Scientific Research Publishing

Open Journal of Emergency Medicine, 2025, 13(3), 210-228
https://www.scirp.org/journal/ojem
ISSN Online: 2332-1814
ISSN Print: 2332-1806

Mortality in the Emergency Department of the 2 Army Training Hospitals in Gabon: A Retrospective Study

Raphael Okoue Ondo[1*], Ghislain Edjo Nkilly[1], Arthur Matsanga[2], Kescialine Moukagni Moukagni[1], Vanessa Sagbo Ada[2], Sarah Dondyas Orema[1], Wilfried Mouiry Bivigou[3], Ulysse Mayegue Anani[3], Jean-Marcel Mandji Lawson[3]

[1]Anesthesia, Intensive Care and Emergency Department of the Omar Bongo Ondimba Army Training Hospital, Libreville, Gabon
[2]Anesthesia, Intensive Care and Emergency Department of the Owendo University Hospital Center, Libreville, Gabon
[3]Anesthesia, Intensive Care and Emergency Department of the Akanda Army Training Hospital, Libreville, Gabon
Email: *raphaelokoue@gmail.com

How to cite this paper: Okoue Ondo, R., Edjo Nkilly, G., Matsanga, A., Moukagni Moukagni, K., Sagbo Ada, V., Dondyas Orema, S., Mouiry Bivigou, W., Mayegue Anani, U. and Mandji Lawson, J.-M. (2025) Mortality in the Emergency Department of the 2 Army Training Hospitals in Gabon: A Retrospective Study. *Open Journal of Emergency Medicine*, **13**, 210-228.
https://doi.org/10.4236/ojem.2025.133019

Received: May 4, 2025
Accepted: August 22, 2025
Published: August 25, 2025

Abstract

Introduction: Mortality is a frequent phenomenon in the Emergency Department (ED) and a major public health concern. In Gabon, few have examined mortality problems specific to emergencies. The interest of our study is to describe the epidemiological profile of patients who died within 72 hours in the emergency services of the two Military Teaching hospitals in Libreville. **Method**: This is a bicentric descriptive study retrospectively from May 2018 to April 2019. **Results**: During the study period, there were 20,339 visits to the ED, including 209 patients who died within 72 hours of admission to the ED. The specific mortality rate of the study's population was 1.03% of annual passages. The majority of deaths were among men (58.3%). The average age was 46.5 ± 24.6 years. High blood pressure and AIDS were the main medical conditions reported with 23.5% and 17.8% respectively. The majority of patients returned from home (81.9%) and in 94.6% of cases, by cab or personal car. The main chief complaint was altered consciousness (29.5%), most frequently after one week of symptom progression (28.8%). At admission, 64.4% of patients showed signs of neurological distress. The ASAP score was predictive at admission for 27.36% of deceased patients. The death occurred on average after a delay of 19.1 ± 19.9 hours. The majority of patients died within 6 hours and 62.6% of deaths were reported during on-call time. The cause of death was medical in 77% of cases. Some patients presented with multiple pathologies and infectious pathologies were mentioned in 66.46% of the observations, followed by neurological disorders (21.11%). Preliminary cardiopulmonary resuscitation procedures were undertaken for 76.96% of the patients who died.

Conclusion: This survey provides an overview of UAS mortality in Libreville's HIAs and identifies some areas for improvement in our health system.

Keywords

Emergency Department, Mortality, Gabon, Epidemiology

1. Introduction

In terms of public health, mortality is obviously a major concern. Indeed, it is a relevant indicator for evaluating a health system in order to propose areas for improving the quality of care. However, mortality data in different countries are not always usable, especially in sub-Saharan regions [1].

In the United States of America, a mortality rate of 0.3% was noted among annual visits to Emergency Departments. In France, a 2018 study described mortality rates between 0.15% and 0.18% [2]. In Africa, mortality in emergency departments was distributed in varying proportions: 0.6% in Morocco, 2.6% in Cameroon, and 11.3% in Benin [3]-[5]. In Gabon, few or no studies have addressed the issue of mortality specific to emergency departments, while a World Health Organization (WHO) Gabon report estimated in 2016 mortality rates in the general Gabonese population at 239 per 1000 and 201 per 1000 respectively for men and women in the 15 - 60 age group [6].

Mortality studies are an essential means of assessing the efficiency of care in an emergency department. Furthermore, in-hospital mortality is a key indicator of the quality of care within the hospital. It also provides an excellent example of the many precautions that must be taken before making a judgment based on outcome indicators. It also allows for the detection of gaps in the integration of quality policy into hospital departments. We therefore considered it useful to conduct a study whose purpose was to describe the epidemiological profile of patients who died in emergency departments (EDs), in order to define the primary contributing factors to 72-hour mortality in the EDs of two military hospitals in Libreville, Gabon.

2. Patients and Method

2.1. Study Type and Period

This was a descriptive, retrospective, bicenter study conducted from May 2018 to April 2019.

The study took place in the emergency departments of the Omar BONGO ONDIMBA Estuary Hospitals in Libreville and Akanda. A team consisting of one major, two to three nurses, one stretcher-bearer, and two ward attendants worked in shifts from 8:00 a.m. to 8:00 p.m. and from 8:00 p.m. to 8:00 a.m. In each team, a nurse was responsible for triaging patients at reception. Each department was headed by a department head, an anesthesiologist-intensive care physician, and his or her deputy, an emergency physician, assisted by two (2) general practition-

ers and three (3) interns. Their working hours are from 8:00 a.m. to 6:30 p.m., when the shift begins, provided by a general practitioner and two interns.

2.2. Study Population

The source population was all patients who consulted in the emergency departments of the described facilities. The target population represented all patients admitted and declared deceased in these departments.

The following were included in our study:

All patients admitted and deceased between 1 and 72 hours after admission to the emergency departments of the Army Training Hospital Omar BONGO ONDIMBA (ATHOBO) and the Army Training Hospital Omar Akanda (ATHA).

Patients who arrived and died during the study period were excluded.

2.3. Data Collection

A data collection form was created to collect the following parameters:

- Population characteristics (gender, age, place of residence, social category, occupation, socioeconomic level, health insurance);

- Admission method (origin, transfer, organization of possible transfer, means of transportation, etc.);

- Medical history, risk factors, and notion of poor health habits;

- Reason for consultation;

- Assessment of the time to onset of symptoms;

- Vital parameters upon admission (blood pressure, heart rate, pulse oxygen saturation on room air, capillary blood glucose, respiratory rate, and temperature);

- Clinical examination upon admission, looking for the main signs of vital distress concerning the three main systems: neurological, circulatory, and respiratory. Another section was opened to indicate any other relevant signs;

- A second examination, superimposable on the previous one, signaled the point of decompensation of the patient's health condition and was proposed in the form;

- The performance of additional tests, and the time taken to complete them (biological and morphological);

- Date of admission and death, calculation of length of stay, determination of the period of death (on-call/business hours);

- Assessment of the time to treatment, treatment time, and prior resuscitation procedures.

- The diagnosis(es) retained are categorized as medical, surgical, and unknown. The cause of death was considered unknown when the probable diagnosis could not be substantiated.

Patients were identified using consultation and death registers maintained by the emergency departments. We also recorded the number of consultations per month and by gender, as well as the main pathologies prevalent in the emergency departments in preparation for our analyses.

These data were then transcribed into a digital database using Excel® software.

2.4. Ethical Considerations

Authorization was obtained from the Chief Physician in charge of the 2 ATH and the Head of the Anesthesia-Resuscitation Department for access to patient records. Data confidentiality was respected.

3. Results

3.1. General Study Population

In total, over the twelve months of the study, there were 20,339 visits to the departments concerned, including 230 who arrived deceased and 279 patients who died after admission to the Emergency Department, representing a mortality rate of 1.66% of emergency department visits (Figure 1).

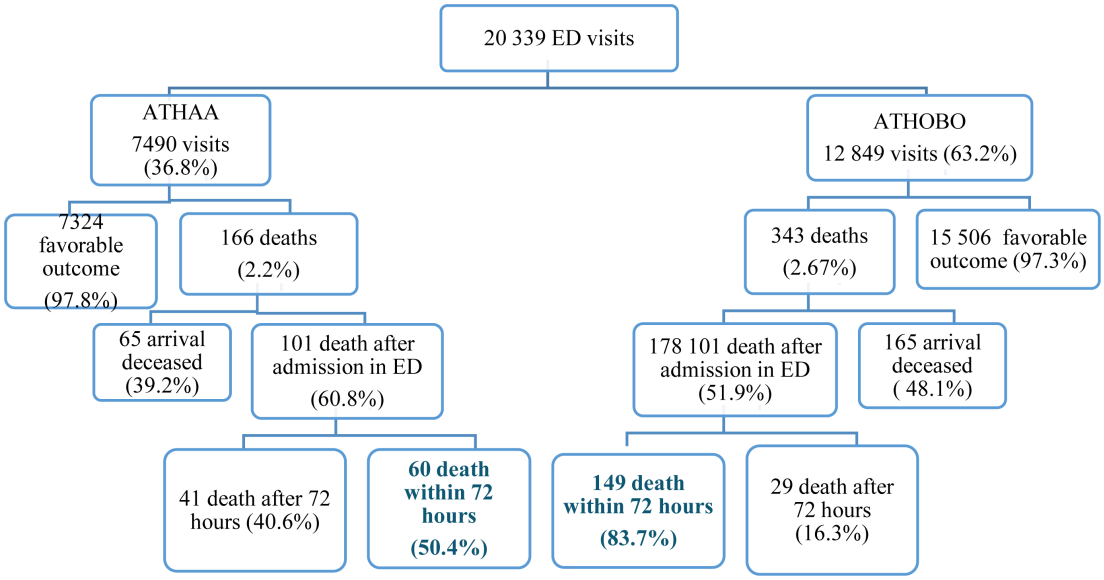

Figure 1. Study population, flow diagram.

Of the 279 deaths that occurred in the ED, 209 occurred within 72 hours, thus constituting our study population. This number therefore reflects a specific mortality rate of 1.03% among patients admitted to the ED (0.80% at the ATHA and 1.15% at the ATHOBO). Female patients were more likely to arrive for consultations, with a distribution of 54.99%, resulting in a male/female sex ratio of 0.85 for ED consultations at both study sites.

During the study period, there were 4075 hospitalizations at both sites. Table 1 summarizes the ten most common pathologies in hospitalizations. Malaria was the most common medical condition, with a proportion of 20.2% (Table 1).

3.2. Sociodemographic Profile of Patients Who Died in the Emergency Department

Males were the most prevalent, representing 58.3%, with a male/female sex ratio

of 1.4. The mean age was 46.5 years ± 24.6, with a range of 3 months to 93 years. Male patients were, on average, younger at death than female patients, at 45.8 and 47.6 years, respectively. Death was more common among patients over 25 years of age (Figure 2).

Table 1. Prevalent pathologies in the emergency department.

Prevalent pathologies in the emergency department	Effective (n)	Percentage (%)
Malaria	827	20.3
Trauma	464	11.4
Acute gastroenteritis	339	8.4
Strokes	264	6.5
Abdominal pain	246	6.0
Gastritis	216	5.3
Fracture	186	4.6
Severe anemia	150	3.7
Pulmonary bacilliosis	101	2.5
Kidney failure	57	1.4

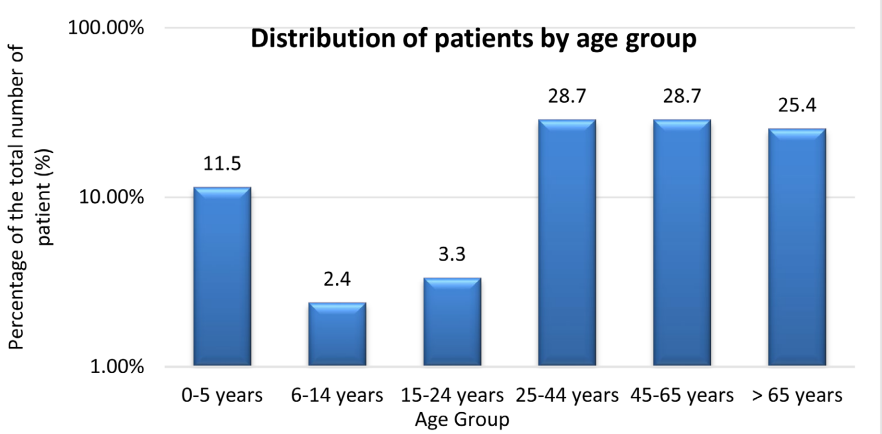

Figure 2. Distribution of patient by age group.

Patients who died during our study were single in 62.8% of the reported cases. Civilians represented 89.9% of the study population. In 59.1% of cases, the patients' social status was considered average, and 73.3% of deceased patients had health insurance. High blood pressure and immunosuppression due to retrovirosis (AIDS) were the most frequently reported antecedents, with respective proportions of 23.6% and 17.8%. Regarding risk factors and bad health habits, an enolic addiction was mentioned in 23% of cases.

Patients were mainly returning from home, 81.9% of them on their own initiative or that of their family and friends. For 13.2% of the reported cases, the transfer was secondary (from another healthcare facility), with the main mode of transport

being a taxi or their own vehicle (94.6%). Of the 27 transfers recorded, only two (7.4%) were noted as organized transfers, *i.e.*, without first alerting the host facility (Table 2).

Table 2. Distribution by origin and mode of transport.

	Effective (n)	Percentage (%)
Origin (n = 205)		
Home	**168**	**81.9**
Public facility	21	10.2
Public road	12	5.8
Private facility	4	1.9
Transfer (n = 205)		
Yes	**27**	**13.2**
No	178	86.8
Transfer organization (n = 27)		
Yes	2	7.4
No	**25**	**92.5**
Mode of transportation (n = 205)		
Taxi/personal vehicle	**194**	**94.6**
Ambulance	9	4.4
Fire department	2	1

Figure 3 describes the distribution of the main reasons for consultation of patients who died in the emergency department. The most frequent reason for consultation was altered state of consciousness, representing 28% of patients who died in the emergency department.

The majority of patients (28.80%) consulted after 1 week of symptom progression.

3.3. Vital Parameters

The majority of patients had normal blood pressure upon admission (40.2%), with mean systolic and diastolic blood pressures of 121.40 mmHg and 74.11 mmHg, respectively.

Tachycardia was observed in 53.4% of cases, with a mean heart rate of 103 beats per minute. Polypnea was noted in 63.4% of reported cases, with a mean of 27 cycles per minute. Pulse oxygen saturation on room air was between [90%; 100%] for 69.4% of deceased patients, with a mean of 89.6% O2. Hyperthermia was observed in 48.8% of patients on admission and the average body temperature was 37.7˚C. Capillary blood glucose on admission was elevated in 46.67% of reported cases, with an average of 1.25 g/L (Table 3).

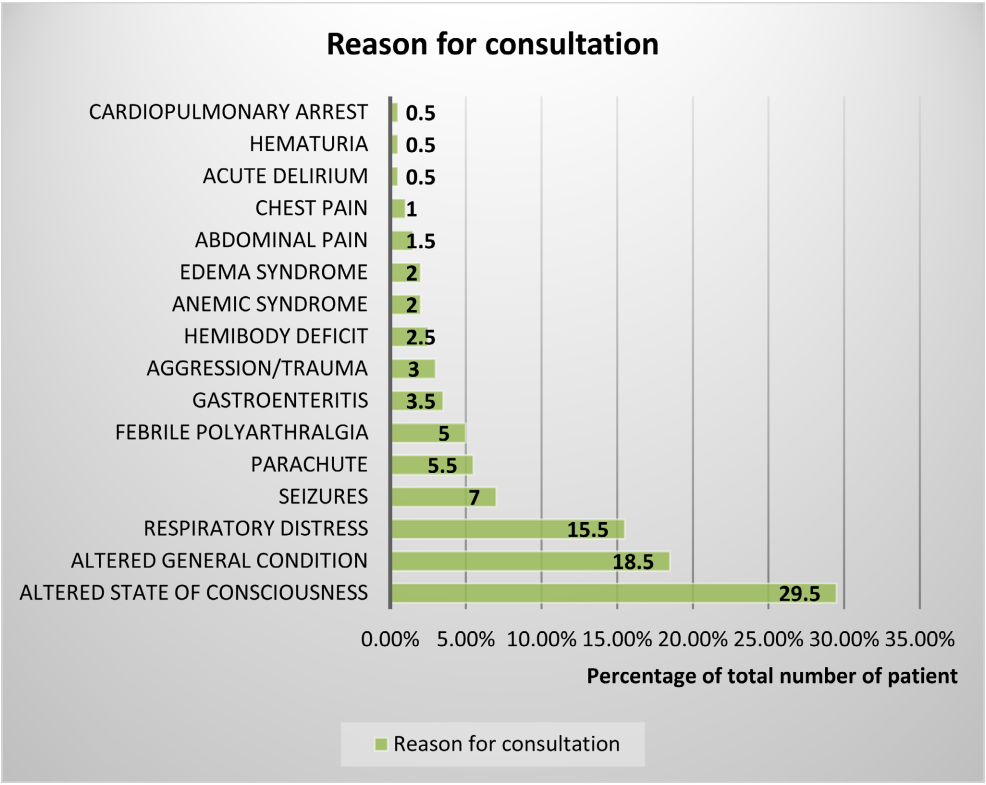

Figure 3. Reason for consultation.

Table 3. Distribution according to vital parameters on admission.

Vital Parameters		Effective (n)	Percentage (%)
Blood Pressure	Hypertension	51	29.3
n = 174	Normal	70	40.2
	Hypotension	53	30.5
Heart Rate	Tachycardia	102	53.4
n = 191	Normal	78	40.8
	Bradycardia	11	5.8
Respiratory Rate	Polypnea	59	63.4
n = 93	Normal	31	33.3
	Bradypnea	3	3.3
Saturation	≥90%	132	69.5
n = 190	<90%	58	30.5
Body Temperature	Hyperthermia	61	48.8
n = 125	Apyrexia	57	45.6
	Hypothermia	7	5.6
Capillary Glucose	Hyperglycemia	56	46.7
n = 120	Normal	50	41.6
	Hypoglycemia	14	11.8

The majority of patients presented signs of neurological distress, 66.5% of them. The most frequent sign was the alteration of the state of consciousness (65.9%) with a mean Glasgow Coma Score of 9.7 and extremes of 3 and 14 for adults. Children had a mean Blantyre score of 2.65 and extremes of 1 and 4 for children. Patients were in shock in 28.2% of observations and septic shock was the most frequent, *i.e.* 16.2% of cases (Table 4).

Table 4. Distribution of shock states.

Shock states	Effective (n)	Percentage (%)
Septic shock	31	16.2
Hypovolemic shock	11	5.7
Cardiogenic shock	7	3.6
Hemorrhagic shock	5	2.6
Total	54	28.2

3.4. Contributions of Additional Tests

The results of laboratory tests were available within an average of 1.8 hours. The complete blood count revealed:

- Anemia in 65.2% of reported cases, with a mean level of 8.9 g/dL and ranges of 1 to 16 g/dL;

- Leukocytosis in 51.5% of cases, with a mean level of 11,934.63 g/mm^3 and ranges of 300 to 50,100 g/mm^3;

- Platelet counts were normal in 54.7% of patients, with a mean rate of 186,153.4/mm^3 and ranges from 10,900 to 519,000/mm^3.

Renal function was impaired in 62.2% of cases, and thick blood smears were positive in 33.3% of the requested tests.

Regarding morphological examinations, results were available within an average of 3.3 hours. Standard radiography was the most requested morphological examination (70.1%).

3.5. Diagnosis

The average length of stay before death was 19.1 ± 19.9 hours, with extremes of 1 and 72 hours (Figure 4).

The majority of patients died within 24 hours, and 62.68% of deaths occurred during shifts, outside of business hours.

Medical causes were suspected in 77.1% of cases, they were surgical in 10.5% of cases, and the two causes were intertwined in 12,4% of cases.

Infectious diseases were the most common, cited in 66.4% of patients who died from medical conditions.

Sepsis accounted for 26.1% of the infectious diseases cited. Nearly a quarter of the deceased patients, or 21.5%, had severe malaria, and pulmonary bacillosis was the most common pulmonary disease, observed at a frequency of 14. of the infec-

tions observed.

Figure 4. Time of occurrence for the death.

Hemorrhagic stroke was the most frequently cited non-infectious neurological disease, at 52.9%.

Acute pulmonary edema was the most common cardiovascular disease.

Surgical diseases accounted for 10.5% of the cited causes of death. Traumatic conditions were the most common, with a proportion of 72.7% of the cases observed. The most common diagnosis was severe head trauma.

3.6. Treatment

The average time to treatment was 1 hour (range 0 to 6 hours) for both hospitals. For some patients, the time to medication administration differed from the time to treatment. The average treatment time was 1 hour 30 minutes, with a range of 30 minutes to 13 hours. The majority of patients in our series, 76.9% of them, received prior cardiopulmonary resuscitation (**Figure 5**).

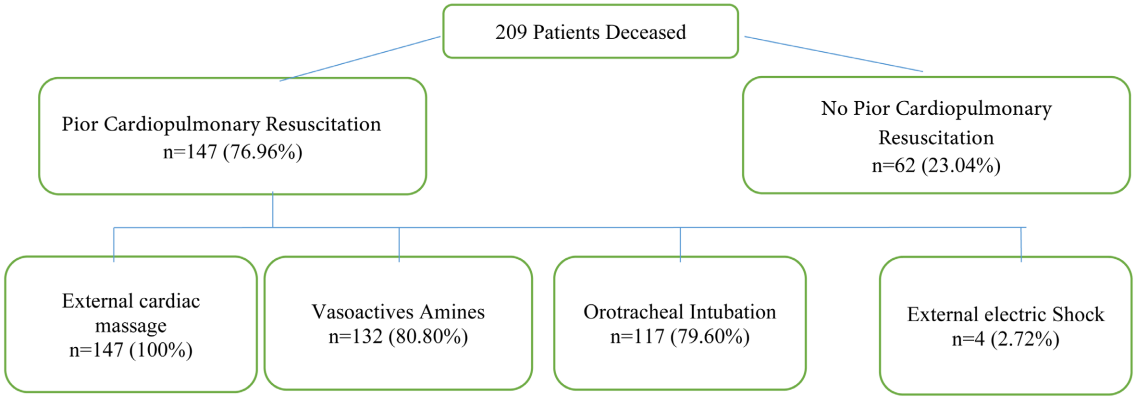

Figure 5. Distribution of patients according to the means of resuscitation chosen.

4. Discussion

The aim of our study was to update mortality data in emergency departments (EDs) by assessing the epidemiological profile of patients admitted within 72 hours to the EDs of the Omar Bongo Ondimba and Akanda Army Training Hospitals. This was done with the aim of proposing areas for improving the quality of healthcare services in Gabon, whose capital city is home to four major hospitals. This was a retrospective study conducted over a twelve-month period in the aforementioned departments.

4.1. Limitations

The primary limitation of this study is the retrospective nature of the first part of our study.

In addition, we noted information biases due to the presence of insufficiently completed and poorly archived files, the loss of certain examination reports and their results, and the failure of administrative and nursing staff to mention the arrival time of each patient and other useful data from our collection in the medical files. Indeed, the relevance of certain data was assessed differently depending on the individual, especially in the emergency context, which resulted in numerous missing values. The files excluded for these reasons are fortunately numerically insignificant, allowing data analysis.

4.2. General Characteristics of the Study Population

In total, there were 20,339 emergency room visits during the twelve months of the study, including a significant proportion of patients who arrived deceased, representing 45.1% of the deaths observed and included in the annual mortality statistics for our study sites. Although not part of our objectives, this observation caught our attention. It brings us back to the issue of under-dynamic prehospital medicine in our country, which nevertheless has several dedicated bodies such as the Emergency Medical Services of the Armies (EMURA), the Emergency Mobile Services (SAMU), the Emergency Mobile Services of the National Social Security Fund (EMUR-NSSF), etc… However, the population seems not to have integrated this concept into their routines due to a lack of awareness and the costs, which some consider burdensome. More work should be done by the relevant authorities through information campaigns on their presence and usefulness. The establishment of a better regulatory system and coverage by the national health insurance could be an area of improvement that would allow for greater use by the population. Furthermore, these figures could be a consequence of the delay in consulting the population. Nevertheless, the specific mortality rate of patients admitted to the emergency department within seventy-two hours was estimated at 1.03% of annual admissions. This proportion is high compared to the results reported by Guartite *et al.* in Morocco in 2002 and that of Bérard *et al.* in France in 2018, which were 0.65% and 0.19%, respectively [2] [5]. However, it is lower than those reported in the DRC and

Benin, 1.4% and 11.3% in 2014 [4] [7].

The incidence of deaths varied between the two facilities. It was lower at ATHA, at 0.80%, than at ATHOBO, at 1.15%. This difference could be explained by the fact that ATHA is a younger facility, in transition, with a lower attendance than ATHOBO and a larger staff, making the caregiver-to-patient ratio more equitable.

4.3. Socio-Demographic Profile of Patients Who Died in the Emergency Department within Seventy-Two Hours

The majority, or 58.3%, of the patients in our series were male, with a male/female sex ratio of 1.4, a distribution inversely proportional to the source population in which females represented 54.9%. Referring to the literature, we also observe a predominance of males among deceased patients according to studies conducted in the Democratic Republic of Congo and Morocco where the respective proportions were 54.1% and 65% [5] [7]. This could be explained by the fact that men have more risky health behaviors, whether it be therapeutic adherence, smoking, drug use, alcoholism, or other risk-taking in daily life.

The vast majority of patients were over 25 years old. This observation is consistent with what is often reported in the literature in Africa. The average ages are similar, describing essentially young subjects with average ages of 40 years in the DRC, 42 ± 2.8 years in Cameroon, 46 ± 21 years in Benin, and 49 ± 17 years in Morocco [3]-[5] [7]. While in some Western countries, patients who died in the emergency department, particularly in France, were older with an average age of 81 years [2].

This difference highlights the importance of premature and avoidable mortality in our countries where life expectancy remains lower than that of Western countries.

More work seems necessary in terms of the prevention of cardiovascular risk factors, and vaccination coverage for medical pathologies. More effort is also made in terms of road safety prevention and workplace safety for traumatic and surgical pathologies.

Furthermore, male patients were on average younger (45.80 ± 23.66 years) than female patients (47.60 ± 27.06 years).

This consistent pattern corroborates the hypothesis put forward above regarding men's health hygiene, in addition to the fact that women have protective biological advantages linked to their hormones. Indeed, estrogens are thought to play a protective role against cardiovascular diseases. Women also have a better immune system that ages less quickly than men's [8].

As shown by data on patients' marital status, 68.2% were single. Only 17% of patients were legally married. According to Bengono *et al.* in Cameroon, the majority of deceased patients were married, with a lower proportion of 53.2% [3]. However, our figures may not accurately reflect the distribution of marital status in the study population due to significant missing data regarding this variable.

Patients' social status was estimated to be average for 59.1% of them, and more than a third of patients, or 76.3%, had health insurance. The importance of the National Health Insurance Fund is implicit in the ease with which registered patients can attend consultations. Furthermore, there appears to be an obvious difficulty for uninsured patients who present themselves to the hospital as a last resort, after having long anticipated the costs of their care.

4.4. History

High blood pressure (HBP) and immunosuppression due to HIV retrovirus were the most frequently reported medical histories, with respective proportions of 23.5% and 17.8%. Several patients could have two or three medical histories. This was also the case in the series by Mbengono *et al.*, who described 53.2% of patients who died in the emergency department with one or more medical histories and a higher proportion, *i.e.* 46% of patients living with HIV in the emergency department [3]. In France, cardiovascular history concerned 72% of patients who died in the emergency department [2]. Hypertension is a real public health problem in the sub-Saharan region and constitutes an important area of fight for the reduction of morbidity and mortality in young people. Furthermore, our observations noted a significant distribution of deceased patients with a history of retrovirosis in ATHA compared to ATHOBO. On the one hand, this observation could be a prodrome of a dysfunction in the system of care of patients living with HIV in our country. Indeed, the latter presented to the ED in a state of advanced immunodepression, argued by the diagnosed opportunistic diseases. This, in a country where the fight against HIV occupies an important place in terms of public health priority with the existence of numerous outpatient treatment centers and a subsidized national program for the free distribution of antiretroviral treatment. At a time of treatment for all patients living with HIV and the objectives of undetectable viral load according to the latest WHO recommendations for the management of this condition, where are we in Gabon? Gabon is still subject to sporadic interruptions in the delivery of antiretroviral drugs, and situations of denial, religious or esoteric beliefs leading many immunocompromised patients to discontinue, sometimes permanently.

Furthermore, these patients ended up in a healthcare facility, the ATHA, which does not have an infectious disease specialist, and therefore cannot offer them the appropriate care pathway for their condition and ongoing care. The fact that it appears to be one of the main comorbidity factors implies that efforts must be redoubled for the screening and optimization of the management of this pathology. The Gabonese Ministry of Public Health should redouble its efforts to bring its AIDS control program into line with the most recent WHO objectives.

Furthermore, only 1% of patients in the series by Bérard *et al.* had no particular medical history, compared to 10.9% in our study [2]. This suggests that the study population was composed of individuals who were regularly monitored and who

paid attention to their health. While the population in our series, although younger, is often surprised by pathologies, in this case at advanced stages that are life-threatening.

4.5. Mode of Admission to the Emergency Department

The majority of patients, 81.9%, were returning from home. These figures were comparable to those of the study by Mbutiwi *et al.*, in which 82.4% of patients also came from home [7].

A lower proportion was reported by Bérard *et al.*, at 67%. In their series, 26% of the remaining patients came from a nursing home, 7% from another hospital or clinic, and they had received medical assistance from the emergency department or the Emergency Mobile Service [2]. In our study, patients returning from home consulted on their own initiative or at the suggestion of a relative.

Inter-hospital transfers only affected 13.1% of patients. The observations made by Mbutiwi *et al.* are consistent with ours with 17.6% of transfers from other health structures [7]. However, only 7.4%, or two of them, were noted as organized. The rest of the transferred patients, whose condition was deemed worrying enough not to be managed as outpatients, were not expected in a reception structure. The logic of transferring a patient is that of a progression of care [9]. It is a question of bringing the patient or the injured person closer to the center with a technical platform and an environment adapted to his case. Ethically, this process involves a joint decision taken between the doctor of the sending unit and the doctor of the receiving unit who is committed to ensuring continuity of care. The transfer between structures seems less well regulated because for fear of being refused, certain health structures, especially private ones, make the dangerous choice of transferring patients, sometimes unstable, without warning the downstream structure, preventing the anticipation of his care and therefore being able to revise the patient's prognosis.As suggested by Zoumenou *et al.*, to reduce mortality, the referral of patients in situations of vital distress should be improved in our country, for the benefit of the patient [4].

The main means of transport were taxis or personal vehicles for 94.6% of admissions. This is despite primary transport for road traffic accidents and secondary transport for inter-hospital transfers. The reasons for not using medical transport are their costs considered too high, the fact that they are not covered by health insurance and response times considered too long for some. In Benin, the main means of transport to the emergency department were private non-medical ambulances (36.5%), civilian vehicles (33.4%), non-medical ambulances of the fire brigade (14.1%), motorcycles (12.1%) and SAMU (3.9%) [4]. In France, Bérard *et al.* reported 88% of transport by non-medical ambulance, 10% by medical ambulance and 3% by personal means. The frequency of the main means of transport described in our series and the previously mentioned proportion of patients ar-

riving deceased could justify the relevance of the work underway in our country on the establishment of medical regulation and that discussions be conducted to boost pre-hospital medicine in Gabon.

Regarding the reasons for consultation, they were dominated by altered state of consciousness (29.5%), altered general condition (18.5%), and respiratory distress (15.5%). The same warning signs are reported in variously varied proportions in the literature. In France, Bérard *et al.* described 54% of respiratory disorders, 41% of altered consciousness, and 19% of altered general condition, while in Benin, patients who died in emergency rooms generally came for respiratory, neurological, global symptoms (altered general condition), or pain [2].

In Cameroon, altered consciousness accounted for 68.1% of the reasons for emergency room admissions [3].

4.6. Physical Signs

Regarding vital signs upon admission, not all of them were systematically recorded and noted in patients' medical records. Some were considered less relevant depending on the situation the practitioner was faced with upon admission. This stage of the patient's physical examination consists of collecting observations likely to contribute to understanding the person's state of health and assessing the main parameters used to monitor their clinical progress [10]. Indeed, they are the first indicators of a patient's state of health.

When they prove abnormal, vital signs constitute the first level of alert that allows the medical profession to direct their research with a view to making an accurate and precise diagnosis and properly organizing care. Systematizing the recording of vital signs, or even developing prognostic or severity scores such as the ASAP or Quick SOFA score, upon admission by the admissions and referral nurse, would be an option worth exploring. Applying this procedure would allow for more efficient triage of admitted patients, and by identifying those most at risk of secondary decompensation, optimize their care and reduce the risk of death.

In our series, when vital signs were reported, the majority of cases had a febrile patient with tachycardic blood pressure, polypnea with saturation ≥ 90% on room air, and high capillary blood glucose. Mbengono *et al.* in Cameroon described four out of ten patients with tachycardic symptoms, nine out of ten with tachypneic symptoms [3]. In contrast, systolic or diastolic hypertension and fever were less common.

The symptoms presented by patients who died in the emergency department could be summarized into three main distress syndromes: neurological, respiratory, and cardiocirculatory. The majority of patients presented signs of neurological distress (66.4%), and the most common physical sign was altered state of consciousness, with a proportion of 65.97%. A lower frequency of neurological failure was observed in the series by Mbutiwi *et al.* [7]. The average Glasgow Coma Score was 9.73 ± 3.1. This average is close to that reported by Zoumenou *et al.*, *i.e.*, 9.2

± 4.4 [4].

4.7. Contributions of Additional Testing

Regarding laboratory assessment, except in extreme emergency situations where patients died within an hour of arrival despite prior resuscitation, complete blood counts were routinely requested for all patients admitted to the emergency department. Other emergency laboratory tests were requested based on the clinical context. However, due to poor archiving and intermittent difficulties with the medical information processing software , all results could not be collected for our study.

In Cameroon, the biological tests performed and available within 24 hours after their prescription in the emergency room were blood count (30.9%), urea and creatinine dosage (34.8%) and blood ionogram (30%) [3]. Mbutiwi *et al.* described biologically, anemia in two-thirds of the patients in their study, a positive thick blood smear in half of them, and one-third had hyperleukocytosis [7].

4.8. Occurrence of Death

The average length of stay before death was 19.1 ± hours, with 73.2% of deaths occurring within 24 hours. Our observations are consistent with those of Guartite *et al.* in Morocco, where the average length of stay was 15 - 16 hours, with 70% of deaths occurring within 24 hours. Zoumenou *et al.* reported a higher average of 57 ± 21 hours, with 42.5% of deaths occurring within the first 24 hours.

Nearly two-thirds of deaths, or 62.6%, occurred during on-call hours. A Malian study also reported a high frequency of deaths during on-call hours, implicating the lack of proper care during these hours [11]. Indeed, in addition to a lack of vigilance and understaffing compared to admitted patients, there is also the flow of consultations, which requires triaging true and relative emergencies. This makes it difficult to monitor admitted patients requiring special attention.

4.9. Diagnosis

During our study, in most cases, patients who died in the emergency department had multiple pathologies. Infectious diseases therefore continue to be one of the leading causes of premature mortality according to our series, despite the 2014 WHO global health statistics, which reported a significant shift in premature mortality from infectious diseases to noncommunicable diseases and injuries over the last decade [12]. The medical causes of death found in our study are among the top 20 causes of death described by the WHO in 2012, and reductions in the number of deaths from infectious diseases among adults have contributed significantly to the increase in life expectancy in low-income countries.

In Cameroon, medical conditions were responsible for 84% of deaths. Severe anemia was the most common clinical presentation in emergency rooms, accounting for 19.1% of cases [3].

In Morocco, Guartite *et al.* found medical causes of death in 58% of cases, mainly strokes (14%) and poisonings (11%) [5]. For Zoumenou *et al.* in Benin, the most common medical causes of death were strokes (27.8%), acute complications of diabetes (7.2%), chronic kidney failure (6.6%), and opportunistic infections of AIDS (6.2%) [3].

The distribution of infectious diseases, highlighted a preponderance of infections, pneumonia, malaria, and meningoencephalitis. In the DRC, the documented infectious diseases were malaria (42.8%), urinary tract infections (9.4%), gastroenteritis (8.7%), pneumonia (7.5%), meningitis and encephalitis (non-malarial) (2.9%), and sepsis (2.7%) [7].

The prevalence of infectious diseases could be explained primarily by self-medication, which is often inappropriate and responsible for the emergence of increasingly widespread resistance to antibiotics. Furthermore, delayed consultation for various reasons, especially economic ones, could also contribute to this state of affairs. Furthermore, we could also question the use of preventive measures to combat these infections through vaccines, the promotion of hygiene measures, especially for fecal-borne diseases, the isolation and containment of contagious diseases, access to care, and the fight against various infectious vectors in our daily medical practice. In terms of primary health care and public health policy, our country would probably benefit from redoubling its efforts in the prevention and treatment of conditions that are among the causes of avoidable death.

The distribution of infectious diseases, raises questions regarding the frequency of diseases that could be prevented by preventive medicine, as well as the frequency of opportunistic diseases. This could corroborate the hypothesis of a problem with the efficiency of the care system for immunocompromised patients in our country, as previously mentioned.

Regarding the frequency of strokes, Kouna and *al.* already designated them as a public health problem in Gabon in 2007, and mentioned the seriousness of this condition due to its mortality [13]. In light of our findings, the implementation of a codified protocol and the strengthening of capacity to manage this condition, also in terms of human resources, structures, and technical facilities, is becoming a public health priority.

Death was due to a surgical cause for 10.5% of the patients in our series. Traumatic conditions accounted for 72.7% of these. Severe head injuries (SHI) were the most common diagnosis of traumatic causes, easily justified by a lack of neurosurgical care in our facilities. Guartite *et al.* described proportions of 24% for traumatic causes of death and 5.2% for surgical pathologies [5]. In Benin, severe trauma accounted for 15.5% of causes of death in emergency departments. In Cameroon, surgical pathologies were responsible for 16% of deaths in emergency departments. The management of patients with GCT is essential in the initial phase because it will determine their neurological outcome and the onset of secondary ischemic cerebral lesions, even in the pre-

hospital phase. Rapid referral of patients with GCT to specialized neurointensive care centers improves their neurological prognosis [14]. In Gabon, the only neurovascular unit is located in another hospital in the capital, the Libreville University Hospital.

4.10. Treatment

The average time to treatment was approximately 1 hour. In the Democratic Republic of Congo, the average time to treatment was 2 hours and 5 minutes [7]. However, due to the lack of triage at the emergency department (ED) reception, some patients have to wait a varying amount of time before being treated.

Within emergency facilities themselves, the organization of flow management is essential and is based on several principles: nursing triage at reception and escalation of treatment after triage; the establishment of a rapid care pathway; adapting staffing levels to the flow; and ensuring the appropriateness of the diagnostic approach within the ED, with a reasoned and controlled request for additional biological and radiological examinations and specialist opinions [10].

For some patients, the time taken to administer medication differed from the time taken to receive treatment. The average treatment time was approximately 1 hour 30 minutes, with a range from 30 minutes to 13 hours. In Cameroon, 7.3% of patients who died in the emergency department received care within 2 - 4 hours. This is explained by the late arrival of medications due to the patient's poverty, rapidly depleting supplies within the hospital, the lack of social security coverage for some, and the absence or scarcity of emergency kits.

The majority of patients in our series received prior cardiopulmonary resuscitation (CPR), *i.e.*, 76.96%. In Benin, Zouménou *et al.* described resuscitation procedures performed before death, such as airway clearance maneuvers (88.2%), oxygen therapy (86.5%), external cardiac massage (82.8%), and defibrillation (1%). Tracheal intubation was performed in 69% of cases and mechanical ventilation was initiated in 56.5% of cases. In our series, 79.60% of patients had been intubated.

5. Conclusions

All emergency departments (EDs) are affected by death. Our study estimated a mortality rate of 1.03% for patients admitted within 72 hours to the emergency departments (EDs) of the HIAs.

It primarily described premature mortality, therefore among young patients, particularly males. The main reasons for admission were altered state of consciousness, and neurological distress, which constituted the main clinical presentations upon admission. The causes of death were predominantly medical etiologies, primarily infectious and neurovascular.

These findings are essential to us in the current organization of our profession,

and numerous adaptations will be necessary to improve the quality of our care with several levels of intervention. From patients to politicians, measures must be taken in synergy to achieve this goal: improving the quality of life of Gabonese people and reducing avoidable mortality.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] OMS (2019) Recensement des décès et des causes de décès: Une évaluation de l'état des données relatives aux causes de décès dans le monde. OMS. https://www.who.int/fr/news/item/09-12-2020-who-reveals-leading-causes-of-death-and-disability-worldwide-2000-2019

[2] Bérard, L., Zeller, J. and Schaeffer, M. (2018) Décès et limitations thérapeutiques aux urgences: Étude rétrospective des pratiques dans un centre hospitalier français pendant quatre ans. *Annales Françaises de Médecine D' urgence*, **8**, 223-230. https://doi.org/10.3166/afmu-2018-0064

[3] Mbengono, J.A.M., Bengono, R.B., Nkodo, J.M., Essame, T.C., Amengle, A.L. and Minkande, J.Z. (2015) Etiologies des décès dans les services d'urgences et de réanimation dans deux hôpitaux de la ville de Yaoundé. *Health Sciences and Disease*, **16**, 12-15.

[4] Zoumenou, E., Lokossou, T.C., Assouto, P., Soton, F. and Chobli, M.K. (2014) Analyse critique de la mortalité dans un service d'accueil des urgences en Afrique subsaharienne: Épidémiologie et perspectives de réduction. *Annales Françaises d'Anesthésie et de Réanimation*, **33**, A343. https://doi.org/10.1016/j.annfar.2014.07.583

[5] Guartite, A., Khaleq, K., Rabai, O. and Louardi, H. (2016) Analyse critique de la mortalité aux urgences. *Annales Françaises d'Anesthésie et de Réanimation*, No. 2, 3 p.

[6] OMS (2019) Gabon WHO. https://data.who.int/countries/266

[7] Mbutiwi Ikwa Ndol, F., Dramaix-Wilmet, M., Meert, P., Lepira Bompeka, F., Nseka Mangani, N., Malengreau, M., *et al.* (2014) Facteurs prédictifs de la mortalité des patients admis aux urgences médicales des cliniques universitaires de Kinshasa. *Revue d'Épidémiologie et de Santé Publique*, **62**, 15-25. https://doi.org/10.1016/j.respe.2013.11.071

[8] Hirokawa, K., Utsuyama, M., Hayashi, Y., Kitagawa, M., Makinodan, T. and Fulop, T. (2013) Slower Immune System Aging in Women versus Men in the Japanese Population. *Immunity & Ageing*, **10**, Article No. 19. https://doi.org/10.1186/1742-4933-10-19

[9] Vig, V., Puget, A. and Auffray, J.P. (2008) Régulation des transferts interhospitaliers. *Annales Françaises d'Anesthésie et de Réanimation*, **10**, 45-48.

[10] Desmettre, T., Baron, A.F., Capellier, G. and Tazarourte, K. (2013) L'infirmière organisatrice de l'accueil (IOA): Rôle et fonctions. *Réanimation*, **22**, 610-615. https://doi.org/10.1007/s13546-013-0727-2

[11] Bah, A.O., Kaba, M.L., Diallo, M.B., Kake, A., Balde, M.C., Keita, K., *et al.* (2006) Morbidité et mortalité hospitalières dans le service de néphrologie de l'hôpital national Donka. *Mali Medical*, **21**, 42.

[12] WHO_HIS_HSI_14.1_fre.pdf.

https://apps.who.int/iris/bitstream/handle/10665/112816/WHO_HIS_HSI_14.1_fre.pdf;jsessionid=FDD350DD371FDB20E0DA1027C6CBE45C?sequence=1

[13] Ndouongo, P.K., Milogo, A. and Siéméfo Kamgang, F.P. (2002) Kamgang aspects épidémiologiques et évolutifs des accidents vasculaires au centre hospitalier de Libreville (Gabon). https://www.researchgate.net/publication/288624131

[14] Lapierre, A., Gauvin-Lepage, J. and Lefebvre, H. (2017) La collaboration interprofessionnelle lors de la prise en charge d'un polytraumatisé aux urgences: Une revue de la littérature. *Recherche en Soins Infirmiers*, **129**, 73-88. https://doi.org/10.3917/rsi.129.0073