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### Profile of Patients Admitted to the Receiving Emergency Department of the National University Hospital Center of Fann (Senegal)

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#### Abstract

The emergency department is the showcase of the hospital. It is the interface of reception, diagnosis, and treatment between the home and the hospital. The Fann reception and emergency department were inaugurated on March 27, 2013, by the Minister of Health and Social Action. This work describes the socio-demographic, clinical, and therapeutic characteristics of emergencies admitted to the National University Hospital of Fann.

The study was retrospective and descriptive. The authors collated all patients admitted to the reception and emergency department of Fann between April 1, 2013, and December 31, 2013, inclusive, that is, over nine months.

The results revealed that 16,325 users had attended the emergency department in 2013. The average age was 51.3 years with a slight male predominance (54.5%). More than half of the patients (54%) were married. Residents of the city of Dakar constituted the largest proportion (57.5%). Of all the patients admitted, 85% of them had consulted at their own expense and 15% had health insurance. Emergency department attendance varied according to the day, with

peaks during on-call hours (66%) and half of the cases occurred at weekends. The most frequent reasons for referral were disorders of consciousness (35.4%) and motor deficit (18%). The diagnosis in the emergency department was dominated by neurological pathologies in 47.5% of cases, with a marked frequency of cerebral vascular accidents. Overall, the majority (93%) of patients admitted had a clinical condition considered serious (CCEM 3= 41%; CCEM 4= 45%). Mortality of admissions (18.3%) was higher in those aged 65 years and older.

The emergency room is a complex and paramount problem. Based on the observations of our study, the reception and emergency department of the Fann National University Hospital must be equipped with enough qualified medical and paramedical personnel. A system allowing the improvement of the relations between the services of the hospital and between the other hospitals of the country must be effective. The creation of a polyvalent resuscitation service will also be of great help.

**Keywords:** Epidemiology, Emergency Service, Fann, Senegal

#### 1. Introduction

The emergency department is a complex and critical issue. The emergency department is the showcase of the hospital. It is the pivotal point of the organization to be put in place for the proper functioning of the emergency department<sup>[1]</sup>. The management of emergencies has become a very sensitive issue in the organization of health systems. Emergency services in Europe meet well-defined criteria of structure, equipment, and functionality<sup>[2]</sup>. The management of these emergencies as practiced in industrialized countries is difficult to apply in our regions. For economic, cultural, and organizational reasons, the emergency room has become the main mode of entry to the hospital for most of the population in developing countries<sup>[3]</sup>. Patients are transported by makeshift means in a precarious state and arrive in emergency departments that are generally ill-adapted, under-equipped, and under-staffed. Very often patients die before they reach the emergency department or die before they are referred to a department adapted to their illness<sup>[4]</sup>. The place of the emergency department within the hospital must be unambiguously defined and appropriate resources must be granted to it to remedy the shortcomings of this initial situation.

On March 27, 2013, the Minister of Health inaugurated an emergency reception and treatment service at the National University Hospital of Dakar in the presence of the Turkish ambassador to Senegal. After nearly a year of operation, it is appropriate to take stock of the situation. Our work is in line with this perspective, the objective of which was to describe the

socio-demographic, clinical, and therapeutic characteristics of the emergencies admitted.

## 2. Materials and Methods

The study took place in the emergency department of the Fann National Hospital. It was a retrospective and descriptive study, running from April 1, 2013, and December 31, 2013, a period of nine months. The National University Hospital Center of Fann is a level III general hospital. It includes in addition to the emergency department, the departments of psychiatry, neurology, neurosurgery, otolaryngology, infectious diseases, pneumo-phytology, general radiology, bacteriology-virology, parasitology, biology, and thoracic and cardiovascular surgery. The reception and emergency services are under the responsibility of a professor at the University of Medicine of Dakar. At the time of this work, this service had three emergency physicians, two resuscitation anesthetists, and five teams of four nurses who take turns. The Fann emergency department operates 7 days a week and 24 hours a day. The operating hours of the doctors are arranged as follows: from 8:00 am to 3:00 pm the service is managed by the 3 emergency physicians and a resuscitating anesthetist, from 3:00 pm to 5:00 pm by an emergency physician, and from 5:00 pm to 8:00 am by an internal physician regardless of his specialty in the hospital. In 2013, 16,325 patients were identified in the patient registers. Over nine months (April 1 to December 31, 2013), 585 medical records had been created corresponding to the number of passages in the inpatient unit or the continuous monitoring room of the Fann emergency department.

Data collection consisted of listing the records of all patients, of both sexes and with an age greater than or equal to 15 years, admitted to the emergency department for the study period. Medical records that were incomplete or could not be found in the department's archives were not included. We transcribed the following variables from the consultation register and medical records: frequency of admission, patient's socio-administrative data, the decision to use the emergency room, and means of transport. In the emergency room, we noted the day and time of arrival, the reason for observation, the complementary examinations performed, the main diagnosis, the patient's outcome, the clinical classification of patients in the emergency room, and the day and time of discharge. The Clinical Classification of Emergency Patients (CCEM) considers the vital prognosis and the examinations performed but remains based on a subjective medical judgment<sup>[5]</sup>. It is a coding system that evaluates the patient's condition in the emergency room, his level of clinical severity, and his medical prognosis. Five codes have been identified<sup>[5]</sup>:

- CCEM 1: Clinical state considered stable. No additional diagnostic or therapeutic procedure. Simple clinical examination.
- CCEM 2: Stable lesion status and/or functional prognosis. The decision of additional diagnostic (blood test, conventional X-ray) or therapeutic (suture, reduction) procedures to be performed by the mobile intensive care unit or an emergency department.
- CCEM 3: Lesion status and/or functional prognosis judged to be able to worsen in the emergency room or during the SMUR intervention, without putting at risk the vital prognosis.

- CCEM 4: Pathological situation engaging the vital prognosis without immediate resuscitation gestures.
- CCEM 5: Life-threatening situation. Management involves immediate resuscitation.

The data collected were coded to preserve anonymity and then entered and processed on a computer equipped with software: SPSS version 10.0 for Windows and WORD-EXCEL.WORD-EXCEL. Various univariate analyses were performed with the calculation of frequencies, and averages.

## 3. Results

### 3.1 Sociodemographic data

**Table 1:** Sociodemographic characteristics, modes of referral, days, and times of arrival of patients admitted to the Fann emergency department during the study period

Variables	Number	Percentage (%)
<b>Gender</b>		
Men	319	54.5
Women	266	45.5
<b>Age groups</b>		
15-24 years old	78	13.3
25-34 years old	82	14.0
35-44 years old	64	11.0
45-54 years old	87	15.0
55-64 years old	100	17.0
65-74 years old	92	15.7
75 years old and more	81	14.0
<b>Marital Status</b>		
Single	170	29.0
Divorced	7	1.0
Married	314	54.0
Widowed	94	16.0
<b>Place of residence</b>		
Dakar city	335	57.5
Dakar suburb	189	32.3
Other	60	10.2
<b>Profession</b>		
No job	216	47.0
Employed	169	29.0
Pupils/ Students	55	9.5
Retired	85	14.5
<b>Mode of orientation</b>		
Nurses/ Midwives	7	1.2
Him/herself	394	67.3
Doctors	174	29.8
Firemen	10	1.7
<b>Mode of payment</b>		
At own expense	501	85.6
Letters of guarantee	76	13.0
Health insurance company	4	0.7
Other	4	0.7
<b>Mode of transport</b>		
Own means	461	78.8
Ambulances	121	20.7
Fire department	3	0.5
<b>Days of arrival</b>		
Monday	71	12.1
Tuesday	72	12.3
Wednesday	74	12.7
Thursday	93	15.9
Friday	84	14.4
Saturday	117	20.0
Sunday	74	12.6
<b>Arrival times</b>		
Working hours	199	34.0
On-call hours	386	66.0

Table 1 provides a general overview of the socio-demographic characteristics, modes of referral, days, and times of arrival of patients admitted to the Fann emergency department.

During the year 2013, we counted 16,325 visits to the emergency department of the Fann National Hospital. Five hundred and eighty-five patients (585) were hospitalized during the period from April 01 to December 31, 2013, thus representing 4% of the clinical activity of the department. The study population consisted of more men (319) than women (266) with a sex ratio of 1.20. The mean age was 51.3 years with a range of 15 to 96 years. Almost one-third of the patients admitted were 65 years of age or older (29.7%).

More than half of the users were married (54%). Single people were the second most common group with less than a third of the population (29%). Almost all the patients came from Dakar City (57.5%) or the suburbs (32%). In terms of occupation, almost half of the users were unemployed (47%). People with a salaried job or a paid occupation made up almost one-third of the sample (29%). Most emergency patients (85.7%) came to the hospital at their own expense and more than three-quarters (78.8%) of admitted patients used their means to get to the hospital. In terms of arrival times at the emergency room, one-third (32%) of admissions took place during the weekend. The highest peak was observed on Saturday with 66% of patients admitted during the on-call hours from 5 pm to 6 am.

**3.2 Clinical data**

Most admissions were due to somatic problems (90%). Symptoms of neurological damage such as coma (35.4%), motor deficit (18%), and convulsions (10%) were the main reasons for admission. Stroke with a little more than a third (36.8%) and epilepsy (5.3%) was the most represented. Infectious pathologies were mainly represented by malaria (11.7%) and sepsis (5.5%). Regarding the diagnosis, the medical pathology was mainly of neurological origin with almost half of the patients admitted (47.5%). (Table 2).

**Table 2:** Distribution of patients admitted to the Fann emergency department by reason for consultation and diagnosis during the study period

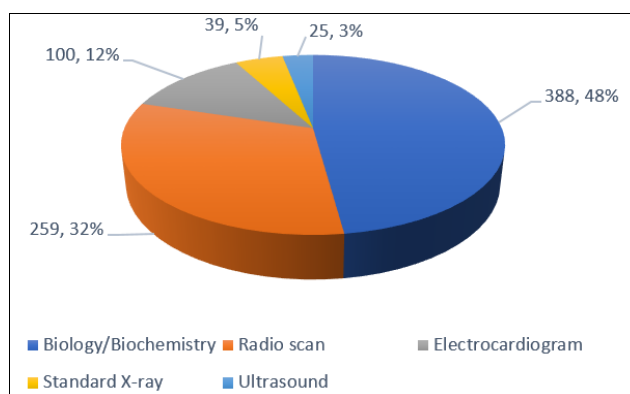
Variables	Number	Percentage (%)
<b>Frequent reasons for consultation</b>		
Coma	207	35.4
Motor deficit	105	18.0
Convulsions	57	9.8
Headache	53	9.0
Vomiting	38	6.5
Pain	35	6.0
Trauma	32	5.5
Agitations	32	5.5
Dyspnea	18	3.0
Diarrhea	2	0.2
Jaundice	1	0.1
<b>Main diagnoses</b>		
Cerebral vascular accident	215	36.8
Malaria	68	11.6
Trauma	44	7.7
Epilepsy	31	5.3
Sirs, sepsis	31	5.3
Hypertensive emergencies	18	3.0
Behavioral disorders	17	3.0
Meningoencephalitis	16	2.8

Decompensated diabetes	13	2.2
Pleuropneumonia	11	2.0
Intracranial expansive process	11	2.0
Hepatopathy	8	1.4
Asthma	6	1.0
Epigastralgia	6	1.0

Communicable diseases accounted for a quarter (25.6%) of admissions. There were two cases of Quinke’s edema (dermatology), one case of peritonitis (general surgery), and one case of snakebite (toxicology).

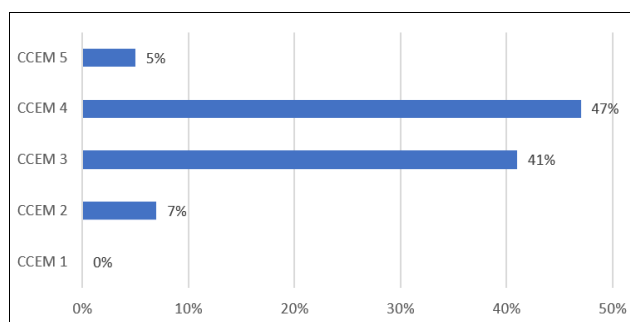
**3.3 Data from the management**

Overall, most patients admitted were able to have a biological check-up (66%). Slightly less than half were able to have a CT scan (44%) and 17% had an electrocardiogram. Other diagnostic tests were performed in a more marginal way (standard X-ray 7%, ultrasound 4%). (Figure 1).



**Fig 1:** Distribution of para-clinical examinations ordered for patients admitted to the emergency department during the study period

In terms of severity, most patients (93%) admitted had a clinical condition considered severe (CCEM 3, 4, 5), and more than half of admissions (52%) were immediately life-threatening (CCEM 4 and 5) (Figure 2).



**Fig 2:** Distribution according to the severity of the emergency among patients admitted to the emergency department of Fann during the study period

The average length of stay was 8.01 days with a range of 1 to 61 days. Almost half of the patients admitted (43%) stayed in the emergency department for more than 72 hours. However, about a quarter of the patients admitted stayed less than 24 hours in the emergency department. At the end of the hospitalization, nearly 82% of the patients were able to return home (40.5%) or were transferred to a more appropriate service within or outside the Fann hospital (41.5%). Mortality represented 18%. It was higher in people

over 65 years of age with a rate of 46.8% of cases. Most deaths were due to neurological pathology, particularly stroke (58%). 18% of deaths were of infectious origin. About the time of death, most deaths occurred during on-call hours (82%). (Table 3).

**Table 3:** Distribution of patients admitted to the Fann emergency department according to the length of stay, outcome after admission, and mortality

Variables	Number	Percentage (%)
<b>Length of stay</b>		
0-24 hours	160	27.3
24-48 hours	114	19.5
48-72 hours	60	10.2
more than 72 hours	251	43.0
<b>What happens after admission</b>		
Deaths	107	18.3
Transfer to specialized service	218	37.2
Return home	236	40.5
Referred to another institution	24	4.0
<b>Mortality/Age Groups</b>		
15-24 years old	2	1.6
25-34 years old	10	9.4
35-44 years old	10	9.4
45-54 years old	10	9.4
55-64 years old	25	23.4
65-74 years old	22	20.6
75 years old and more	28	26.2
<b>Mortality/Main diseases</b>		
Infectious diseases	19	18.0
Neurological diseases	62	58.0
Cardiovascular diseases	4	3.7
Neurosurgical diseases	3	2.8
Internal Medicine Diseases	9	8.4
Other diseases	3	2.8
<b>Mortality/Arrival times</b>		
Working hours	19	18.0
On-call hours	88	82.0

## 4. Discussion

### 4.1 General epidemiology

During 2012, 13,478 visits were recorded at the Fann reception and referral service. More than 16,000 medical visits were recorded at the SAU during 2013, i.e., an increase of 21%. These results are related in smaller proportions to the evolution of the general population characterized by an annual growth rate of 2.5% [6]. This attendance is essentially linked to the fact that the Dakar agglomeration, which represents 0.3% of the national territory, concentrates 25% of the general population [4], but it could also be explained by the situation of Fann Hospital (reference hospital located in the center of residential areas with specialized services unique in Senegal). The increase in the number of emergency room visits is a phenomenon commonly observed in several countries. In Morocco, for example, the number of patients attending the emergency department of the Nador hospital has more than doubled in four years [7]. In France, this continuous growth is 4.5% on average per year, reaching 16.4 million visits in 2007 for the 646 emergency facilities [8, 9]. In the United States, in 10 years, the number of emergency room visits has increased from 90 million/per year to 113 million/per year. In Canada, in 2004, emergency services handled 14 million visits. In Australia, the reported increase is 37% between 2000 and 2010 [8]. These increasing trends almost everywhere in the world may be related to changes in user behavior with the

increase in requests for "non-urgent" care, especially since only 20% of the visits on average result in hospitalization [10]. Moreover, in our study, during the last three quarters of the year, only 585 patients were admitted, i.e., 4% of hospitalization for the year 2013.

In this series, the study population is relatively old with a mean age of 51.3 years. Nearly one-third of the patients admitted were also 65 years and older. The population is predominantly male with a sex ratio of 1.2. These results do not differ significantly from those obtained in the emergency room of the university hospital of Point G in Mali, where the average age of patients admitted was 46 years for a sex ratio of 1.5 [11]. On the other hand, other studies have shown a young population with an average age of 32 years and an equal distribution of the two sexes among the users of the Pikine emergency department [12]. In 2001, a study conducted in the medical-surgical emergency department of the Aristide le Dantec Hospital in Dakar found an average age of 23 years. This average is consistent with the average age of the general Senegalese population, which is characterized by its great youth, with 56% of the population under 20 years of age [4]. In our sample, more than half of the patients admitted were married, reflecting the nature of the country with a strong Muslim majority. Nevertheless, this proportion of married people is identical to that found by McLean *et al.* in the USA [13], even if the population structures of these two countries are different. On the other hand, in France, only 39.4% of the users of emergency rooms in the Nanterre region were living with a partner [9]. Nearly half (47.5%) of our hospitalized patients lived in Dakar city and 32.5% in the Dakar suburbs. These data are consistent with those observed for the population of emergency room users at Aristide le Dantec Hospital [4], 50% of whom lived in Dakar city and 35% in the suburbs, certainly because of the geographical location of these two hospitals in the heart of Dakar. On the other hand, 97% of emergency room users at the suburban hospital in Pikine [12] lived in the suburbs, reflecting the results of the 2002 national census, in which 60% of the population of Dakar was in the suburbs [14].

Most patients hospitalized in the Fann emergency department were at their own expense (85.6%). The same situation was observed in Morocco where only 12.4% of the patients in the emergency department of Nador had social security coverage [7]. In developed countries such as France, 88% of emergency department users had full social security coverage, and this proportion even reached 98% in some regions [8, 9, 15]. In the United States, 80% of emergency department users had health insurance, and only less than a quarter paid out-of-pocket [13]. However, the cost of health care is becoming increasingly high. Thus, the use of emergency rooms has become the main mode of admission to hospitals for most people in our developing countries. This is of concern to us if we consider that only less than one-third of the patients admitted have a salaried job or a paid occupation, in contrast to the 71% of users of the Nanterre emergency room [9]. In Senegal, the hospital reform initiated by the Ministry of Health and Social Action aims to improve equity and accessibility to care. In addition, the "SESAME" plan, which offered free care to people over 60 years of age, is experiencing limitations in its implementation [3]. Consequently, the search for adapted solutions integrating economic, medical, and especially organizational imperatives appears to be a necessity. Thus,

the organization of the National Health Conference in 2013 and the key decisions such as the Universal Health Coverage initiative and free emergency care for people under 5 years of age can be seen as the beginning of solutions [3]. However, serious concerns persist among health administrators and professionals about the efficiency and effectiveness of the medical service, both because of the level of utilization and because of the existence of an alternative of care with more appropriate access and equity. The Senegalese health system is organized according to a pyramid scheme: the health post, the health center, the level 1 departmental hospital, the level 2 regional hospital, and the level 3 national hospital (Fann Hospital). Our study showed a high level of direct recourse to the Fann emergency room without medical advice for most patients admitted (67.3%). Most of these hospitalized patients (78.8%) arrived by "cab" or other means. Similar observations were made in the emergency room of the Aristide le Dantec Hospital in Dakar [4] and the emergency room of Point G in Mali [11], with nearly 78% of patients brought in by private individuals. The same situation has been reported in France where 70% of the users of emergency services presented themselves directly without prior medical contact and by their means. In the case of Senegal, several limitations explain the situation. Indeed, in Dakar, there are only two private emergency medical assistance companies accompanying the National SAMU. The SAMU National's share of the study was limited to 8 transfers out of the 20% of hospitalized patients brought in by ambulance. Finally, since its creation in 2005, the SAMU has encountered certain difficulties to develop fully [3].

#### 4.2 The clinic and management

The distribution of types of emergencies in an emergency department is also a function of the structure of the health system in a region, and the availability and orientation of other centers in the region [12]. Most admissions are essentially related to somatic problems (90%). Altered consciousness was the most common reason for admission (35.4%). The predominant pathology was neurological in almost half of the admissions (47.5%). The main etiology found was stroke (36.8%). This high frequency of neurological pathology in the emergency department may be related to the fact that Senegal has only one department specialized in the management of neurological diseases. This service is in the Fann National University Hospital, with ten neurologists for a capacity of thirty-five beds. This situation reflects the difficulty of caring for patients with neurological diseases in other health facilities where only general practitioners and nurses are generally available. These same problems have been noted in Zambia and in some developed countries such as Spain, where there are about 2 neurologists per 100,000 inhabitants and where the demand for neurological care remains high [16].

Transmissible pathology accounted for a quarter (25.6%) of admissions, whereas in the hospital of Pikine in Senegal, it was highly predominant with 55% of emergency room visits and in the Point G hospital in Mali for 58% of admissions. However, in our countries, it is still globally dominated by malaria: 78% of infectious emergencies at the Dantec Hospital in 2001, 52.4% at the Pikine Hospital in 2008 [12], and 45% in our series. In Mali, pneumopathies were in the foreground with 32% [11]. Surgical pathology was dominated by neurosurgery (3.7%) and head and neck trauma (5.7%),

in contrast to the results of Sall and colleagues [4], where most traumatic injuries were in the limbs (55.48%). In the field of our sample, the management of somatic conditions (a term that includes all conditions not related to an accident or mental disorder) and traumatological conditions most often required para-clinical explorations in search of a curable cause. The vast majority (66%) of hospitalized patients had access to biological examinations. Computed tomography (44%) was the most common imaging request due to the frequency of neurological emergencies but also due to the existence of a 24-hour general radiology and neuroimaging service within the Fann Hospital.

In our series, most of the patients admitted (93%) had a clinical condition considered serious (CCEM greater than or equal to 3), confirming the results noted by Keita *et al* [11] where more than half of the patients admitted were considered "serious" (53.9%). Fifty-two percent of the patients admitted had an immediately life-threatening condition (CCEM 4 and 5) and nearly three-quarters of the patients (73%) had stayed in the emergency department for more than 24 hours. Stays of more than 72 hours are considered aberrant in France [8] and represent 43% of our hospitalized patients. In other words, for most patients, timely management in an intensive care unit would have been more appropriate. This situation is linked to the fact that Fann Hospital does not have a multipurpose resuscitation service. In addition, the specialized divisions of neurological and infectious resuscitation, whose disciplines represent nearly three-quarters of emergency room admissions (73%), are under-equipped and have only six and seven beds respectively. Consequently, the new, better-equipped emergency department tends to be used more as a resuscitation unit than as its primary mission. This allows for longer lengths of stay which, among other things, explains the significant mortality found (18.3%) and which is identical to that observed in the Point G Hospital emergency room in Mali [11]. The relationship is more telling since more than three-quarters of the deaths (76%) recorded were of neurological or infectious origin and 99% of them had a threatened vital prognosis (CCEM 4 and 5). A striking element is that most deaths (82%) occur during on-call hours, which are provided by interns from other hospital departments, with most psychiatrists who, a priori, have no training in the management of somatic emergencies. It seems appropriate to ask the hospital administrators to provide the emergency department with sufficient medical staff.

#### 5. Conclusion

Nowadays, the emergency department tends to become a specific mode of access to the hospital. It is the showcase of the hospital. It is the interface of reception, diagnosis, and treatment between the home and the hospital. For economic, cultural, and organizational reasons, the emergency room has become a real problem for most developing countries. The doctor in the emergency room is not only confronted with the management of one person, but with the management of a flow of patients entering and leaving the hospital. In addition to this, there is the need to deal with multiple emergencies (vital, social, psychological, etc.), the management of families who are often anxious and in demand, and the management of the limits with other hospital services. The objective of our work was to describe the profile of emergencies admitted and their management

in the new emergency department of the Fann National University Hospital. The study showed that emergency department attendance remains high with 16,325 users. But apart from this frequency, all the socio-demographic aspects, and the management, several difficulties were encountered by the doctors of the Fann emergency service. Thus, for the improvement and continuity of care for patients received at the emergency department, it is imperative to provide the emergency department with adequate medical and paramedical staff; setting up a system allows the improvement of relations between departments within the national university hospital center, and between hospitals; to develop a mobile emergency department and to enlarge and equip the specialized neurological and infectious resuscitation units. It is also important soon to set up a specialized neurological emergency pole (SNEP) at the Fann National University Hospital Center because of the patient profile.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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