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Original Article

Patients with chronic kidney disease and diabetes mellitus: How is health care?

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ABSTRACT

Objective: To evaluate if the recommendations of appropriate health care for Chronic Kidney Disease (CKD) are implemented in patients with Diabetes Mellitus (DM) and Systemic Arterial Hypertension (SAH).

Methods: This is a descriptive study conducted between January and March 2019 in Divinópolis, in the Brazilian state of Minas Gerais. Patients aged 18 years or older with CKD, DM and/or SAH were followed up at the municipal nephrology outpatient clinic. An interview was conducted using a structured questionnaire to assess care, which was categorized as adequate or inadequate, based on the health care recommendations of the national guidelines for care of patients with CKD.

Results: 42 participants with CKD participated in the study. All participants had SAH and 42.9% (n = 18) also had DM. It was evidenced that 81.0% (n = 34) of the individuals with CKD had adequate health care, especially among patients in earlier stages (3A and 3B) and those who progressed to renal replacement therapy. However, 80.0% (n = 8) of the participants in the intermediate stage (stage 4) were inadequately followed up by the nephrologist and multidisciplinary team.

Conclusions: Patients in intermediate stages do not receive follow-up with a multidisciplinary team at the recommended frequency. The preventive approach of the progression of renal disease in the intermediate stage in the studied municipality was not within the recommendations of the Ministry of Health.

1. Introduction

Chronic kidney disease (CKD) is an important public health problem and is defined as changes in kidney structure and function, present for more than three months and with health implications [1]. The number of cases of CKD has increased in recent decades as a consequence of increased life expectancy and increased prevalence of diabetes mellitus (DM) [2,3]. Studies in different countries, such as the United States, India, China, Japan and Canada have reported that between 8 and 13% of the population present some degree of renal impairment [4–6]. In Brazil, the prevalence of CKD is still uncertain. According to population surveys, 3 to 6 million Brazilians have CKD and 0.05% of the population undergo dialysis [7]. Systemic arterial hypertension (SAH) and DM have been reported as the main causes of CKD [4].

Several factors influence the progression of CKD, such as elevated blood pressure, uncontrolled blood glucose, dyslipidemia, obesity, smoking, proteinuria, nephrotoxins and chronic inflammation [8,9]. In addition, CKD is a risk factor for cardiovascular outcomes, with a high mortality rate [10]. Thus, adequate management of risk factors may delay the progressive loss of renal function and complications resulting from this health condition [1]. Other factors, such as health literacy - which reflects the ability to obtain and understand information, to make pertinent decisions about one's own health - self-care, and health care are important to prevent the progression of CKD [11,12].

In regard to health care for patients with CKD, there are international guidelines denominated *Kidney Disease: Improving Global Outcomes (KDIGO)* that establish criteria for the clinical management of CKD [1]. In Brazil, the Ministry of Health proposed the "Clinical Guidelines for CKD patient care in the Public Health System" (*Diretrizes clínicas para o cuidado ao paciente DRC no Sistema*

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Único de Saúde). This document establishes clinical management, linkage with basic health units, frequency of consultations with the nephrologist and multidisciplinary team, in addition to the recommendations regarding the management of risk factors [13]. The aim of both guidelines is to establish minimum criteria for appropriate assistance for evaluation, clinical management, and prevention of the evolution of CKD.

According to international studies, approximately 50% of patients with CKD have inadequate health care and almost half of dialysis patients are not seen by a nephrologist prior to the initiation of renal replacement therapy (RRT) [6]; proper care of these patients is capable of reducing the rapid progression of CKD [1]. Since KDIGO and the Ministry of Health updated their guidelines for CKD care, studies in Brazil that evaluate whether the recommended care for CKD patients are being performed are unknown, and also whether the health strategies implemented in this population are successful.

Taking into account the high prevalence, progression, and mortality of CKD and that the prevalence of SAH and DM is high in the country, it is necessary to evaluate whether adequate care for patients with CKD is being provided in the early stages of the disease [7]. In Brazil, studies of this nature are unknown until now in nephrological patients. Therefore, the objective of this study is to evaluate whether the recommendations of adequate health care in CKD are implemented in patients with SAH and DM.

2. Materials and methods

2.1. Design and study population

This is a descriptive study conducted between January and March 2019, in the city of Divinópolis, in the Brazilian state of Minas Gerais. Divinópolis is the largest municipality in the region, with a population of 213,016 inhabitants. It has a municipal nephrology outpatient clinic, to where Brazilian Public Health System (SUS) [14] secondary care patients are referred from primary care. The SUS is a free health system that aims to serve all citizens fully.

Patients older than 18 years with CKD and DM and/or SAH were followed for at least two consecutive years between 2014 and 2018 in the nephrology outpatient clinic, and were classified as stages 3A, 3B, 4, and 5- non-dialytic. Additionally, as a criterion of eligibility were considered patients who had not died or moved to another city after the follow-up. All this information was verified in the clinic's computerized health information system (HIS). Patients living in rural areas or at high risk of urban violence, and patients unable to answer the questionnaire due to health conditions (e.g., stroke and hearing loss) were excluded. A pre-test with five patients was performed to verify the recruitment strategy, collection instrument, and comprehension of the respondent.

2.2. Data collection

After the pre-test, the participants were invited by up to three telephone contacts and a home visit. All patients who met the eligibility criteria were contacted. Data collection was performed at the patient's home. Participants were advised about the research objectives and those who agreed to participate signed an Informed Consent Term (ICT). After acceptance, a trained investigator conducted the interview using a questionnaire described as follows.

2.3. Data collection instrument

A structured questionnaire was developed for this research, based on the health assistance recommendations of the Ministry of Health expressed in the "Clinical Guidelines for Care of Patients with Chronic Kidney Disease - CKD in the Public Health System" (*Diretrizes clínicas para o cuidado ao paciente com doença renal Crônica – DRC no Sistema Único de Saúde)* [13].

The questionnaire contains socioeconomic information, clinical history, time since CKD diagnosis, comorbidities, frequency of consultations with the nephrologist and multidisciplinary team in the last year (general practitioner, nurse, psychologist, social worker, nutritionist and pharmacist), health guidance received after diagnosis of CKD, medications in use, life habits, and laboratory exams.

The variables related to the practice of physical activity were adapted from the questionnaire of the Ministry of Health study entitled Surveillance of Risk Factors and Protection for Chronic Diseases by Telephone Interviews (*Vigilância de Fatores de Risco e Proteção para Doenças Crônicas Não Transmissíveis por Entrevistas Telefônicas* (Vigitel) – 2017) [15]. The variables related to smoking were adapted from the Diabetes Self-Care Activity Questionnaire (*Questionário de atividades de autocuidado com o Diabetes – QAD*) [16]. The per capita income was given in accordance with the minimum salary in force in Brazil (R$ 998/US$ 258) and converted into US dollars according to the quotation on April 3rd, 2019 (R$ 3.87 ~ US$ 1).

In addition, the participants answered the "short assessment of health literacy for Portuguese-speaking adults (SAHLPA-18)" questionnaire to assess health literacy [17]. SAHLPA-18 is an 18-item assessment tool that assesses the individual's ability to correctly pronounce and understand common medical terms. The tool is validated for adults in the Brazilian Portuguese language and each correct item receives a point, and the total score is obtained by summing the items, ranging from 0 to 18. A score between 0 and 14 suggests inadequate health literacy [17]. SAHLPA-18 was not applied to non-literate participants, deaf participants, or individuals without cognitive conditions, according to information obtained from the medical record or medical history. Subsequently, blood pressure was measured followed and anthropometric evaluation (weight and height for calculation of Body Mass Index - BMI, and waist and hip circumference). BMI was classified as normal weight (18.5 and 24.9 kg/m^2), overweight (25 and 29.9 kg/m^2), and obesity (>30 kg/m^2) [18].

Information regarding comorbidities, prescription medication, and laboratory exams provided by the participants was later confirmed in their medical records at the municipal nephrology outpatient clinic. The most recent serum creatinine exams for classification of the CKD stage were considered from the calculation of the estimated glomerular filtration rate (GFR) by the formula CKD-EPI [1]. Patients were categorized into stages 3A, 3B, 4, 5-non-dialytic, and 5-dialytic [13].

To evaluate the appropriate care provided, three criteria were created according to the recommendations expressed in the guidelines for care of patients with CKD [13]. The three criteria are: 1) link with basic health unit, 2) nephrological evaluation, and 3) follow-up with a multidisciplinary team. The guidelines orient care according to the stage of CKD in which the patient is found. 1) For patients in stage 3A and 3B the guideline recommends follow-up at the basic health units (BHU). For patients in stage 4, 5-non-dialytic, and 5- dialytic, follow-up is recommended with a multiprofessional team composed of at least: nephrologist, nurse, nutritionist, psychologist, social worker; these patients should also be followed up by a BHU. 2) The frequency of nephrological evaluation for stages 3A, 3B, 4, and 5 should be, respectively: annual, semiannual, quarterly or monthly. According to these criteria, whether or not the patients met the partial and total requirements of adequate health care [13] was assessed.

The criteria were systematized and categorized according to Chart 1. For each of the three items according to the guidelines the

Criterion	Points
1- Link with basic health unit	
Fulfills: consultation with a general practitioner, nephrologist or perform laboratory exams by the SUS in the last 12 months for all stages.	1
2- Nephrological evaluation:	
Stage 3A: *Annual assessment* Fulfills: consultation with a general practitioner at least once a year; Nephrologist: Not applicable Stage 3B: *Semi-annual evaluation* Fulfills: consultation with a general practitioner at least twice a year; Nephrologist: Not applicable Stage 4: *Quarterly* evaluation Fulfills: if the sum of consultations with general practitioners and nephrologists is greater than or equal to four visits per year Stage 5-non-dialytic and dialytic: *monthly assessment* Fulfills: if the sum of consultations with general practitioners and nephrologists is greater than or equal to 12 consultations per year.	1
3 - Follow-up with multidisciplinary team	
Stage 3A and 3B: Not applicable Stage 4, 5-non-dialytic and 5-dialytic: Fulfills: consultation with at least one professional per year: nurse, nutritionist, psychologist or social worker	1
Total Score	Up to 3

Chart 1. Criteria used to evaluate and categorize health care as adequate and not adequate, according to guidelines for care of patients with chronic kidney disease in the Public Health System (SUS). (BRASIL, 2014) [13].

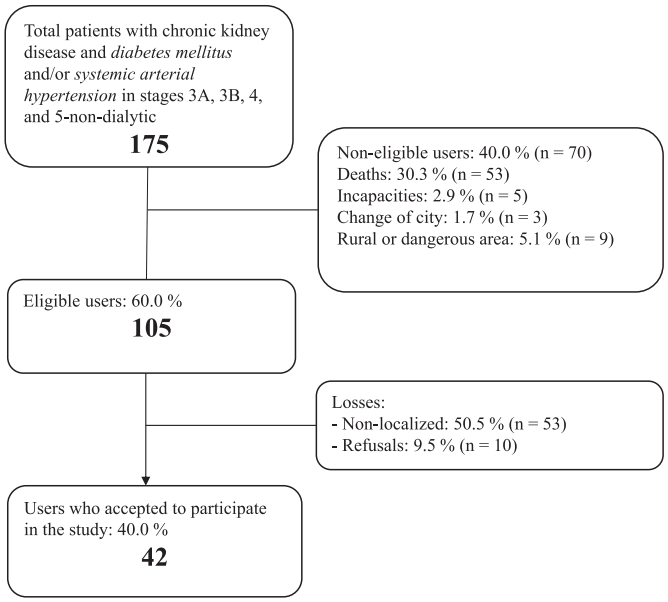

Fig. 1. Study participants recruitment flowchart.

patient received a score, one for completeness and zero for not fulfilling the item. At the end a score is generated ranging from zero to three. This score was then compared to the cut-off point for each stage to assess care compliance. According to the stage and score, the patient was classified as having adequate or inadequate care (for patients in stage 3, the score should be two points, and for patients in stages 4 and 5 the score should be equal to three).

2.4. Plan of analysis

For the evaluation of socio-demographic, clinical, and lifestyle variables, the patients were divided according to the presence or absence of the diagnosis of DM. The patients were divided according to the stage of CKD to perform analyzes of the adequacy to fulfill the criteria of care. A descriptive analysis was also performed comparing patients who had adequate or inadequate care and possible variables that could explain these types of care. The data were collected and entered into the *Questionnaire Development System QDS®* V2. 6.1 and the descriptive analyzes were performed with *IBM SPSS Statistics Base* 19.0 software.

The study was approved by the Ethics Committee of the Federal University of São João Del-Rei - Centro-Oeste Campus (UFSJ), approval protocol 3.010.366, CAAE: 65858117.3.0000.5545.

3. Results

Of the 175 patients enrolled in the municipal nephrology outpatient clinic from 2014 to 2018, 60.0% (n = 105) met the eligibility criteria. Of the eligible, 42 participants were included in the study and interviewed (Fig. 1). Fig. 1 shows the flowchart for eligibility and recruitment of participants. It is noteworthy that 53 potentially eligible patients evolved to death between the follow-up period in the outpatient clinic and the study.

According to the patient's records, all 42 participants included in the study had a diagnosis of CKD and SAH, and 42.9% (n = 18) of the participants stated that they also had type 2 DM. All participants confirmed this information later during the interview. However, only 66.7% (n = 28) reported having been informed by a physician about the diagnosis of CKD. Of the 42 participants, 7.1% (n = 3) progressed to stage 5-dialytic and were followed up by tertiary care.

There was a predominance of males, with 57.1% (n = 24), and the elderly between 61 and 80 years of age with 54.8% (n = 23). Among the elderly, 31.0% (n = 13) had also DM. The participants' ages ranged from 42 to 85 years, with an average of 68.4 and a standard deviation of 12.4. Low schooling and low income prevailed, with 66.7% (n = 28) of participants having 1–4 years of schooling and 84.2% (n = 32) per capita income lower than one minimum wage in the country (≤US$ 258) (Table 1).

Regarding CKD staging, the majority of patients, 38.1% (n = 16), were in stage 3B, followed by stage 3A with 31.0% (n = 31), and stage 4 with 23.8% (n = 10). There were no participants classified in stage 5-non-dialytic at baseline. Patients who progressed to stage 5-dialytic represented 7.1% (n = 3) of the total, with the mean hemodialysis treatment being 28 months. Regarding the time of diagnosis of CKD, participants with SAH and DM presented a median of four years, while participants who had only SAH had a median of five years. Cardiovascular disease, hypercholesterolemia and overweight and obesity had a prevalence higher than 60.0%.

When assessing the adequacy of care according to the stage of CKD, it was observed that all the participants investigated in stages with lower renal function decline (3A and 3B) met the criteria of adequate health care, as well as all the patients in advanced decline (Table 2). However, only 20.0% (n = 2) of stage 4 patients presented care as recommended by the guidelines. It is also noted that compliance with assistance from a multidisciplinary team in stage 4 was that having the lowest compliance.

Regarding follow-up with the nephrologist, 46.2% (n = 6) of participants in stage 3A CKD and 93.8% (n = 15) of patients in stage 3B performed at least one nephrologist care in the last year, even if the referral to this professional in these stages had not been suggested. Regarding patients in stage 4, 90.0% (n = 9) performed at least one nephrologist service in the last year, with an average of 2.2 visits/patient/year. The recommended at this stage would be a quarterly nephrological evaluation, in which only 20.0% (n = 2) complied with the nephrologist. When considering nephrological evaluation as care of the general practitioner and/or nephrologist, this percentage rises to 50.0% (n = 5).

Of the total number of participants, 81% (n = 34) had adequate health care (Table 3). The majority of individuals over 80 years old,

Table 1
Socioeconomic, clinical, and life habits data of participants with chronic kidney disease and systemic arterial hypertension. Divinópolis, 2019 (n = 42).

Variable	With Diabetes (n = 18) n (%)	Without Diabetes (n = 24) n (%)	Total (n = 42) n (%)
Gender			
Male	11 (26.2)	13 (31.0)	24 (57.1)
Female	7 (16.7)	11 (26.2)	18 (42.9)
Age			
Up to 60 years	3 (7.1)	8 (19.0)	11 (26.2)
Between 61 e 80 years	13 (31.0)	10 (23.8)	23 (54.8)
Above 80 years	2 (4.8)	6 (14.3)	8 (19.0)
Marital status			
Married/stable relationship	14 (33.3)	16 (38.1)	30 (71.4)
Others	4 (9.5)	8 (19.0)	12 (28.6)
Years of schooling			
Illiterate	2 (4.8)	1 (2.4)	3 (7.1)
from 1 to 4	12 (28.6)	16 (38.1)	28 (66.7)
from 4 to 8	2 (4.8)	0 (0.0)	2 (4.8)
Above 8	2 (4.8)	7 (16.7)	9 (21.4)
Color or race			
Mixed	8 (19.0)	8 (19.0)	16 (38.1)
White	4 (9.5)	10 (23.8)	14 (33.3)
Black	5 (11.9)	4 (9.5)	9 (21.4)
Do not know	1 (2.4)	2 (4.8)	3 (7.1)
Health plan			
Yes	5 (12.2)	7 (17.1)	12 (29.3)
No	12 (29.3)	17 (41.5)	29 (70.7)
[a]**Per capita income**			
Less than one minimum salary (≤US$ 258)	15 (39.5)	17 (44.7)	32 (84.2)
Between one and two minimum salaries (Between US$258 and 516)	1 (2.6)	5 (13.2)	6 (15.8)
CKD Stage			
3A	7 (16.7)	6 (14.3)	13 (31.0)
3B	6 (14.3)	10 (23.8)	16 (38.1)
4	4 (9.5)	6 (14.39)	10 (23.8)
5-Dialytic	1 (2.4)	2 (4.8)	3 (7.1)
Mean time of CKD (months)[b]	48 (36–84)	60 (36–120)	60 (36–87)
Comorbidities			
Hypercholesterolemia	9 (23.1)	14 (35.9)	23 (59.0)
Cardiovascular disease	11 (26.2)	7 (16.7)	18 (42.9)
Body Mass Index			
Normal	5 (11.9)	9 (21.4)	14 (33.3)
Overweight	7 (16.7)	5 (11.9)	12 (28.6)
Obese	6 (14.3)	10 (23.8)	16 (38.1)
Family history			
Chronic Kidney Disease	5 (12.2)	6 (14.6)	11 (26.8)
Infarction, stroke or sudden death before age 50	10 (23.8)	16 (38.1)	26 (61.9)
Smoking			
Yes	3 (7.1)	1 (2.4)	4 (9.5)
Never smoked	6 (14.3)	12 (28.6)	18 (42.9)
Ex-smoker	9 (21.4)	11 (26.2)	20 (47.6)
Consumption of alcoholic beverages			
Yes	2 (4.8)	6 (14.3)	8 (19.0)
No	8 (19.0)	12 (28.6)	20 (47.6)
Ex-drinker	8 (19.0)	6 (14.3)	14 (33.3)
Practice of physical activity in the last week			
Yes	6 (14.3)	10 (23.8)	16 (38.1)
No	12 (28.6)	14 (33.3)	26 (61.9)

Legend: CKD: chronic kidney disease.
[a] Income per capita: Four patients omitted income.
[b] Average CKD duration: Non-parametric distribution; value expressed in median and interquartile range. Evaluated only in 33.3% of patients who reported having been informed by a physician about the diagnosis of CKD.

50.0% (n = 4), and non-literate, 66.7% (n = 2), had inadequate health care. A higher percentage of individuals with DM and cardiovascular disease had adequate health care.

Regarding the self-reporting of the participants in presenting difficulty in attending consultations with a nephrologist, 43.8% (n = 7) of the participants in stage 3B and 50.0% (n = 5) in stage 4 reported having difficulties scheduling consultations with a nephrologist. No patient on RRT reported having difficulty scheduling a consultation. It is highlighted according to Table 3, that 85.7% of the participants with adequate assistance presented inadequate health literacy.

4. Discussion

In this study, it was evidenced that the majority of individuals with CKD have adequate health care, especially among patients in the more early stages (3A and 3B) and in patients on RRT (5-dialytic). However participants in stage 4, considered intermediate, do not receive adequate care, with deficits of follow-up with the nephrologist and multidisciplinary team.

In patients with stage 3A and 3B, it is recommended that follow-up should be performed in the BHU, and in case of alterations compatible with the rapid loss of renal function, these patients should be referred to specialized care units [13]. In the present

Table 2
Frequency of adequate care according to stage of chronic kidney disease (CKD) as recommended in clinical guidelines for care of patients with CKD. Divinópolis-MG, 2019 (n = 42).

	CKD Stage			
	3A n = 13 n (%)	3B n = 16 n (%)	4 n = 10 n (%)	5D N = 3 n (%)
Follow-up by a Health Unit	13 (100.0)	16 (100.0)	10 (100.0)	3 (100.0)
Recommended annual nephrological assessment				
General Clinic	13 (100.0)	16 (100.0)	2 (20.0)	2 (66.7)
Nephrologist	NA	NA	2 (20.0)	3 (100.0)
Nephrological evaluation criteria are met	13 (100.0)	16 (100.0)	5 (50.0)	3 (100.0)
Multidisciplinary team follow-up				
Nurse	NA	NA	0 (0.0)	3 (100.0)
Nutritionist	NA	NA	2 (20.0)	3 (100.0)
Psychologist	NA	NA	0 (0.0)	2 (66.7)
Social Worker	NA	NA	1 (10.0)	2 (66.7)
Fulfills Multidisciplinary Team	NA	NA	3 (30.0)	3 (100.0)
Meets all criteria for proper care	13 (100.0)	16 (100.0)	2 (20.0)	3 (100.0)

Legend: CKD: Chronic Kidney Disease, D: dialytic.
NA: Not applicable - services that are not required by the guidelines.

Table 3
Health care profile according to socio-demographic variables, comorbidities, health literacy, CKD staging, patient perception, and guidance received. Divinópolis-MG, 2019 (n = 42).

Health Care		
Variables	Adequate (n = 34)	Inadequate (n = 8)
Age		
Up to 60 years	9 (81.8)	2 (18.2)
Between 60 and 80 years	21 (91.3)	2 (8.7)
Above 80 years	4 (50.0)	4 (50.0)
Schooling		
Illiterate	1 (33.3)	2 (66.7)
Primary education incomplete	24 (85.7)	4 (14.3)
Primary education complete	2 (100.0)	0 (0.0)
High school complete	7 (77.8)	2 (22.2)
***Per capita* income**		
Less than one minimum salary	26 (81.3)	6 (18.8)
From one to two minimum salaries	6 (100.0)	0 (0.0)
Comorbidities:		
DM		
Yes	15 (83.3)	3 (16.7)
No	19 (79.2)	5 (20.8)
Obesity		
Yes	11 (68.8)	5 (31.3)
No	23 (88.5)	3 (11.5)
Cardiovascular disease		
Yes	15 (83.3)	3 (16.7)
No	19 (79.2)	5 (20.8)
Hypercholesterolemia		
Yes	18 (78.3)	5 (21.7)
No	14 (87.5)	2 (12.5)
Health literacy		
Adequate	10 (71.4)	4 (28.6)
Inadequate	24 (85.7)	4 (14.3)
Perception of the patient regarding the number of annual consultations to treat health		
Sufficient	21 (80.8)	5 (19.2)
Insufficient	13 (81.3)	3 (18.8)
Difficulty attending consultations with nephrologist		
None	15 (75.0)	5 (25.0)
Schedule consultation with the professional through the public network	13 (81.3)	3 (18.8)
Health condition	5 (100.0)	0 (0.0)
Others	1 (100.0)	0 (0.0)
Guidelines received after CKD diagnosis:		
Decreased sodium intake		
Yes	30 (81.1)	7 (18.9)
No	4 (80.0)	1 (20.0)
Reduction of protein intake, accompanied by nutritional guidance		
Yes	26 (78.8)	7 (21.2)
No	8 (88.9)	1 (11.1)
Physical activity compatible with cardiovascular health and tolerance		
Yes	29 (78.4)	8 (21.6)
No	5 (100.0)	0 (0.0)

study, all participants in stage 3 (A and B) had follow-up with a general practitioner in the BHU, and 72.4% (n = 21) also attended a nephrologist in secondary care. In a study carried out in the north of Brazil, 44.6% of stage 3 patients were referred to the nephrologist [19]. This finding is positive, since other studies carried out in the country have shown that patients are usually referred late to nephrology outpatient clinics, when the most likely outcome is RRT [20,21]. The follow-up of patients in the early stages by the BHU and early referral to the nephrologist can prevent the rapid progression of the disease by treating risk factors for CKD progression.

Participants who progressed to the RRT stage presented adequate health care, including follow-up with a multidisciplinary team. This can be justified by the fact that these patients are followed up in the tertiary care of the municipality where they perform the RRT and no longer in secondary care. Studies demonstrate that age, cardiovascular diseases, and DM are the main determinants of survival in patients on RRT [20]. Cardiovascular diseases are the main cause of death in the general population, but in the population with CKD, mortality risk increases proportionately for progression to more advanced stages of the disease [22]. This is because, in addition to the traditional risk factors (SAH, DM, dyslipidemia), the new risk factors related to CKD (anemia, changes in calcium and phosphorus metabolism, among others) contribute even more to an increase in cardiovascular risk [20,23]. Thus, frequent and multidisciplinary follow-up allows appropriate treatment for a complex and multifactorial disease such as CKD.

One troubling result found was inadequate care found in patients in the intermediate stage (stage 4). Although 90.0% of participants had at least one consultation with a nephrologist in the last year, only 20.0% fulfilled all the criteria related to the adequate frequency of annual nephrological evaluations and follow-up with a multidisciplinary team. Thus, it is observed that although these patients are receiving care, this is not performed at the appropriate frequency for follow-up of a patient who is in the last stage before RRT. Considering that these patients are at increased risk for progression to terminal stage CKD, in each nephrological evaluation it is important to evaluate the progression of CKD and to take staging of the disease into account to plan intervention strategies [24]. If the patient is not receiving follow-up at the recommended frequency, there is a loss of the opportunity to implant therapeutic strategies that could lead to a delay in the progression of CKD.

The fact that stage 4 patients are not being followed up at the required frequency may be related to the difficulty of accessing health care. Among patients in stage 4, 50.0% (n = 5) reported difficulties in scheduling medical appointments. The return to the nephrologist in secondary care is scheduled by primary care. Each health unit has a monthly limit of referrals for secondary care. When this limit is reached, a queue is held for the subsequent months. Among patients in stage 5-dialytic, none reported difficulty in scheduling appointments with the nephrologist. This is because these participants are on RRT and are followed up in tertiary care. Problems in referral of patients to specialized care end up increasing the number of late diagnoses, the need for urgent dialysis, and hospital admissions [25,26]. Thus, the evidence indicates that the scheme of referrals for the secondary care of the municipality is limited and impairs the follow-up of the patients as determined by the Ministry of Health guidelines.

Follow-up with a multidisciplinary team, which should be performed for stage 4 and 5 patients, was the criterion that presented less frequency of health care compliance. It is also worth noting that the criteria established in this study to evaluate assistance by the multi-professional team, considered as adequate care the report of at least one consultation with a non-medical professional per year. Given that CKD is a multifactorial and complex disease that demands not only medical care, but changes in lifestyle and health behaviors, multidisciplinary follow-up is undoubtedly essential for a better prognosis when it also works on the psychosocial and functional needs characteristics of the affected patients [1,21]. At intermediate stages, no participant reported having consulted with a nurse or psychologist, and attendance with a social worker and nutritionist was considered low. It is a function of the support network for patients with CKD to meet the demands of treatment of comorbidities and intervene in the quality of life of individuals, improving the overall prognosis of CKD, which is not always possible due to the low investment in the implementation of SUS precepts [25]. Thus, both the regularity of follow-up by nephrologists and the referral to non-medical professionals need to be reviewed and made, especially in patients in the intermediate stages.

The sample of this study consisted mainly of men, the elderly, individuals with low schooling, and per capita income below the minimum wage. These data are consistent with socio-demographic results of the Brazilian Dialysis Census and other national and international studies [3,27–29]. Results of the National Health Survey (2013) showed advances in access and use of health care in Brazil, but there are still regional differences and levels of education [30]. A study carried out in São Paulo also showed that the elderly with lower income and lower educational level had lower demand for health services [31]. Therefore, the particularities of the population with CKD indicate the need for public policies that take into account the specificities of this population, facilitate access, and can reduce these inequalities.

A prevalence of 42.5% of patients with DM was found among patients with CKD. In the United Kingdom, 23.0% of the patients with reduced GFR had DM [3]. DM was considered the leading cause of renal failure in Europe, according to the European Renal Association (ERA-EDTA) (2015) [32]. In the southeastern region of Brazil a prevalence of 38.1% [20] of DM in CKD was found. In addition to the high prevalence of DM in the present study, patients with DM were on average 12 years younger than the other patients. A total of 83.3% of patients with DM presented inadequate care. The fact that the patient presents multiple comorbidities can cause them to worry more about their health and seek more services.

An interesting point to be discussed is the fact that the participants who were classified with inadequate care, reported having received guidelines on decreased sodium intake, reduction of protein intake, and on the practice of physical activity compatible with cardiovascular health. In addition, despite having relatively lower levels of schooling and income than those with adequate care, individuals with inadequate access understand that the number of consultations with a nephrologist is sufficient, and a higher proportion had adequate health literacy. This leads us to note that, although they did not have adequate health care, these patients were well oriented even though the number of consultations with health professionals was lower than recommended.

Finally, this study shows potentialities and limitations. As limitations, it can be mentioned that it is a local study with a reduced sample size, even though an attempt was made to contact all the eligible patients who were followed up in the period. In addition, CKD is usually an under-diagnosed disease. Another limitation refers to the fact that we investigated patients who were already receiving follow-up at the municipal nephrology outpatient clinic, which may overestimate patients with access to this service.

Among the potentialities, we can mention that this is the first study that evaluates health care in patients with CKD according to the guidelines for care of these patients [13]. The results obtained can help identify failures in the service, to improve service management.

As final considerations, this study showed that patients in the early and late stages of CKD are receiving adequate health care.

However, patients in intermediate stages have inadequate assistance to health care, especially in relation to care by a multiprofessional team and frequency of nephrological evaluation. This fact characterizes a loss of opportunity to perform interventions at a crucial time to avoid progression to terminal CKD. It was observed that the limiting factor for care is not the intrinsic characteristics of the patients (such as age, income and schooling), but rather the low supply of services. Inequalities were observed in the care model, indicating the need for public policies that take into account the specificities of this population, facilitate access, and reduce the progression of CKD.

Conflicts of interest

None.

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