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Research Article

Impact of Nephrological Follow-Up Before Initiation of Extrarenal Purification in Conakry

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Abstract

This study aimed to assess how pre-dialysis nephrological follow-up influences the clinical condition of patients at dialysis initiation.

Methodology: Patients undergoing hemodialysis from September to November 2022 at the Donka Public Center were divided into two groups: those with early planned management and those admitted late with emergency dialysis. Cases of acute renal failure were excluded.

Results: Of 78 hemodialysis patients, 70 were included. Of these, 13 (18.57%) had early nephrological follow-up, compared with 57 (81.43%) admitted late. Comparing the two groups, the mean ages were 46 and 49 respectively, with sex ratios of 0.6 and 0.7. The main comorbidities were arterial hypertension (17.14% and 67.14%) and diabetes mellitus (2.86% and 14.29%). Among the indications for hemodialysis, acute lung edema was absent in the first group versus 9% in the second, uremic pericarditis zero cases versus 4%, and uremic coma zero cases versus 14%.

Recourse to femoral catheterization was 9% in the early-admission dialysis group versus 91% in the late-admission dialysis group (p-value=0.0001). There were no deaths in the early-admission group versus 4% in the late-admission group.

Conclusion: Early management of kidney disease and the factors associated with its progression can limit the need for emergency dialysis and improve patient survival.

Keywords: Follow-Up Impact; Extra-Renal Replacement Therapy

Abbreviations

GFR: Glomerular Filtration Rate; F: Female; CNG: Chronic Glomerulonephritis; H: Male; HTA: Hypertension; ARF: Acute Renal Failure; CKD: Chronic Renal Failure; TCRI: Terminal Chronic Renal Failure; NTIC: Chronic Tubulointerstitial Nephropathy; OAP: Acute Lung Edema; SG: Glasgow Score

Introduction

End-stage renal disease (ESRD) is defined as a progressive and irreversible loss of renal function, resulting in a fall in glomerular filtration rate (GFR) below 15 ml/min/1.73m^2. It is a major public health problem, due to its severity and its medico-economic impact on the healthcare system [1]. Its prevalence is rising rapidly with the increasing incidence of type 2 diabetes and hypertension [2].

The timing of the initiation of renal replacement therapy depends not only on the level of residual function of this organ, estimated by calculating GFR, but also on the clinical condition of patients and medical practices [3].

GFR is the best quantitative marker of overall renal function, including the purifying, homeostatic and endocrine functions of the kidney. Knowledge of GFR is essential for diagnosing CKD and accurately assessing its severity [2].

Hemodialysis is sometimes indispensable in the management of severe AKI or end-stage CKD. In these conditions, it is most often used on an emergency basis, as the diagnosis of chronic renal failure is usually made late in the course of treatment [3].

In most cases, CKD remains asymptomatic until the end stage (ESRD). In the end stage, it requires long-term renal replacement therapy, such as extra-renal purification (peritoneal dialysis or hemodialysis) or renal transplantation (grafting). hemodialysis is the most common and most accessible method of renal replacement. It involves detoxification by blood filtration through an artificial membrane [3].

End-stage renal disease has become a major economic challenge for public health.

In 2012, the cost of treating ESRD with hemodialysis was estimated at between $50,000 and $90,000 [4].

Starting maintenance dialysis in a planned way remains a challenge for many patients. Previous studies have shown that late referral to a nephrologist is associated with initiation of emergency dialysis, and that patients starting emergency dialysis have more comorbidities [5].

According to many authors, this late referral to a nephrologist must be blamed for the mortality of dialysis patients, in association with other causes: high age, significant comorbidity (notably cardiovascular), and nutritional status impaired by uremia [6,7].

Early management of kidney disease and the factors associated with its progression can delay the initiation of replacement therapy, limit the need for emergency dialysis, improve survival after dialysis, and prepare patients for the possibility of renal transplantation [8]. This study aimed to assess how pre-dialysis nephrological follow-up influences the clinical condition of patients at dialysis initiation for at least 6 months.

Patients and Methods

This was a prospective descriptive and analytical study lasting 3 months, from September 1 to November 30, 2022.

Recruitment was exhaustive and included all chronic hemodialysis patients hospitalized or followed as outpatients during the study period.

Patients undergoing hemodialysis from September to November 2022 at the Donka public center were divided into two groups: those with early planned management for at least 6 months and those admitted late with emergency dialysis.

Patients receiving hemodialysis for complications of acute renal failure were excluded from this study. Study variables were qualitative and quantitative, divided into epidemiological, clinical and prognostic data.

The patient declared followed: any patient with CKD, not put on hemodialysis and followed in the department for at least 6 months before being put on hemodialysis.

Non-follow-up patient: any patient referred to the nephrology department for CKD requiring emergency
hemodialysis.

Anuria was defined as diuresis of less than 150ml per day.

Oliguria was defined as diuresis between 300 and 500ml per day.

Normal diuresis was defined as a diuresis greater than 500ml per day.

Uremic intoxication is the occurrence in a patient with CKD of hiccups, nausea, incoercible vomiting persisting despite the use of antiemetics, Hyperkalemia, defined as a plasma potassium value above 5.5mmol/l.

Uremic encephalopathy was defined as impaired consciousness with an OS of less than 13/15, in a CKD patient with uremia greater than or equal to 30mmol/l; (impaired consciousness, coma or psychomotor agitation) in the absence of other etiologies.

Metabolic acidosis is defined as deep, rapid breathing with good room air saturation and bicarbonatemia below

20mmol/l in a CKD patient.

Uremic pericarditis: presence of pericardial friction, confirmed by Doppler ultrasound of the heart, with no other associated etiology in a patient with CKD.

Acute lung edema: state of overload in an oligo-anuric context, presence of crepitating rales in both lung fields on rising tide, and an X-ray highlighting the presence of diffuse snowflake opacities in a CKD patient.

Data were collected on a survey form, entered and analyzed using Epi-info software version 7.2.3.1. Word, Excel

and Power Point software from the 2019 Office Pack were used to enter the document and present the results in the form of tables and figures.

Qualitative variables were expressed as proportions and quantitative variables as mean ± standard deviation.

The Chi-square test and Fisher's exact test were used to compare proportions, and the Student's t test was used to compare means. Statistical significance was retained when the p-value was less than 0.05.

Background

The Nephrology and Hemodialysis Department of the Donka National Hospital, located in the capital. Conakry, is the only department in the country specializing in the treatment of kidney disease. It has a limited capacity of 30 dialysis stations, and is currently facing difficulties in managing the growing number of patients arriving for extra-renal purification. Patients with limited resources who cannot be cared for in private facilities are registered on a waiting list for dialysis at the public center; hence the need for follow-up during this period; then some patients, after the diagnosis is announced, do not decide early on to undergo hemodialysis, so they are followed up in a planned outpatient consultation and benefit from counseling before changing their mind after or sometimes uremic complications.

Limitations and difficulties

Lack of adherence to follow-up appointments by patients largely living outside the Conakry region and the initiation of dialysis by some patients before the six-month follow-up period were factors that changed the sample size.

Results

Socio-demographic data Of 78 hemodialysis patients, 70 were included. Of these, 13 (17%) had early nephrological follow-up, compared with 57 (73%) admitted late.

The study found a predominance of females in both groups, with a sex ratio (M/F) equal to 0.6 in the group of patients with planned follow-up and 0.7 in the group of patients admitted late.

The mean age of patients was 45.74 ± 15.06 years in the group with planned follow-up; 46.46 ± 13.14 years in the group without planned follow-up, with extremes of 17 and 75 years.

The study found that the 50 to 60 age group predominated, followed by the 28 to 38 age group with frequencies of 27.15% and 24.30% respectively.

Patients living in the Conakry area and housewives in professional categories were the most numerous in both groups.

Socio-demographic data		Patients with planned follow-up	Patients with planned follow-up
Frequency		13 (18,57%)	57 (81,43%)
Sex-ratio (H/F)		0,6	0,7
Age range (years)	17-27	1 (7,69%)	6 (10,53%)
	28-38	3 (23,08%)	14 (24,56%)
	39-49	3 (23,08)	12 (21,05%)
	50-60	4 (30,77%)	15 (26,32%)
	61-71	2 (15,38%)	8 (14,03%)
	72-80	-	2 (3,51)
Mean age		45,74 years ± 15,06 years	49,46 years ± 13,14 years
Origin	Conakry	9 (69,23%)	41 (71,93%)
	Outside Conakry	4 (30,77%)	16 (28,07%)
Professions	Household	5 (38,46%)	29 (50,88%
	Retailers	2 (15,38%)	13 (22,81%)
	Civil servant	1 (7,69%)	4 (7,02%)
	Workers	3 (23,08%)	6 (10,53%)
	Unemployed	-	2 (3,51%)
	Student	1 (7,69%)	2 (3,50%)
	Retired	1 (7,69%)	1 (1,75%)

Table 1: Patient distribution by socio-demographic data.

Among the comorbidities that can have an impact on renal function, hypertension and diabetes were predominantly found in both groups of hemodialysis patients (Table 2).

Symptoms at the start of hemodialysis were dominated by the impact of uremia, signs of decompensated anemia or extracellular hyperhydration (Table 3).

Comorbidities	Patients with Planned Follow-ups	Patients with no planned follow-ups
HTA	12 (92,31%)	47 (82461%)
Diabetes	5 (38,46%)	7 (12,28%)
Heart failure	1 (7,69%)	4 (7,02)
Recurrent urinary tract infection	-	1 (1,75%)
GNC	2 (15,38%)	9 (15,79%)
Tobacco	3 (23,08%)	5 (8,77%)

Table 2: Distribution of patients by comorbidities.

Clinical signs	Patients with planned follow-up	Patients with no planned follow-up
Nausea and vomitin	10 (76,92%)	42 (73,68%)
Oligo-anuria	8 (61,54)	37 (64,91%)
Physical asthenia	9 (69,23%)	41 (71,93%)
Dyspnea	3 (23,08%)	11 (19,30%)
Epigastric pain	2 (15,38%)	10 (17,54%)
Peripheral edema	3 (23,08%)	11 (19,30%)
Generalized pruritus	2 (15,38%)	9 (15,79%)
Thoracic pain	2 (15,38%)	11 (19,30%)
Altered consciousness	-	8 (14,03%)
Conjunctival pallor	4 (30,77%)	57 (100%)
Halen uremi	1 (7,69%)	5 (8,77%)

Table 3: Distribution of patients according to clinical signs at start of hemodialysis.

Clinical and paraclinical arguments enabled us to identify the causative nephropathies and classify them into six groups; chronic glomerular nephropathy and vascular or hypertensive nephropathy in the context of this study were the most common in both groups (Table 4).

Uremic complications were the main reasons for patients being placed on hemodialysis; uremic intoxication and hyperkalemia were the first complications to predominate in both groups; there were more complications such as uremic encephalopathy, acute pulmonary edema (APO), metabolic acidosis and uremic pericarditis in the group of patients with no follow-up than in those with planned follow-up (Table 5).

Causal nephropathy	Patients with planned follow-up	Patients without planned follow-up
GNC	6 (46,16%)	29 (50,88%)
Vascular nephropaty	3 (30,77%)	17 (29,82%)
Diabetic nephropathy	2 (15,38%)	5 (8,77%)
NTIC	1 (7,69%)	6 (10,53%)
Nephropathy Indeterminate	1 (7,69%)	-
Total	13(100%)	57(100%)

Table 4: Distribution of patients by type of causative nephropathy.

Reason for starting dialysis	Patients with planned follow-up	Patients without planned follow-up
Uremic poisoning	13 (100%)	39 (68,42%)
Hyperkalemia	4 (30,77%)	18 (31,58%)
Uremic coma	-	8 (14,04%)
OAP	-	5 (8,77%)
Metabolic acidosis	1(7,69%)	3 (5,26%)
Uremic pericarditis	-	2(3,51%)

Table 5: Breakdown of patients by reason for starting dialysis.

No group of patients was sufficiently prepared to benefit from the creation of an arteriovenous fistula, due to the late discovery of their renal insufficiency and the lack of a vascular surgeon. Only the group of patients with planned follow-up benefited from the tunneled catheter, and the femoral catheter was most frequently used in the group of patients with no nephrological follow-up (Figure 1).

According to the clinical course of patients in these two groups, there were no deaths in the group of patients with nephrological follow-up, whereas mortality in the group of patients without follow-up was 7.02% (Figure 2).

Statistical analysis was carried out to identify the factors associated with patients being placed on dialysis in the two distinct

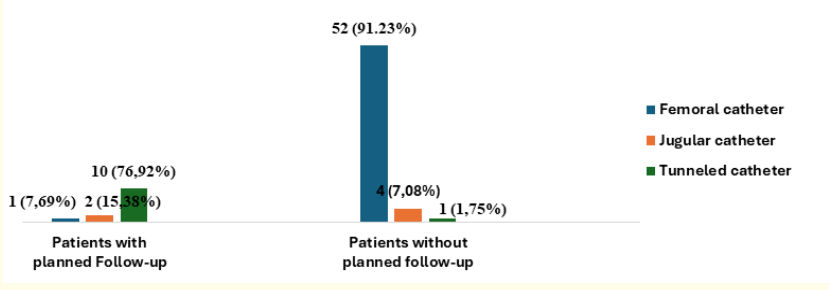

Figure 1: Distribution of patients according to the vascular approach used at the start of hemodialysis.

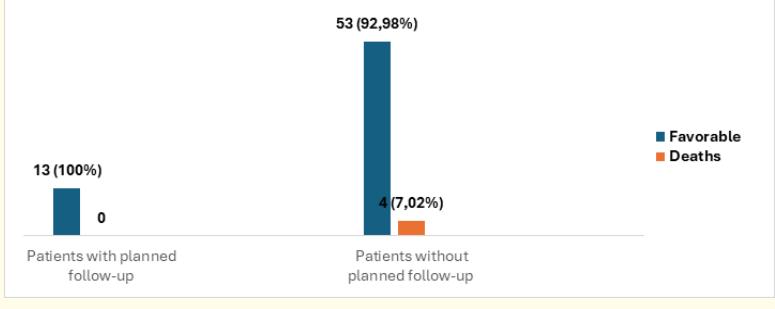

Figure 2: Distribution of patients according to progress on hemodialysis.

groups. The results showed that diabetes, uremic intoxication and the use of central venous lines (femoral, jugular and tunneled catheters) were strongly associated with these patients being placed on hemodialysis (Table 6).

Discussion

Chronic kidney disease is a major public health problem, due to its frequency and the high cost of its treatment, but it is frequently under-diagnosed because of its silent evolution [6]. The hospital frequency of patients diagnosed with CKD and placed on hemodialysis during the three months of the study was 70 cases out of 78 patients, i.e. 89.74%, including 13 (18.57%) with nephrological follow-up, 57 (81.43%) without nephrological follow-up.

BAH AO at al found that in their study population of 572 hemodialysis patients, 48 patients were admitted as emergencies (8.3%); 105 were scheduled for nephrological follow-up (18.3%) and 422 were referred to the nephrology department (73.4%) [9].

Younger adults were more represented in both groups: patients with nephrological follow-up and patients without nephrological follow-up, i.e. 45.74 ± 15.06 and 49.46 ± 13.14 years respectively.

Parameters	Patients with planned follow-up	Patients without planned follow-up	p-value
Sex			
Male	24(82,8%)	5(17,2%)	0,53
Female	33(82,8%)	8(19,5%)	
Age	45,74 ± 15,06	49,46 ± 13,14	0,32
Comorbidities			
HTA	47(79,7%)	12(20,3%)	0,37
Diabètes	5(39,46%)	7(12,28%)	0,02
Heart Failure	1 (20%)	4 (80%)	0,4
Recurrent urinary tract infection	1(100%)	0(0%)	0,81
GNC	6 (18,75%)	26 (81,25%)	0,37
Tobacco	3 (37,50%)	5 (62,50%)	0,07
Reasons for dialysis			
Uremic intoxication	13(25,0%)	39(75,0%)	0,02
Hyperkalemia	4(18,2)	18(81,8%)	0,95
Uremic coma	-	8(100%)	0,34
OAP	-	5(100%)	0,26
Metabolic acidosis	1(25,0%)	3(75,0%)	0,56
Uremic pericarditis	-	2(100%)	0,66
Causal kidney disease			
GNC	7(19,4%)	29(80,6%)	0,84
Vascular nephropathy	3 (13,6%)	19 (86,4%)	0,47
Diabetic nephropathy	3(37,5%)	5(62,5%)	0,14
NTIC	1(14,3%)	6(85,7%)	0,75
Nephropathy Indeterminate	-	1 (100%)	0,18
Vascular access			
Femoral catheter	5(9,43%)	48(90,57%)	0,001
Jugular catheter	5(45,5%)	6(54,5%)	0,013
Tunneled catheter	3(50%)	3(50%)	0,03
Evolution			
Favorable	13 (100%)	53 (92,98%)	0,32
Deaths	-	4 (7,02%)	

Table 6: Distribution of patients according to risk factors associated with initiation of hemodialysis.

The study found a predominance of females, with a sex ratio of 0.6 in the group of patients with follow-up and 0.7 in the group of patients without follow-up.

BAH AO., *et al*. in 2017 in Guinea had found during 5 years of study, on a total of 572 patients put on hemodialysis a mean age of 44.4 ± 16.20 years with extremes from 15 to 85 years and a predominance of male sex with a sex ratio (M/F) of 1.14 [9] T. Mesbahi., *et al*. in Tunisia in 2020, on 229 patients with chronic renal failure initiated on hemodialysis, noted that the mean age of patients was 60.2 ± 15.3 years [10].

In this study, housewives were the most represented socio-professional category in these two groups (patients with planned follow-up and without follow-up) with respectively (38.47% and 50.88%) followed by shopkeepers with (15.38% and 22.81%). BAH AO at al found 220 housewives (38.3%), 181 blue-collar workers (31.5%), 104 civil servants (18.1%), 56 pupils and students (9.7%), 14 unemployed (2.4%) [9].

Patients with comorbidities, particularly those with diabetes, hypertension and/or cardiovascular disease, are at high risk of developing chronic renal failure [6]. In this study, comorbidities in these two groups (patients with planned follow-up and no follow-up) were dominated by hypertension (92.31% and 84.21%) followed by diabetes mellitus (38.46% and 12.28%) respectively.

Yawovi MT., *et al*. in Lomé (Togo) in 2021 found that hypertension and diabetes were present in 61.6% and 44% of patients respectively [11]. These results corroborate the literature, which reports that both hypertension and diabetes are traditional risk factors for CKD [12].

Reasons for patient admission were dominated by signs of advanced uremia characterized by digestive disorders such as nausea and vomiting 76.92% and 73.68%; respectively in the group of patients with planned follow-up and without planned follow-up; physical asthenia 69.23% and 71.93% in these groups of patients without planned] follow-up; oligo-anuria 61.54%; 64.91% respectively in these two groups, but also the presence of dyspnea; peripheral edema, pruritus, uremic panting; conjunctival pallor; these signs were more marked in the group of patients without planned follow-up than in the group of patients with planned follow-up (Table 3).

End-stage renal failure is manifested by non-specific signs related to degree, but also to tolerance of uremia, signs of hydro-electrolytic disturbance and decompensation of anemia.

Bah AO., *et al*. found in their study that the reasons for emergency admission were: acute lung oedema in 21 patients (43.7%), decompensated anemia in 13 patients (27.1%), loss of consciousness in 9 patients (18.7%) and malignant hypertension in 5 patients (10.4%). Referral reasons were uremic syndrome in 312 patients (54.3%), followed byhypertension, 247 patients (42.9%), edema syndrome, 234 patients (40.7%), oligo-anuria, 222 patients (38.6%) [9].

Sinomono DE., *et al*. in Brazzaville in 2018 who had found anemia in 91.4% of cases, uremic syndrome in 72.7% and hydrosodium overload in 2.4% of cases [13]. Diawara., *et al*. in Senegal in 2020 found anemia in 63.6% of patients, uremia in 39.25% and OMI in 45.8% [14].

Causal nephropathy types remain marked by GNC, vascular nephropathy followed by diabetic nephropathy, respectively 46.16%, 30.77% and 15.38% in the group of patients with planned follow-up and 50.88%, 29.82% and 8.77% in the group of patients without planned follow-up.

Hoffmann., *et al*. found in their study; diabetic nephropathy 31.3%; vascular nephropathy 16%; chronic interstitial nephropathy 15.2%; primary chronic glomerulonephritis 13.8% [15].

Reasons for referral to hemodialysis were dominated by signs of uremic intoxication and hyperkalemia, respectively 100% and 30.77% in the group of patients with planned follow-up; 68.42% and 31.58% in the group of patients without planned follow-up. Uremic complications such as PAO, uremic encephalopathy and uremic pericarditis were only found in the group of patients without planned follow-up (Table 5).

Diawara MS., *et al*. found that the reasons for emergency dialysis were related to poorly tolerated uremia in 50.47% of cases, and threatening hyperkalemia in 40.19% of cases [14].

Hoffmann., *et al*. had found in their study that starting dialysis urgently was often associated with a precarious

clinical situation in patients, PAO, threatening hyperkalemia [15].

Diakité F., *et al*. found in their study that emergency dialysis initiation was associated with poorly tolerated anemia 83.9%; PAO 21.19%; uremic encephalopathy 15.25% and a higher death rate in patients admitted with PAO [16].

No group of patients was sufficiently prepared to benefit from the creation of an arteriovenous fistula, due to the late discovery of renal insufficiency and the lack of a vascular surgeon at the time of this study; femoral catheter use was 7.69%; non-tunneled jugular catheter 15.38%; tunneled catheter 76.92% in the group of patients with planned follow-up, and 91.23%; 7.02% and 1.75% respectively in the group of patients without planned follow-up (Figure 1).

Hoffmann., *et al*. found that emergency dialysis of patients required the use of temporary vascular approaches: the femoral catheter in 29% of cases; the tunneled catheter in 22%; and a temporary central venous approach with a high immediate risk of infection and bleeding, proven sources of excess mortality [15].

Mortality in less than three months was observed in the group of patients with no planned follow-up, i.e. a frequency of 7.02% (Figure 2).

Late nephrological management of patients with chronic kidney disease is very often associated with higher early mortality [9].

Hoffmann., *et al*. reported that end-stage renal failure was associated with early excess mortality limited to the first three months after the start of dialysis [15].

Statistical analysis found that diabetes (p-value 0.02), uremic intoxication (p-value 0.02), femoral catheter (p-value 0.001), jugular catheter (p-value 0.013), tunneled catheter (p-value 0.03), were strongly associated with the initiation of emergency hemodialysis in these patients (Table 6).

Hoffmann., *et al*. found that uremic intoxication was associated with the late discovery of end-stage renal failure 39 (75.0%); p = 0.02); this emergency dialysis is always associated with the use of central venous catheters [15].

Conclusion

The prevalence of chronic renal failure is rising steadily in resource-limited countries, representing an enormous economic burden for these states where per capita income remains low. This increase is linked to a growing number of hypertensive and diabetic patients. Diagnosis of chronic renal failure is often late, at the stage of uremic complications requiring emergency dialysis, with high use of central venous catheters; often responsible for an increased risk of infection, which increases morbidity and mortality in these patients. Prevention and early detection are better ways to reduce this patient morbidity and mortality, reduce the rapid progression of the disease to the terminal stage and improve patients' quality of life.

Declaration of Informed Consent

All authors appearing in this article share and accept equally the publication of this article in your journal.

Conflicts of Interest

The authors declare that there were no conflicts of interest in the preparation of this article.

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