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Hospital morbidity and mortality in the nephrology department of the DONKA University Hospital Center

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Abstract
Introduction: Mortality and morbidity are two important public health indicators that can be used to distinguish between an effective healthcare system and a failing one.
The overall objective was to study morbidity and mortality in the Nephrology Department at CHU-DONKA.
Methodology: This was a retrospective descriptive and analytical study covering a period of six years from January 1, 2017, to December 31, 2022, focusing on the records of patients hospitalized in the department for more than 48 hours with a nephrological condition.
Results: During our study, we collected 456 patient records. The average age of our patients was 40.92 years, ranging from 6 to 86 years. Males predominated, with a sex ratio of 1.24.
The majority had a hemoglobin level $\geq$ 7g/dl (57% of cases) and a clearance < 15ml/min in 77% of cases. The mortality rate was 16.2%. Factors associated with death were delayed consultation, uremic encephalopathy, and hyperkalemia.
Conclusion: The prevalence and lethality of nephrological conditions were significant during our study. Emphasis should be placed on improving knowledge of kidney diseases in order to ensure early and optimal patient care.

Keywords: Mortality, morbidity, nephrology, Chu-Donka

1. Introduction

Mortality and morbidity are two important indicators of public health [1]. For the World Health Organization (WHO), studying morbidity and mortality makes it possible to distinguish between an effective health system and a failing one [2, 3]. Mortality statistics systems provide basic data on the extent of mortality among populations. Worldwide, only one-third of countries have a comprehensive civil registration system that provides cause-specific mortality data to health sector decision-makers and surveillance services [4].

In a hospital department, such a study allows for the monitoring and review of therapeutic measures, which are likely to deteriorate in their implementation over the years, requiring periodic review [5].

The prevalence of kidney disease continues to grow, particularly in Africa, where delayed referral to nephrology remains a pressing issue [6, 7].

Studies on hospitalizations in nephrology are rare in our context. Some data in the literature show a relatively high incidence of hospitalizations for co-morbidities of cardiovascular disease and infections [6, 8].

Worldwide, acute renal failure (ARF) is estimated to contribute to approximately 1.7 million deaths per year [9].

In Morocco, Ezziani M *et al* [12] reported a mortality rate of 7.5% in the nephrology department of the Hassan II University Hospital in Fez, with diabetes mellitus as the main risk factor.

In Bamako, mortality in the Nephrology Department was 5.05% and kidney disease accounted for 3.91% of deaths [10].

In Côte d'Ivoire, Ouattara B *et al* [11] reported a hospital mortality rate in nephrology of 54% linked to chronic kidney disease.

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Kidney disease in Guinea, as elsewhere in the world, is a group of conditions whose importance continues to grow, both in terms of prevalence and diversity in the general population [2].

Bah AO *et al* [2] reported in their 2006 study that hospital mortality was 21.45%, with associated factors including delayed consultation, traditional treatment, low patient income, lack of health coverage, lack of proper care during on-call shifts, lack of adequate equipment, and lack of public health education.

The care of patients hospitalized in nephrology departments is often fraught with complications that are sometimes serious and life-threatening [12].

The high prevalence of kidney disease, the sometimes lethal progression of these conditions, and the scarcity of recent data motivated the choice of this topic.

The main objective was to study hospital morbidity and mortality in the nephrology department of the CHU-DONKA.

2. Patients and Method
We conducted a retrospective, descriptive, analytical study covering a six-year period from January 1, 2017, to December 31, 2022.

Our study included all records of patients hospitalized in the department during the study period who had a nephrological condition and agreed to participate in our study.

Our variables were quantitative and qualitative, divided into data:

A-Socio-demographic data: prevalence, frequency of hospitalization, CRF-related mortality rate, CRF-related morbidity, CRF-related mortality, age, gender, occupation.

B-Clinical data
Time to consultation: This is the time between the onset of symptoms and the nephrology consultation. It was divided into 7-day intervals.

Reasons for hospitalization
- **Impaired renal function:** increase in blood creatinine levels compared to baseline creatinine.
- **Uremic syndrome:** was suspected in the presence of urea ≥30 mmol/L associated with uremic breath, uncontrollable nausea and vomiting, pruritus, hiccups, and seizures.
- **Hypertensive syndrome:** BP ≥ 140/90 mmHg with or without symptoms.
- **Lower urinary tract syndrome:** indicated by dysuria, pollakiuria, urinary incontinence, and nocturia.

Neuromuscular signs such as convulsions, muscle cramps, agitation, insomnia, tremors of the extremities, and tingling.

Comorbidities: hypertension, diabetes, heart failure, HIV infection, hepatitis, and sickle cell disease.
- **Hypertension:** was included in all patients, whether known to be hypertensive or not, with systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg.
- **oDiabetes:** was selected for all patients with fasting blood glucose ≥1.26 g/l or greater than 2 g/l at any time of day.

- oSickle cell disease: all patients already known to have the condition, or diagnosed by hemoglobin electrophoresis, hemoglobin S
- **Hepatitis:** in all patients with HBsAg (+).
- **Heart failure:** was suspected in cases of exertional dyspnea or even orthopnea, asthenia, cough, bilateral crackles at the lung bases, pleural effusion, arterial hypotension, muffled heart sounds (B1 and B2), regular tachycardia, and functional mitral regurgitation murmur.
- **Phytotherapy:** investigated in the patient's habits to identify a toxic cause.
- **Biology:** Urea, creatinine, complete blood count, albumin, lipid profile, blood ionogram, calcium, reticulocytes, viral serology (HBsAg, HIV, and HCV).

Kidney Disorders
- **Acute functional renal failure:** Defined by a combination of signs of extracellular dehydration, urea levels 100 times higher than creatinine levels, natriuresis lower than kaliuresis, and the KDIGO criteria for defining ARF.
- **Organic acute renal failure:** Exposure to nephrotoxins, clinical evidence of renal hypoperfusion, natriuresis greater than kaliuresis, elevated urinary NGAL.
- **Obstructive acute renal failure:** was suggested in the presence of elevated serum creatinine secondary to bilateral or unilateral urinary tract obstruction in a single kidney, confirmed by ultrasound.
- **Chronic renal failure:** Marker of renal impairment persisting for 3 months, associated with signs of chronicity (hypocalcemia, normochromic, normocytic, aregenerative anemia, secondary hyperparathyroidism, small and/or dedifferentiated kidneys).

CKD patients were classified according to GFR as follows:
- **Stage 1:** GFR greater than 90 ml/min/1.73 m² (normal or increased GFR)
- **Stage 2:** GFR = 60-89 ml/min/1.73 m² (slightly decreased GFR)
- **Stage 3:** GFR = 30-59 ml/min/1.73 m2 (moderate chronic kidney disease)
- **Stage 4:** GFR = 15-29 ml/min/1.73 m2 (severe chronic kidney disease)
- **Stage 5:** GFR less than 15 ml/min/1.73 m2 (end-stage chronic kidney disease)

In the absence of renal biopsy, initial nephropathy was defined according to the following clinical and biological criteria:

- **Glomerular nephropathy:** suggested based on a combination of symptoms including edema of the lower limbs, proteinuria greater than 1 g/24 hours, micro- or macroscopic hematuria, hypertension, acute renal failure, or chronic renal failure.
- **Tubulointerstitial nephropathy:** suggested in the presence of the following clinical signs: a history of recurrent upper urinary tract infections; uropathy, gout, metabolic disease; hypertension (absent, moderate, or late onset), low-flow proteinuria less than 1 g/24 hours, leukocyturia without bacteria, leukocyte casts, and

ultrasound showing small kidneys with irregular contours.

- **Vascular nephropathies:** suggested due to a history of severe hypertension, a vascular murmur, a cardiovascular risk factor, low proteinuria <1 g/24 h, signs of cardiac and ocular complications of hypertension, and ultrasound findings: small kidneys
- **Hereditary or congenital nephropathies:** suggested due to cases of autosomal dominant polycystic kidney disease (pain, hematuria, infection, calculi, and impact on kidney function).¬
- **Diabetic nephropathy:** suggested by a history of diabetes for more than 5 years, microalbuminuria greater than 300 mg/dl or nephrotic proteinuria, associated with diabetic retinopathy at the back of the eye; no hematuria, no explosive nephrotic syndrome, no rapidly progressive renal failure.
- **Undetermined kidney disease:** suggested in the absence of evidence supporting any particular etiology despite etiological investigations.

Treatment
Conservative treatment: all methods used to manage CRF other than dialysis and transplantation.

Hemodialysis treatment
Dialysis: Indicated for uremic encephalopathy, metabolic acidosis, acute respiratory distress syndrome, and life-threatening hyperkalemia. We reported the time between indication and implementation in days.

Outcome:
Transferred: represents any patient with no nephrological pathology.
Improved discharge: represents any patient who showed partial or total regression of the symptoms that led to their discharge.
Discharge against medical advice: includes patients who did not improve and were discharged without the approval of the treating nephrologist.

The data were collected using a survey form.
The data were entered using Word Office 2016 software and analyzed using Epi-info version 7.2.5 software.
Qualitative variables were expressed as proportions and quantitative variables as means ± standard deviation.

- The chi-square test and Fisher's exact test were used to compare proportions.
- Statistical significance was considered when the p-value was <0.05.
- The mortality factors investigated were: delay in consultation, extreme age, presence of comorbidity, severe anemia, type of nephropathy, uremic encephalopathy, occurrence of acute pulmonary edema, bacterial infections, delay in dialysis after indication, and occurrence of shock.

3. Ethical considerations
We obtained the patients' consent to use their data, and anonymity and confidentiality were respected.
We collected data on 456 patients. Among the pathologies found, mortality linked to CRF was the highest at 42%, followed by obstructive ARF at 22.6%. Table I
The most represented age group was under 45 years old, accounting for 53% of patients, with an average age of 41 years and a range from 16 to 65 years. There was a male predominance of 55%. Vascular nephropathy was the most common condition, accounting for 33%. Table II
Among the reasons for hospitalization, uremic syndrome was the most frequent, accounting for 70.8%. Table III
Biologically, the majority of patients were in stage V of CRF (77%), and most had Hb levels above 7 g/dL (57%). Table IV
In our study, 25.5% were already on dialysis. Among those not on dialysis, 21.5% were placed on dialysis. The main reason for not placing patients on dialysis was lack of resources (8.7%). In terms of outcomes, 62.8% were discharged in improved condition and 16.2% died. Table V
Multivariate logistic regression analysis showed that the time to consultation, uremic encephalopathy, and the presence of hyperkalemia were statistically associated with death. Table VI

Table I: Distribution of patients according to different pathologies related to mortality and morbidity rates

Main pathologies	Workforce	Morbidity	Lethality
chronic kidney disease	242	44(59, 6%)	42, 8
Urinary tract infection	96	8(10, 8%)	8, 3
organic renal failure	53	12(16, 2%)	22, 6
Heart failure	35	7(9, 5%)	20, 0
functional renal failure	27	2(2, 7%)	7, 4
Kidney cancer	11	1(1, 4%)	9, 1

Table II: Distribution of patients by age group, gender, and type of kidney disease

Age group	Workforce	Percentage%
≤45	243	53
>45	213	47
Sex		
Male	250	55
Feminine	206	45
Type of kidney disease		
Type of nephropathy	Workforce (N=456)	Pourcentage%
Vascular nephropathy	150	32, 9
Diabetic nephropathy	94	20, 6
Mixed nephropathy	73	16, 0
Glomerular nephropathy	67	14, 7
Tubulo-interstitial nephropathy	43	9, 4%
Hereditary nephropathy	29	6, 4%

Table III: Distribution of patients according to reasons for hospitalization

Reasons for hospitalization	Workforce (N=456)	Pourcentage%
Uremic syndrome	323	70, 8
Impaired renal function	277	60, 7
Fever	208	45, 6
Dyspnea	194	42, 5
Oliguria	164	36, 0
Anuria	145	31, 8
OMI	143	31, 4
Headaches	125	27, 4
Cough	97	21, 3
Blurred vision	95	20, 8
Swelling	89	19, 5
Ringing in the ears	78	17, 1
Ascites	48	10, 5
Weight loss	44	9, 6
Palpitations	38	8, 3
Dysuria	17	3, 7
Psychomotor agitation	11	2, 4
Burning sensation during urination	9	2, 0
Pollakiuria	9	2, 0
Seizures	8	1, 8

Table IV: Distribution of patients according to biological parameters

Biological parameters	Workforce (N=456)	Pourcentage%
Hb (g/dL)	196	43, 0
<7	260	57, 0
≥7	18	3, 9
60-89	10	2, 2
30-59	29	6, 4
15-29	48	10, 5
<15	351	77, 0

Table V: Distribution of patients according to dialysis therapy and progression

Dialysis	Workforce	Pourcentage%
Known dialysis patient		
Yes	98	21, 5
No	358	78, 5
Achievements		
Yes	147	32, 2
No	65	14, 3
Reasons for not undergoing dialysis		
Lack of resources	40	8.7
Catheter problem	4	0, 9
Parental refusal	8	1, 8
Death before completion	3	0, 7
No place available	10	2, 2
Depending on developments		
Improved release	287	62, 9
Deceased	74	16, 2
Released against medical advice	49	10, 7
Transferred	24	5, 3
Escaped	22	4, 8

Table VI: Multivariate analysis by logistic regression

Variables	Deaths			P-Value
	IC=95%			
	OR	lower	superior	
Consultation period				
>7 days	16, 020477	9, 0699	90, 69943	0, 0112245
≤7 days	advisor			
Acute pulmonary edema				
No	0, 318182	0, 020985	4, 824331	0, 409078
Yes	Advisor			
Uremic encephalopathy				
Yes	Advisor			
No	0, 969519	2, 447	8, 040	0, 000909
Hyperkalemia				
No	Advisor			
Yes	48, 5529 6, 0393		390, 3395	0, 0003

4. Discussion
The prevalence of kidney disease continues to grow, particularly in Africa, where delayed referral to nephrology remains a pressing issue. During the study period, we included 456 patients in our study, of whom 98 were already on dialysis and 358 were not.

The mortality rate associated with CRF was the highest at 42%, followed by obstructive ARF at 22.6%. This can be explained by the poor prognosis of stage V CRF due to its fatal metabolic complications.

The average age reported in our study is lower than that reported by Faye M *et al* [13] in Senegal in 2016 and Ezziani M *et al* [14] in Tunisia in 2014, who reported average ages of 48.45 and 49, respectively. Kidney disease can occur at any age, but its frequency increases with age. Could the discovery of the disease at an advanced age in our study be due to a delay in consultation on the part of our patients, or to a particularly slow and progressive evolution of the disease that only becomes symptomatic at an advanced stage? Our average age also reflects the youth of the population, among whom early-onset kidney disease is increasingly common due to excessive exposure to risk factors for chronic kidney disease.

The male predominance reported in our study differs from that reported by Chemlal A *et al* [15] in Morocco in 2015 and Faye MO *et al* [16] in Senegal in 2022, who reported a female predominance. Christian T *et al* in 2023 did not report any notable predominance [17]. Jungers P *et al* in France in 2011 and Cissé MMM *et al* in Senegal in 2016 reported a male predominance [18, 19]. This is linked to the fact that men are more exposed to risk factors for chronic diseases.

Vascular nephropathy was the most common, accounting for 33% of cases. Diakité F *et al*. also reported a predominance of vascular nephropathies, accounting for 66.2% of cases, which is consistent with data in the literature showing a predominance of vascular or diabetic nephropathy depending on the country.

Uremic syndrome was the leading reason for consultation. This frequency was higher than that found by Dieng A *et al* [7] in Senegal in 2022 and Di Napoli A *et al* [20] in Italy in 2005 (7.4%). This high frequency is linked to uremic poisoning secondary to late diagnosis of chronic kidney disease.

Biologically, the majority of patients were in stage V of CRF (77%), and most had Hb levels above 7 g/dl (57%). The discovery of patients at a late stage (stage V) reflects the late arrival of patients for consultation, the lack of screening for chronic kidney disease in our countries, and the poor referral system for patients before they arrive.

to university hospitals, where they should receive a correct diagnosis and appropriate care. The anemia observed was normocytic, normochromic, and aregenerative due to a lack of erythropoietin synthesis, in accordance with the literature [21, 22, 23]. Poly transfusion, characteristic of the type of anemia associated with CRF, is a common factor that leads physicians to request renal assessment and refer these patients to our services.

In our study, 25.5% were already on dialysis. Among those not on dialysis, 21.5% were placed on dialysis. Among the reasons for not being placed on dialysis, lack of funds was the main reason.

Although there is currently only one subsidized dialysis center for the entire country, it remains expensive for patients who are unemployed and do not have health insurance.

Given that the patient is the sole breadwinner and his family relies on him for support, kidney disease and dialysis reduce the daily activities that provide income for the family, which is an obstacle to dialysis for our patients.

We reported a 16.2% mortality rate during our study. Drabo *et al* [24] in Ouagadougou in 2006 reported a mortality rate of 12.9%. Bah AO *et al* [2] in Conakry in 2006 reported a high mortality rate of 45.38%. Sawadogo A *et al* [25] in Burkina Faso reported an overall mortality rate of 21%. The relatively high mortality rate in our study could be attributed to admission at an advanced stage of CKD, which predisposes patients to metabolic and hemodynamic complications, but also to organizational problems in our healthcare system and the cost of care, which may delay treatment.

Using multivariate logistic regression, the time to consultation, uremic encephalopathy, and the presence of hyperkalemia were statistically associated with death.

5. Conclusion
The prevalence and mortality of nephrological conditions were significant during our study and affected patients with CRF who were admitted late to the department with uremic symptoms and metabolic and hemodynamic complications. Emphasis should be placed on improving knowledge of kidney disease in order to ensure early detection and optimal management of patients.

Further studies are needed to establish mortality by pathology in the department.

Conflict of interest
The authors declare no conflict of interest.

What we know about the subject
CKD is common in developing countries such as Guinea and constitutes a public health problem.

What is new in our study
This study revealed that late detection of chronic kidney disease, the onset of metabolic complications, and delays in dialysis treatment are associated with high mortality rates.

Authors' contributions
All authors participated in data collection, analysis, and manuscript writing. The final manuscript was reviewed and approved by all authors.

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