was observed in patients who had up to 08 years under study.

Studies14 also show a greater frequency of CKD involvement in individuals with low schooling. We would like to point out that the change in the setting of schooling in our study might have occurred due to the accessibility of teaching in recent years and the improvement of life quality as a whole.

Regarding the marital status, it was evidenced that the highest frequency of the individuals was married (30%). A survey conducted in 201525, where it was shown that the marital status of the individuals interviewed, 54% were married.

When analyzing the race variable, we showed that 50% of the individuals declared themselves white skin color, which indicates similarity with another study26, which showed that 88% of the subjects were white. It is emphasized28 that CKD affects the white race more. While the 2009 study27 considers the black and mulatto race with a higher risk for Terminal Renal Disease.

Regarding the presence of religiosity, 60% of individuals declared Catholics. It is stated14 that the presence of religiosity makes these people believe in a greater/divine being that contributes to overcoming the adversities of the disease and nourishes the hope of a possible cure.

Concerning occupation and income, the majority of the participants are retirees and monthly income of two minimum wages. Similar to the literature, which shows that patients bearing CKD have low socioeconomic status. The high number of retirees can be justified due to the benefit acquired by the Instituto Nacional de Seguridade Social (INSS) [National Institute of Social Security], after finding having the CKD45.

The low-income CKD23 patients carry out their treatments in the SUS because they do not have the economic conditions to pay for health insurance as well as treatment. They point out17 although the low socioeconomic condition, influences the quality of adherence to treatment, food, in addition to hampering access to health service, transportation, pharmacological and dialytic treatment, favoring an undignified survival.

Regarding the BMI, it should be noted that the mean of the patients is 26.20%, which are classified as pre-obese. Although the Brazilian reality is not yet an obese country, such comorbidities are not one of the main causes of the CKD, it is necessary having caution since the BMI of patients bearing CKD44 has increased in recent years. Factors such as obesity contribute to the development of chronic diseases. In view of this reality36,38, the need to establish measures to increase the population's access to healthy food, interventions and incorporations of the theme in government advertising and the commitment of actions in the Public Health Policy Programs, in order to increase the knowledge of the disease and its evolution both in the scope of research and in the field of health education.

Evaluating the main causes of CKD in the research subjects, we observed the predominance of SAH and DM. Epidemiological research has pointed out the same as the main causes of CKD, corroborates with our results, demonstrating that SAH is the primary cause of CKD.1,10,29

However, DM is targeted4 as the main underlying disease of CKD in developed countries. From this, it has become clear that adequate and early interventions, which encompass the full spectrum of CKD, both in primary and medium care, can delay the progression of the disease, preventing loss of renal function, or still in the improvement of the organic dysfunction and co-morbid conditions in the patients with the basic diseases of CKD.

Starting from the assumption for the initiation of dialysis therapy, its recommended GFR should be <15 mL/min/1.73 m2 and for this the nephrological evaluation should occur quarterly or with a longer period of time according to its clinical evaluation until the creation of a vascular access that allows it to perform its SRT.5,6

Analyzing what is recommended and what has been found in the study, we have found an average GFR well below what is established, which in fact can not explain the phenomenon, since it was not the objective of the study. Some questions can be raised such as poor adherence to the follow-up period, non-acceptance of the patient, not even presenting signs and symptoms, which makes it more difficult to explain the need for dialysis.

During conservative treatment, there are times to plan the preparation and maturation of a biological vascular access. The AVF is shown as the best and mandatory access for this patient to enter SRT. The first choice of vascular access is AVF, where the patient will have benefits such as longevity of this access, not allowing him so easily infections and consecutive losses.23

What also refers to the way this patient enters SRT, as observed in this study was an equivalence between patients who had their first hemodialysis in an elective and emergency (50%). As this patient is conducted and prepared in conservative treatment, it would be mandatory for all to enter SRT electively, which did not happen and for some reason this patient underwent dialytic urgency.

The early initiation of outpatient follow-up for the CKD patient aims to slow the rate of disease progression, with measures aimed at blood pressure control, glycemic control and dietary guidelines.33

The follow-up period is related to the time of entry and the stage of the disease. The recommended follow up by a
The concentration of consultations of other categories that obtained a lower quantitative. This finding indicates the scarcity of interventions of the multidisciplinary team, but it is not clear if this absence occurs in fact or is due to the lack of records that prove it, anyway the discussion is undertaken with the resources that were actually found in the records.

Patients bearing CKD when followed in conservative treatment are assisted according to the clinical guidelines of renal patient care. In this scope of treatment is placed as a care strategy, as requests for exams following programming that is related to the stages of the disease and the time intervals, monthly, quarterly, semiannually, annually and eventually when necessary. Most are biochemistry, hematology, hormones, urinary and imaging tests.

In this research we have found a higher percentage in the number of records of biochemistry exams compared to other exams. It is important to emphasize the necessity of carrying out the laboratory tests for this assisted population, since these results help in the identification and classification of the stage of the disease and says about the hemodynamic balance of the patient, which is necessary to trace the best care practice with the intention of delaying the patient’s entrance into dialysis.

In order to control the disease, it is extremely important to associate the results of the exams and the prescription of medication, which aims to control pressure levels, glycemic control, treatment of anemia, disorder of mineral and bone metabolism and dyslipidemia. These measures help in the CKD management. In the study scenario, we have seen that, according to the guidelines, the use of drug classes to correct clinical alterations is instituted. Analyzing the drugs used, we identified as the major source of cost was in the treatment of anemia with the use of erythropoietin followed by the class of antihypertensives.

After identifying the numbers of registered consultations, examinations performed and prescribed drugs, an average annual cost per patient under conservative treatment was found to be equal to R$ 771.44 (seven hundred seventy-one reais and forty-four centavos) corresponding to annual SUS expenditure. In contrast, the annual amount that the SUS pays per hemodialysis patient amounts to eight thousand five hundred and ninety-three reais and forty-four centavos (R$ 8,593.44).

Based on these data, the SUS investments should appreciate as a guarantee of the follow up in renal patient care with clinical and medical support, since any time spent in the conservative represents potential savings for the system.

CONCLUSIONS

After the study development, it has been concluded that the scope of chronic renal patient care in conservative treatment is still little explored at the national level. This problem is difficult to contextualize the results of this study with the
Brazilian framework, which reverts in a predominantly descriptive analysis of the findings.

Even though we have faced limitations regarding the quality of records, sample size and the variability of pricing the medicines, we can conclude that the results of the study showed that the amount paid by the SUS per patient in the conservative treatment is lower compared to the amount spent in SRT when dealing with hemodialysis.

Therefore, there is a need to encourage researches on this thematic regarding the epidemiological, financial and clinical aspects. Thus, aiming to expand the technology of low complexity, elaboration and use of differentiated guidelines for each phase of the CKD, and then bringing lower cost and greater effectiveness in the approach and assistance of this disease in the SUS.

REFERENCES

195-9.


