

# Profile of Patients with Acute Renal Injury in N'Djamena: About 36 Cases

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**How to cite this paper:** Mahamat Abderraman, G., Ibrahim, H., Maiga, M.T.Z., Lemrabott, T.A., Maria, F., Sabi, K.A., Youssouf, M., Moustapha, C.M., Ka, K.E.F., Abdou, N. and Boucar, D. (2017) Profile of Patients with Acute Renal Injury in N'Djamena: About 36 Cases. *Open Journal of Nephrology*, 7, 1-8.

<https://doi.org/10.4236/ojneph.2017.71001>

**Received:** December 1, 2016

**Accepted:** January 21, 2017

**Published:** January 24, 2017

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## Abstract

**Introduction:** The incidence of acute renal injury (AKI) has increased in recent decades. Acute renal failure is defined by the abrupt arrest (within hours or days) of the kidney excretory function. Oliguria (urine output <400 ml/24h) is presented in about half of the cases. The circumstances of the occurrence of AKI are multiple: surgical, traumatic, obstetric, medical, often obvious. Its prognosis depends on the speed of management and the associated organ failure. The objective of this study is to describe the profile of patients in emergency hemodialysis at the Nephrology Unit of the National Reference General Hospital (HGRN) in N'Djamena, Chad. **Methods:** This was a multi-center, descriptive study in patients with acute renal failure place over a period of 12 months in the emergency departments of the 2 hospitals in N'Djamena. Defined as carriers of an AKI (RIFLE criteria), patients with: 1) Oliguria: urinary output < 400 ml/24h (<0.5 ml/kg/h in children) or anuria: urinary output < 300 ml/24h; 2) Associated with an increase in serum creatinine: serum creatinine  $\times 3$  or serum creatinine > 350  $\mu\text{mol/l}$  or decrease of GFR by 75%. **Results:** Of the 311 patients admitted, 36 cases met the inclusion criteria, a frequency of 11.57%. The mean age was 34.46 years with extremes ranging from 7 to 80 years. The female sex predominated with 52.80% as sex ratio of 0.91. Isolated hypertension was noted with 38.88%. Dyspnea accounted for 41.66% of patients admitted to emergency departments. In our series, 50% of our patients had hyperthermia at admission. Oliguria was observed in 41.70% of the cases. Edema accounted for 33.33% of cases. The AKI with the "failure" criterion was 58.34% (21/36), with the criterion "injury" 25% (9 cases) and the criterion "risk" 16.66 (6 cases). AKI were organic in 83.34% (30/36). It was noted that 14 patients, 38.8% had an infectious syndrome.

There were 6 patients who had (16.66%) an obstructive AKI, 5 patients (13.88%) had eclampsia, 4 patients (11.12%) had hepatocellular insufficiency, 3 patients (8.34% Cardiac, 2 patients (5.56%) extracellular dehydration and 2 patients (5.56%) whose cause is indeterminate. It was noted that 10 patients, as 27.7%, had fully recovered their renal function after vascular filling and etiological treatment. Four (4) patients with obstructive obstruction were referred to the urology department. There were 22 patients who had benefited from the hemodialysis. 6 patients recovered completely their renal function. We had recorded a number of deaths in our study which was 44.44% (16/36). Septic shock was the most frequent cause of death in 50% of cases. Conclusion: The incidence of AKI in our study was 11.57%. It affects a young population and despite the therapeutic progress, the mortality remains high. The causes are multiple, entangled, dominated by infectious syndrome and hypovolemia. Prevention seems to be the best therapeutic option to avoid the installation or worsening of an AKI.

### Keywords

Acute Renal Injury, Hemodialysis, Epidemiology, Chad Component, Formatting, Style, Styling

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## 1. Introduction

Acute renal injury (AKI) is defined by the abrupt arrest (within hours or days) of kidney excretory function. Oliguria (urine output < 400 ml/24h) is present in about half of the cases. The circumstances of the occurrence of ARI are multiple: surgical, traumatic, obstetric, medical, often obvious. Its mechanisms are themselves diverse, and at the same circumstance of occurrence can correspond with various types and mechanisms of AKI, for example during severe infections or in postoperative period. The incidence of acute renal failure (ARI) has increased in recent decades. It is currently in the region of 200 to 400 cases per million inhabitants in Europe and the United States [1]. Although it is a relatively common syndrome, the multiplicity of definitions and types of populations studied (community, hospital, intensive care, resuscitation) makes it difficult to compare epidemiological data. The clinico-biological translation of AKI is acute uremic syndrome. It combines a daily elevation of urea and serum creatinine, hyperkalemia and metabolic acidosis, the severity of which depends on the severity of ARI. Depending on the inclusion criteria, the percentage of AKI treated by extrarenal treatment varies from 48.3% [2] to 100% according to the studies [3] [4] [5] [6] and more than 3 million patients die each Year in countries where this treatment is not available [7].

The prognosis of acute renal injury (AKI) depends on the speed of management and the associated organ failure. However, it remains remarkably severe with significant mortality and a negligible incidence of residual alteration of renal function in survivors. This underlines the importance of kidney protection in situations of renal aggression. Chad is a country of about 14 million inhabitants

[8] and has only 2 hemodialysis units, all in N'Djamena (National Reference General Hospital and Renaissance Hospital).

The objective of this study is to describe the profile of patients in emergency hemodialysis at the Nephrology Unit of the General Hospital of National Reference (GHRN) in N'Djamena, Chad.

## 2. Methodology

This was a descriptive and analytical study performed in patients with AKI. It was conducted in two hospitals in N'Djamena within the emergency departments and the Nephrology-Hemodialysis Unit of the GHRN, in the pediatric and gynecological-obstetric emergency departments and medical and surgical resuscitation of the Mother and the Child Hospital, over a period of 12 months. All patients undergoing emergency hemodialysis for AKI with one or more indications for emergency dialysis were enrolled in the study. Defined as carriers of an AKI (RIFLE criteria), patients with:

- Oliguria: urinary output < 400 ml/24h (<0.5 ml/kg/h in children) or anuria: urinary output < 300 ml/24h
- Associated with an increase in serum creatinine: serum creatinine  $\times$  3 or serum creatinine > 350  $\mu$ mol/l or decrease of GFR by 75%

The criteria for emergency dialysis are: metabolic acidosis with a bicarbonate level of less than 8 mmol/l, hyperkalemia greater than 7 mmol/l symptomatic, a state of hydrologic overload (acute edema of the lungs) refractory to medical treatment. The data collected were analyzed by the Epi Info software.

## 3. Results

During our study, 311 patients were admitted. There were 36 cases that met the inclusion criteria, as a prevalence of 11.57%. The mean age was 34.46 years with extremes ranging from 7 to 80 years. The female sex predominated with 52.80% or a sex ratio of 0.91.

### a) Clinic

#### 1) Risk factors

Isolated arterial hypertension was noted with 38.88%. Other risk factors are summarized in **Table 1**.

**Table 1.** Patient distribution by risk factors.

Risk factors	Number	Percentage (%)
<b>Arterial</b>		
<b>Hypertension</b>	<b>14</b>	<b>38.88</b>
Diabetes	3	8.33
Sickle cell disease	3	8.33
AIDS	2	5.56
Cirrhosis	1	2.78
Indeterminate	13	36.12
<b>Total</b>	<b>36</b>	<b>100</b>

## 2) Functional signs

Dyspnea accounted for 41.66% of patients admitted to emergency departments. In our series, 50% of our patients had hyperthermia at admission. Oliguria was observed in 41.70% of the cases. Edema accounted for 33.33% of cases.

## 3) Acute kidney injury

The AKI with the “failure” criterion was 58.34% (21/36), with the criterion “injury” 25% (9 cases) and the criterion “risk” 16.66 (6 cases). AKI were organic in 83.34% (30/36). It was noted that 14 patients, 38.8% had an infectious syndrome. There were 6 patients who had (16.66%) an obstructive AKI, 5 patients (13.88%) had eclampsia, 4 patients (11.12%) had hepatocellular insufficiency, 3 patients (8.34%) Cardiac, 2 patients (5.56%) extracellular dehydration and 2 patients (5.56%) whose cause is indeterminate.

### b) Paraclinical exams

The various biological and biochemical tests are summarized in **Table 2**.

## 4. Treatment

There were 15 patients as 41.66% who had benefited from vascular filling. The solution of choice was Ringer Lactate. The clinical picture of the patient was evaluated prior to any vascular filling and the dosage of filling depended on the clinical picture presented by the patient. It was noted that 10 patients as 27.7%, had fully recovered their renal function after vascular filling and etiological treatment (4 infectious causes, 2 dehydrations, 2 heart failure, 1 obstructive and 1 eclampsia). Four (4) patients with obstructive obstruction were referred to the urology department. There were 22 patients who had benefited from the hemodialysis. 6 patients recovered completely their renal function. We had recorded a number of deaths in our study which was 44.44% (16/36). Septic shock was the most frequent cause of death in 50% of cases. Half was due to the acute complications of AKI.

## 5. Discussion

The frequency of AKI in our study was 11.57%. This result is consistent with

**Table 2.** Biological assessments of patients before hemodialysis.

Biological assessment	Average	Standard deviation
Urea (g/l)	1.66	0.78
Serum creatinin (mg/l)	75.39	62.78
Uric acid (mg/l)	123.75	46.91
Natremia (mmol/l)	16744	169.65
Kalemia (mmol/l)	4.71	1.25
Calcemia (mg/l)	61.41	22.87
Phosphatemia (mg/l)	72.20	29.81
Hemoglobin (g/dl)	7.96	2.17
Platelet (/mm <sup>3</sup> )	313.25	163.30
Blood sugar (g/l)	0.82	0.20

data from the literature, which estimates that intensive care units range from 3 to 30% [9]. The mean age is very variable in the literature. In the Western series, this average is between 60 and 80 years, whereas it is between 35 and 45 years in the developing countries. A higher frequency was found in a population aged over 75 years in Western countries [10]. The average age in our series was 34.46 years. Lengani *et al.* in Burkina Faso (2009) and A Rabie in Morocco (2010) noted respectively 38.6 years and 40.2 years of middle age [11] [12]. In our series, the female sex predominated slightly with a sex ratio of 0.91. This result is similar to that reported by Ghafel [13] with a slight female predominance of 51.52%. This could be explained by the fact that some of our patients came from the maternity ward. On the other hand, a male predominance is observed in almost all the studies [2] [9] [14] [15]. Major epidemiological studies have found some constitutional risk factors for AKI including advanced age, male sex and a pre-existing set of comorbidities as hypertension, heart disease, diabetes, and liver disease or cirrhosis. Other factors are modifiable and predispose to a risk of AKI. These factors include diagnosis of severe sepsis or septic shock and vascular surgery. Rhabdomyolysis is another factor, frequently reported. In our study, 63.88% of our patients have been exposed to one or more pre-existing pathological risk factors. In our series HTA was noted in 38.88% of cases. This result is superimposed on that of Alassane FAROTA in Mali (2008) who noted that 61.6% of patients were exposed to one or more risk factors. According to the recommendations of some [12] [16] [17] conducted studies, acute renal failure should be routinely screened in clinical circumstances at risk (massive bleeding, dehydration, heart failure, shock states ...) and after exposure to nephrotoxic drugs in patients at risk: newborns and infants, elderly patients, diabetics and hypertensive patients. Acute renal injury should be systematically suspected in the presence of oliguria anuria or before the existence of symptoms related to kidney failure. Anuria signs the interruption of glomerular filtration or complete obstruction of the urinary tract. In our series oliguria was present in 41.70% of patients compared with 57% in the Amellal RABIE series in Morocco and 65.4% in the A FAROTA series in Mali. The finding was that the frequency of oliguria varies from study to study. Dyspnea represented 41.6% of patients, this rate is comparable to that found by Alassane FAROTA in Mali has found that 42.3%. This explains why respiratory distress was the most common functional sign in emergency departments. In our series, the criterion "Failure" of the RIFLE classification was 58.34%. This could be explained by the delayed diagnosis and orientation of patients in nephrology referral services. A predominance of the organic AKI was observed in our series with 83.34% of cases. This result was greater than that of A RABIE, which recorded 72.8% [12]. This could be explained by the predominance of the etiologies which were mainly infectious leading to acute tubular necrosis. Sepsis, cardiogenic and hypovolemic shock are the main causes of AKI in the literature [2] [14] [15] [18] [19]. In our study, the causes were varied but there was a high proportion of the infectious syndrome which represented 38.88%. This result could be explained by the importance of

tropical infections in our country. It was noted that 10 patients, as 27.7%, had fully recovered their renal function without extra renal purification. This was due to adequate management including vascular filling and etiological treatment (4 infectious causes, 2 dehydrations, 1 heart failure and 1 obstructive and 1 eclampsia). We recorded 16 deaths, or 44.4%, with 50% as the main cause of septic shock. This is similar to that found by Osterman *et al.* [20] with 45.8%, great than results of Bagshaw *et al.* with 42.7% [21] [22] but agrees with literature v which varies from 40% to 60%. The main causes of death are: shock, infection, cardiac and respiratory failure. Until now there is no consensus to define a timing of initiation of extra renal purification. The attempts cited in the literature compared qualitative criteria (early dialysis vs. late dialysis) and did not conclude consistent results. It is recommended in a study carried out in Morocco to initiate dialysis prophylactically against any risk of aggravation and before the occurrence of uremic complications or severe hydro-electrolyte disorders. Extra-renal treatment should be continued as long as the criteria for severity of AKI persist [3] [23] [24]. This important mortality is explained essentially by two factors: the severity of the initial clinical picture of patients arriving at the hospital at the stage of hydro-electrolyte complications and the delay in diagnosis. Acute renal failure is more severe when it is organic and especially oligoanuric [15] [25] [26].

In our study, we did not study the long-term outcome of patients. We transfer patients at the end of dialysis to their respective departments or to an internal medicine department for follow-up because the unit does not have its own hospitalization service [24] [27] [28] [29].

## 6. Conclusions

Despite significant progress in the detection of risk situations and management, AKI remains a remarkably severe organ dysfunction because of the life-threatening implications as well as the risk of persistent impairment of renal function leading to chronic renal failure. This is due to insufficient strategies for the prevention and protection of the kidneys in situations of aggression.

The incidence of AKI in our study was 11.57%. It affects a young population and despite the therapeutic progress, the mortality remains high. The causes are multiple, entangled, dominated by infectious syndrome and hypovolemia. Prevention seems to be the best therapeutic option to avoid the installation or worsening of an AKI.

## Conflict of Interest

The authors declare that they have no conflict of interest.

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## Abbreviations

AKI: acute kidney injury; GHNR: General Hospital of National Reference





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