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ORIGINAL ARTICLE

Hospitalizations in Octogenarian Patients with End-Stage Renal Disease: What Changes after Beginning of Hemodialysis?

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Abstract

Introduction: The benefits of dialysis in the octogenarian are dubious. This study aimed to investigate whether initiation of chronic hemodialysis (HD) changes the rate and duration of hospitalizations in a Portuguese cohort of octogenarian patients.

Material and methods: A single-centre, retrospective, observational study was performed. Patients aged ≥ 80 years who initiated HD in a Portuguese Central Hospital between January 2007 and December 2017 were screened for inclusion. Hospitalizations in the 2-year period before HD initiation were compared to the first 2 years after starting HD. McNemar and Wilcoxon signed rank test were used.

Results: A total of 88 patients were included, with a mean age of 84 ± 2.8 years. Nearly all the patients (97.7%) had one or more comorbid conditions. In 60.2% of the patients the functional activity was normal (Karnofsky score ≥ 80). Hemodialysis was initiated in an emergency situation in 58% of the patients and the majority (59.1%) had an arteriovenous fistula as vascular access. In the pre-HD period, most patients (54.5%) had at least one hospitalization (min = 1; max = 4). After HD started, the number of hospitalizations decreased (p = 0.034) and only 39.8% of the patients required hospital admission (min = 1; max = 3), with shorter average hospital stay (p = 0.013).

Conclusion: The number and length of hospitalizations did not increase with the beginning of HD in this Portuguese cohort of octogenarian patients. Therefore, hospitalizations do not constitute an argument for restricting access to HD to octogenarians. Comorbidity and performance status are the factors that should exert the greatest influence on such decision.

Keywords

Octogenarians, Hemodialysis, Hospitalization, End-stage kidney disease

List of Abbreviations

ESRD: End-Stage Renal Disease; HD: Hemodialysis

Introduction

Nephrologists are currently facing an increased demand from elderly patients suffering from end-stage renal disease (ESRD) in developed countries. In Portugal, the proportion of the incident dialysis patients aged 65 years or more at the start dialysis increased from 61.8% in 2010 to 62.3% in 2017 [1,2]. According to the Portuguese Registry, 22% of the prevalent dialysis patients in 2019 were aged over 80 years [3].

The benefits of dialysis in terms of survival and quality of life in the elderly have often been questioned. Although patients may live longer with dialysis, the extension of lifetime may be associated with a poor quality of life and high morbidity. Time spent on dialysis, functional decline, complications associated with the vascular access and increased hospital admissions worsen the burden imposed by dialysis [4-9].

Some studies have reported that hospitalizations tend to increase among older patients who start dialysis [10-12]. Analysis of healthcare service requirements,

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such as hospitalizations, provides us with insight on the morbidity associated with dialysis therapy [6,7].

Among elderly ESRD patients, the octogenarians ("very old") raise the most complex problems with respect to dialysis initiation. Despite this, studies specifically devoted to octogenarian ESRD are lacking, and their conclusions are rather controversial.

The question addressed in this report was whether initiation of chronic hemodialysis (HD) changes the rate and duration of hospitalizations (a robust index of morbidity) in a Portuguese cohort of octogenarian patients.

We analysed hospitalizations during the period preceding initiation of HD and during the HD period in octogenarian patients followed in Nephrology Department of a Portuguese Central Hospital.

Methodology

Study population, setting and design

A retrospective, observational study was performed, analysing all patients aged 80 years or more at the start time of regular HD, between January 2007 and December 2017, followed in Nephrology Department of a Portuguese Central Hospital. To be included in the study, patients required at least 6 months of follow-up during the HD period and should have their hospital admissions to our hospital. Patients were followed until December 31st, 2019. Premature loss of follow-up occurred in the event of death.

Information was collected through consultation of the hospital and dialysis centre records. Sociodemographic data, comorbid information, medical history, and dialysis-relation information were retrieved for each patient at the time of centre admission. For each patient, we extracted hospitalization-related information (number, causes and dates of admissions and discharge) that occurred during the 2 years before and 2 years after the start of HD.

The study protocol is according to the Declaration of Helsinki. The collection of clinical information for this study was approved by the Ethics Committee of the Hospital Centre under the number 98/2022-1. Given its retrospective and non-interventional nature, we did not obtain the patients' informed consent.

Statistical analysis

Sample descriptive statistics were computed such as minimum, maximum, mean, media, quartiles, standard deviation and coefficient of variation for quantitative variables and proportions for categorical variables. The comparison of hospitalizations was based on only hospitalizations within 2 years of the initiation of HD in the pre-HD and HD periods. McNemar test and Wilcoxon signed rank test were used.

Results

Patient characteristics

A total of 88 patients were included in this analysis. Mean age was 84 ± 2.8 years, ages ranged from 80 to 95 years at dialysis start. Nearly all patients were between 80 and 90-years-old with the majority in the mid 80's.

Patients' descriptive statistics are displayed in Table 1.

Hemodialysis, 3.5 to 4.5 hours per session, was performed 3 times a week. The type and membrane of dialyzers used changed over the years. Removal of azotemic substances was monitored throughout the observation period by the single pool Kt/V urea calculated monthly from pre-dialysis and post-dialysis serum urea measurements using the second generation Daugirdas formula [13]. Kt/V urea values were 1.20 per session or higher in more than 80% of the observations.

A total of 81 patients (92%) had at least 2 years of follow-up during the HD period and 7 (8%) had a follow-up of less than one year.

Table 1: Patients' descriptive measures at the time of centre admission.

Patients Characteristic	% or Mean ± SD
Demography	
Age (years)	84 ± 2.8
Male gender	61.4%
Clinical	
Late referral (< 3 months)	35.2%
Karnofsky score ≥ 80	60.2%
Karnosfy score ≤ 40	3.4%
Etiology of ESRD	
Vascular disease	17.0%
Diabetic renal disease	23.9%
Other systemic disease	5.7%
Other causes	53.4%
Comorbid conditions	
Diabetes	43.2%
Hypertension	86.4%
Heart disease	58.0%
Peripheral vascular disease	22.7%
Lung disease	19.3%
Cerebrovascular disease	26.1%
Osteoarticular pathology	26.1%
Sum of comorbid conditions	
0	2.3%
1 to 3	69.4%
≥ 4	28.3%
First hemodialysis	
Fistula as the access	59.1%
Emergency hemodialysis	58.0%
Hemodialysis duration (years)	3.75 ± 2.68 (median = 3.14)

Hospitalizations in the cohort

Among the 88 patients, 48 (54.5%) had at least one hospitalization during the pre-HD period and 35 (39.8%) required hospital admission during the HD period (Table 2). The proportion of patients with no hospital admissions was slightly larger after 2 years of HD initiation ($p = 0.074$).

Table 3 shows the number of hospitalizations during the pre-HD period and HD period (excluding patients with no hospital admissions). In 2 years prior to the start of HD, most patients had 2 admissions or less, only a few had 3 admissions and very few had 4 admissions. During the two years after starting dialysis, most patients had 1 admission only, a few had 2 admissions and very few had 3 admissions.

In the HD period, compared with pre-HD period, the average number of hospital admissions was significantly lower ($p = 0.034$).

Table 4 shows hospitalization length in the pre-HD and HD periods. The average hospital stay 2 years after the start HD was lower than in the previous 2 years ($p = 0.013$).

Among the hospitalizations that occurred in the pre-HD period, 44.7% were due to renal related disease. After dialysis started, hospital admissions were mainly due to non-access related infections (40.8%). Table 5 shows the number of hospitalizations for each category of hospitalization.

Discussion

Although various aspects of hospitalization in elderly patients have been addressed, comparisons of hospitalizations before and after beginning of HD in this group of patients are scarce. To the best of our knowledge, this study is the first to analyse whether the number of hospital admissions and hospital stay changes with the start of HD in a cohort limited to patients aged

Table 2: Hospital admissions.

Hospital admissions	Previous 2 years		After 2 years	
	n	%	n	%
0	40	45.5	53	60.2
≥ 1	48	54.5	35	39.8
Total	88	100.0	88	100.0

Table 4: Hospital stay.

Hospital stay	Previous 2 years	After 2 years
Minimum; Maximum	2; 82	1; 45
Mean	17.1	12.7
Quartiles (Q1; Med; Q3)	9; 13; 22	5; 10; 16
Std. deviation (c.v.)	13.9 (81.5%)	10.4 (82.2%)

Table 3: Number of hospital admissions (excluding patients with no admissions).

Number of admissions	Previous 2 years		After 2 years	
	n	%	n	%
1	30	62.5	24	68.6
2	10	20.8	8	22.9
3	6	12.5	3	8.6
4	2	4.2	0	0.0
Total	48	100.0	35	100.0
Minimum; Maximum	1;4		1; 3	
Mean	1.6		1.1	
Quartiles (Q1; Med; Q3)	1; 1; 2		1; 1; 1	
Std. deviation (c.v.)	0.87	(55.0)	0.36	(31.1)

Table 5: Causes of hospitalizations.

Causes of hospitalizations	Previous 2 years		After 2 years	
	n	%	n	%
Vascular access	1	1.3	10	20.4
Non-vascular access infections	13	17.1	20	40.58
Renal disease	34	44.7	0	0.0
Cardiovascular disease	16	21.1	5	10.2
Cerebrovascular disease	0	0.0	1	2.0
Surgery or trauma*	9	11.8	8	16.3
Miscellaneous**	3	3.9	5	10.2
Total	76	100.0	49	100.0

*Surgical admissions excluded those for HD access issues; **Miscellaneous included those admissions for psychiatric, metabolic, gastrointestinal (no surgical causes) diseases, and others.

≥ 80 years, comparing the period preceding beginning of HD and the HD period. Our study shows that the number of hospitalizations was lower in the HD than in the pre-HD period in this age group.

Prior studies have assessed the association of patient characteristics (e.g., comorbid conditions and functional status) and treatment practices (e.g., early nephrology referral and type of vascular access) before and at the time of dialysis beginning with subsequent outcomes [4,5,14]. Our findings may reflect the characteristics of octogenarians that start HD in this facility. In our sample, most patients did not have heavy comorbidity and had a good functional status (*Karnofsky score* ≥ 80), most presented early referral to a nephrology specialist and initiated dialysis by an autologous vascular access which may have contributed to the good outcomes.

Another reason for the decrease in the number and length of hospitalizations in the dialysis period could be by dialysis treatment administered by skilled caregivers which enabled clinical monitoring and prevention and timely treatment of intercurrent illnesses and avoiding hospital admissions.

The main causes of hospitalization in the pre-dialysis period were renal related-diseases which can be explained by worsening renal function in patients approaching end-stage renal disease. After dialysis had been initiated, hospital admissions were mainly due to non-access related infections. Infections are some of the most worrisome complications in older patients [15,16]. The immunosenescence associated with uremia and chronic inflammation has been linked to infectious complications in elderly on HD [17]. Our study was limited by the small sample size and by having few hospitalization events in the considered time.

The retrospective design limits the accuracy in data collection and correction for potential confounders. Also, there were no specific inclusion criteria other than the beginning of HD in this facility (sample bias).

A recent study reported that hospital length of stay was higher among older adults receiving maintenance dialysis than in those who received non-dialysis care [8]. Non-dialytic conservative care has been recognized as a viable alternative, which aims to preserve quality of life by active medical treatment and multidisciplinary care including all interventions as needed although without dialysis. However, we did not include ESRD patients 80 years or older under conservative management and therefore we cannot establish comparison between both groups.

Another limitation is that we did not analyse the frailty phenotype of patients included in this study. Frailty has been defined as a deterioration syndrome or state of increased vulnerability to stressful situations, resulting from aging-associated decline, characterized by a reduction in biological functional reserves, which raises the risk of poor outcomes [18]. Several societies such as KDIGO (Kidney Disease: Improving Global Outcomes) have recognized the importance of assessing frailty to provide better elderly care. Some studies have established an association between frailty in hemodialysis and poor prognosis, leading to hospitalization and death [19,20].

Availability of different standards of healthcare in different countries may limit the generalization of our results to other populations of octogenarians worldwide. The healthcare system framework and availability of hemodialysis treatment centres with skilled caregivers is key for better outcomes.

Conclusions

The number and length of hospitalizations, which affect quality of life, did not increase with the beginning of hemodialysis in our study. Therefore, the increase in the number of hospitalizations should not stand alone as an argument for restricting access to HD in octogenarian patients. Comorbidity and performance status are the factors that should exert the greatest influence on the decision to consider hemodialysis in this population.

Disclosures

Conflict of interest

The authors declare that there is no conflict of interest in this work.

Source of funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical aspects

The study protocol is according to the Declaration of Helsinki. The collection of clinical information for this study was approved by the Ethics Committee of the Hospital Centre under the number 98/2022-1. Given its retrospective and non-interventional nature, we did not obtain the patients' informed consent. The authors declare that no data that allows identification of the patient appears in this article.

Author contribution

DA, CS, AV: Study design; DA, VF: Data collection; PT: Statistical analysis; DA, PT: Data analysis; DA, VF: Manuscript draft; CS, PT, CA, AV: Revised the manuscript for important intellectual content.

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