

Global Journal of Urology and Nephrology
(ISSN:2637-5109)



Hemodialysis in emergency situation in a Hemodialysis Center in Dakar : A prospective study about 81 cases

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ABSTRACT

Introduction: Hemodialysis is a renal replacement technique that uses extracorporeal blood circulation (ECC) to purge the blood of patients with renal failure. It is used urgently in severe acute kidney injury (AKI) and complicated end stage renal disease (ESRD). The objective of this work was to determine the prevalence of each indication of emergency hemodialysis and its prognosis.

Methods: We conducted a prospective, mono-centric study of descriptive and analytical type over a period of 6 months at the hemodialysis center of Aristide Le Dantec University Hospital. All patients with acute or chronic renal failure who underwent hemodialysis during an emergency were included. These emergencies were for the AKI or Chronic Kidney disease (CKD) the existence of one or more severity criteria: pulmonary oedema, hyperkalemia, severe metabolic acidosis, poorly tolerated uremia, persistent anuria and / or symptomatic hyponatraemia.

Results: Eighty-one emergency hemodialysis patients were received during the study period out of a total of 660 hemodialysis patients serving a hospital prevalence of 12.2%. The mean age of the patients was 39.31 ± 18.78 years with a sex ratio of 1.02. The first indication of emergency hemodialysis was poorly tolerated uremia in 46 patients (56.7%) followed by threatening hyperkalemia with 43.2%. The evolution was highlighted by a complete recovery in 53% of patients with AKI whereas for patients with ESRD lifting the emergency was the rule. Fifteen patients (18.50%) had died, including 12 patients (14.80%) outside dialysis and 3 patients (3.75%) on dialysis. The occurrence of death was statistically correlated with hyperkalemia ($p = 0.003$) and metabolic acidosis ($p = 0.001$).

Conclusion: Hemodialysis was performed urgently in 12.2% of cases. Poorly tolerated urine was the most common indication (56.7%). In the majority of cases we noted a good evolution with the emergency lifting. However we noted 15 deaths (18.5%).

Keywords: Acute kidney injury ; Chronic Kidney disease ; Emergency situation ; Hyperkalemia ; Hemodialysis

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How to cite this article:

Ba Bacary, Lemrabott Ahmed Tall, Faye Maria, Faye Moustapha, Mbengue Mansour, Diagne Seynabou, Keita Niakhaleen, Ba Mamadou Aw, Dieng A, Elhadji Fary Ka. Hemodialysis in emergency situation in a Hemodialysis Center in Dakar: A prospective study about 81 cases. Global Journal of Urology and Nephrology, 2020, 3:19



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Website: <https://escipub.com/>

Introduction

Hemodialysis is a renal replacement technique that uses extracorporeal blood circulation to purge the blood of patients with renal insufficiency. Renal failure is divided into two entities: acute kidney injury (AKI) and end stage renal disease (ESRD). In Africa, the prevalence of AKI and ESRD is unknown^{1,2}. In Senegal, in 2003, 20000 to 30000 people underwent a CKD among them 2000 to 4000 were at end-stage renal disease (ESRD)³. The prevalence of AKI was estimated at 4.5% of all hospital admissions⁴. Hemodialysis is the most commonly used technique in patients with renal failure in developing countries. In Senegal 27% of patients in ESRD undergo hemodialysis. Moreover, it is used urgently in our frameworks, particularly in severe AKI and complicated ESRD. In a study conducted in Dakar, Koroma et al. outlined a prevalence of 23%. To complement and reevaluate this previous work, we carried out this study to determine the prevalence of emergency hemodialysis, its indications as well as its prognosis.

Patients and Methods

We conducted a monocentre looking-forward descriptive and analytical study over 6 months (November 1, 2017-April 30, 2018) at the Hemodialysis Center of Aristide Le Dantec University Hospital. All patients with acute or chronic renal failure who underwent an emergency hemodialysis were included. These emergencies features either for the AKI or ESRD the existence of one or more severity criteria: pulmonary oedema, severe metabolic acidosis, hyperkalemia, uremia intolerance, persistent anuria and / or symptomatic hyponatremia.

Epidemiological, clinical, paraclinical, hemodialysis parameters, comorbidities, adverse effects and accidents, and evolution data were studied. These parameters were studied for overall patients whatever the evolution might be, which made it possible to determine the prognostic factors. The data were collected by standardized pre-established forms and entered with Sphinx software version 5.1.0.2 and analyzed with SPSS VERSION 20.

Table I : Impact of hemodialysis indications on mortality in a hemodialysis center in Dakar-Senegal between september 2017 to april 2018.

Urgents indications of hemodialysis		Death			p
		Yes	No	Total	
Pulmonary oedema	Effective	10	6	16	0.065
	Percentage (%)	15.2	40.0	19.8	
Hyperkalemia	Effective	23	12	35	0.003
	Percentage (%)	34.8	80.0	43.2	
Severe hyponatremia	Effective	11	0	11	0.203
	Percentage (%)	16.7	0.0	13.6	
Poorly tolerated uremia	Effective	29	9	38	0.391
	Percentage (%)	43.9	60.0	46.9	
Metabolic acidosis	Effective	8	8	16	0.001
	Percentage (%)	12.1	53.3	19.8	

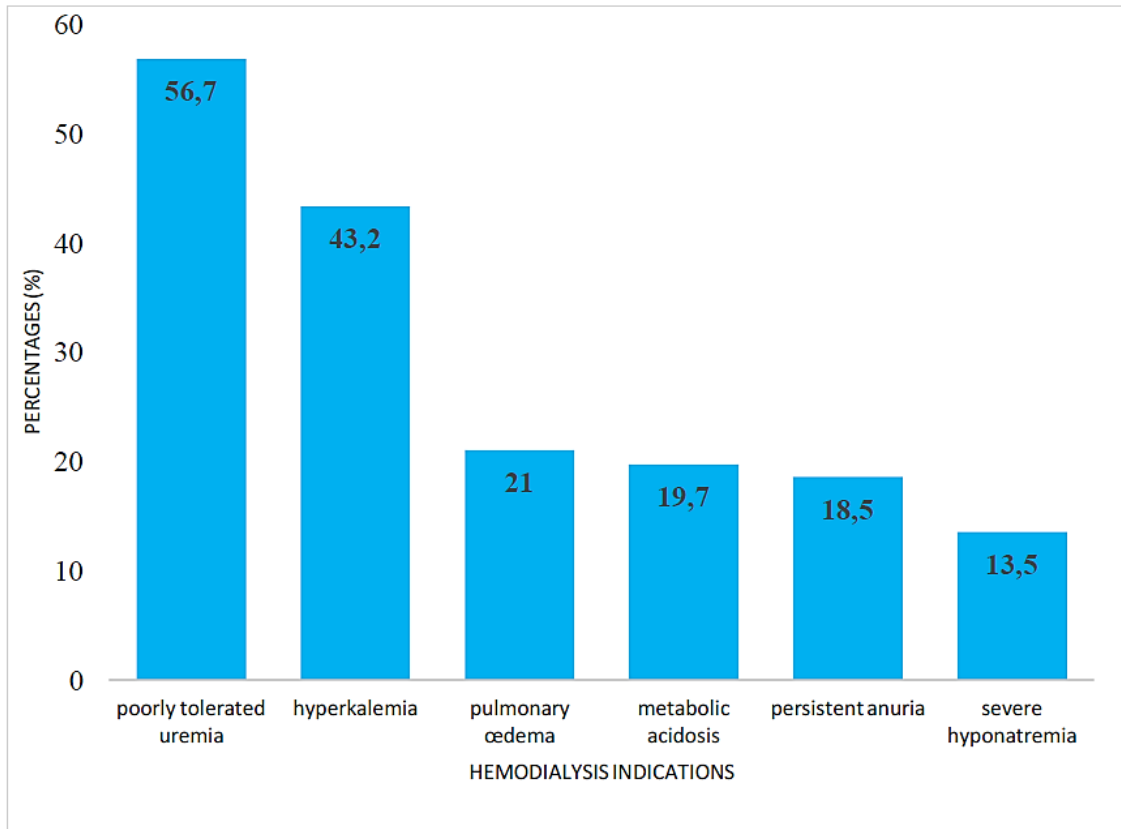


Figure 1 : Distribution of 81 patients according to the indication of hemodialysis in emergency in Dakar between November 2017 and April 2018.

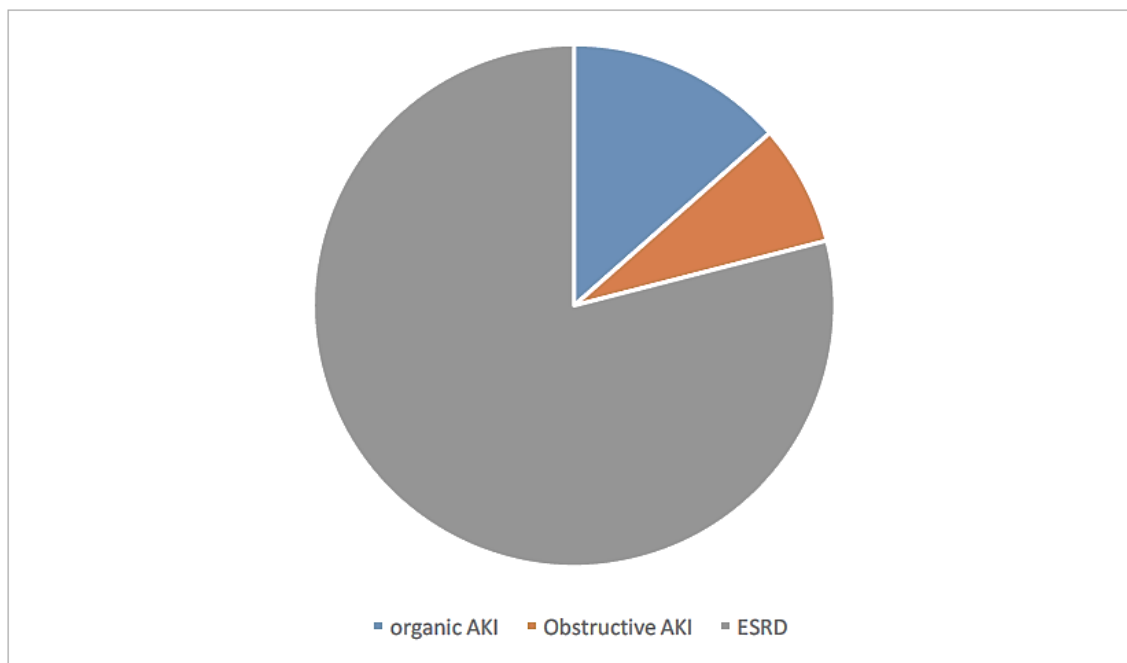


Figure 2 : Emergencies indications of hemodialysis in Dakar between November 2017 and April 2018 according to the type of renal insufficiency.

The descriptive study was performed with using proportions for the qualifying variables and average followed by standard deviation for the quantitative variables. The analytical study was done through the crossed tables. To compare the proportions, we used Pearson's KHI-2 test or

Fisher's exact two-sided test according to their applicability conditions with a significance threshold of « p-value » ≤ 0.05 . To compare the averages, we use the t-student test.

Results

During the study period, out of a total of 660 hemodialysed patients, eighty-one were received for emergency with a hospital prevalence rate of 12.2%. The mean age of the patients was 39.31 ± 18.78 years with a sex-ratio of 1.02. Twenty-eight (28) patients (34.60%) have had renal disease. Hypertension and diabetes were the most common comorbidities with 53.10% and 13.60%, respectively.

The first indication of emergency hemodialysis was poorly tolerated uremia in 46 patients (56.7%) followed by threatening hyperkalemia with 43.2% (Figure 1). Most of the patients were ESRD (79%). The prevalence of organic and obstructive AKI were respectively rated at 13.5% and 7.5% (Figure 2). For the session, femoral catheter was the most performed technical approach (86.4%) with an average length of 2.14 ± 0.47 hours. Free ultrafiltration was used in 12% of patients. Hypotension was the most noted adverse effect (11.1%) followed by hypoglycemia (4.9%). The prevalence of cardiac arrest and seizures was rated at 3.75%. The evolution was highlighted by a complete recovery in 53% of patients with AKI whereas for patients with ESRD lifting the emergency was the rule. Fifteen patients (18.50%) died, including 12 (14.80%) outside dialysis and 3 (3.75%) during dialysis. The occurrence of death was statistically correlated with hyperkalemia ($p = 0.003$) and metabolic acidosis ($p = 0.001$) (Table I).

Discussion

The prevalence of emergency hemodialysis was estimated at 12.2%. A higher prevalence (61%) is reported in a Moroccan study⁵. A previous study done in 2013 in Dakar hemodialysis centers, covering cases of AKI and ESRD as in this study, reported a prevalence of 23%⁶. This difference in prevalence compared to the

previous study done in 2013 could be explained by the improvement of the geographical accessibility of hemodialysis with the opening of several hemodialysis centers in Dakar and the other regions of Senegal. In this series the main indication was poorly tolerated uremia (56.7%) followed by hyperkalemia (43.2%). Koroma et al. outlined 62.5% of poorly tolerated urine and 15.1% of hyperkalemia in 2013⁶. However, hyperkalemia remains by far the most common indication in several studies. Lazrak M.A et al reported 58%⁷, Maaroufi C et al reported 29.41%⁸. Two Moroccan studies in 2008 and 2011 reported 48% and 58%, respectively^{8,9}. Felah E et al.¹⁰ found a prevalence of 47.8%. In our regions poorly tolerated uremia remains the most frequent indication of emergency hemodialysis. This could be explained by the time limit of consultation of our patients. Death was noted in 18.5% of patients. A fairly high but lower mortality rate compared to a study conducted in 2013 by Koroma et al, who reported a prevalence of 25.84%⁶. A study carried out in Morocco by Alaoui et al. in 2014 found a mortality rate of 6.5%¹¹ and another more recent study done in Tunisia by Felah E et al. found a lower rate of 3%¹⁰. This heavy mortality is related to the clinical presentation at the time of initiation of hemodialysis, which is life-threatening during and after hemodialysis. It is correlated with certain factors in particular metabolic acidosis and hyperkalemia in this study.

Conclusion

Emergency hemodialysis represents 12.2% of hemodialysis in Dakar. Poorly tolerated uremia was the most common indication (56.7%). In the majority of cases, we noted a good outcome for emergency cases however we had noted 15 deaths (18.5%).

Conflict of Interest : there is no conflict of interest

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