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Research Article

Acute Dyspnea in the Emergency Medical Service in a Country with Limited Resources

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ABSTRACT

Background: The aim of this study was to identify the poor prognostic factors associated with acute dyspnea in medical emergencies.
Methods: A retrospective descriptive and analytical study conducted over a 12-month period (January 2022 to December 2022) in the medical emergency department of the Centre Hospitalier Universitaire de Treichville. All patients admitted to the medical emergency department for dyspnea during the study period were included.
Results: Prevalence was 7%. The mean age was 49 years, with a standard deviation of 16 years. The sex ratio was 1.08. Comorbidities were dominated by arterial hypertension (30.5%) and diabetes (14.7%). The majority of patients had NYHA stage 4 dyspnea (40%). Vital signs revealed arterial hypotension (45.5%), tachycardia (43.75%), tachypnea (66.9%), desaturation (52.2%), and disturbed consciousness (28.3%). The etiological diagnosis was dominated by bacterial pneumonia (35%), covid-19 pneumonia (22.4%), heart failure (21.7%), and pulmonary tuberculosis (13%). The mean time to therapeutic management was 3 hours and 23 minutes. Oxygen therapy was used in all patients. The average length of stay in the medical emergency department was 4 days ± 2 days. Mortality was 29% and was statistically associated with the existence of comorbidities (heart disease, arterial hypertension, tuberculosis, and diabetes), tachycardia (HR greater than 120 bpm), arterial hypotension (MAP less than 60 mmhg), tachypnea (respiratory rate greater than 30 cycles per minute), saturation less than 80%, and impaired consciousness (Glasgow score less than 14).
Conclusion: Dyspnea is responsible for a significant mortality rate. Several poor prognostic factors have been identified. Management of these factors could reduce mortality.

Introduction

For many patients, an emergency department (ED) is the first port of call for healthcare services. Its role is to welcome and care for anyone presenting in an emergency situation, whether their condition is truly urgent from a medical point of view or is perceived as such [1]. Acute dyspnea is one of the main symptoms encountered in medical emergencies [2].

According to the World Health Organization, dyspnoea accounts for 55% of emergency department consultations [3]. In the West, dyspnoea accounts for 8% of calls to emergency services [4] and 4 to 55.8% of emergency department consultations [5-7]. It is associated with a

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high in-hospital mortality rate, ranging from 5 to 15% depending on the series [8-9].

In Africa, the prevalence of dyspnea in emergency departments ranges from 2.9% to 36.6%, depending on the series [10-11]. In Côte d'Ivoire, in the medical emergency department of the CHU de Bouaké, acute dyspnea was estimated at 9.07% [12].

All these data were collected before the Covid-19 pandemic. After the Covid-19 pandemic, no work was carried out on dyspnea in medical emergencies at Treichville University Hospital. The aim of this study was therefore to identify the poor prognostic factors of acute dyspnoea in medical emergencies, after describing the clinical, evolutionary, and therapeutic characteristics.

Methods

Study framework

The study took place in the medical emergency departments of the Centre Hospitalier et Universitaire de Treichville.

Type of study

This was a retrospective study with descriptive and analytical aims.

Study period

The study ran for 12 months (January 2022 to December 2022).

Population

Patients admitted to the medical emergency department of the Centre Hospitalier Universitaire de Treichville.

- **Inclusion criteria**

All patients admitted to the emergency department with dyspnea during the study period were included.

- **Non-inclusion criteria**

Patients whose dyspnea was of metabolic or renal origin were not included in the study.

Data collection

Data were obtained from patient records, hospitalization registers, and patient files from the medical emergency department of the Centre Hospitalier Universitaire de Treichville.

Inquiry form

The information was then recorded on a pre-established individual survey form, which included several types of variables.

Variables

- **Epidemiological**: Age, gender, patient origin, mode of evacuation
- **Clinical and paraclinical**: time to consultation, comorbidities, reason for admission, clinical symptomatology, paraclinical examinations, etiological diagnosis.
- **Therapeutic**: Treatments received
- **Evolving**: length of stay, changes during hospitalization.

Data entry and analysis

Data entry and analysis of results were performed using SPSS. The Fisher test was used for statistical analysis at the 5% alpha threshold.

Translating results

Results are expressed as percentages for qualitative variables and as mean ± for quantitative variables. They are presented in table.

Ethical considerations

The study was conducted after obtaining the necessary institutional authorisations, in strict compliance with anonymity and confidentiality requirements for the data collected.

Results

Epidemiological characteristics

During the study period, 4036 patients were admitted to the medical emergency department, including 272 cases of dyspnea, i.e., a prevalence of 7%.

The mean age was 49 years, with a standard deviation of 16 years. The most represented age group was [45-60 years] (30%).

The study population comprised 141 men. The sex ratio was 1.08. The majority of patients had a low socio-economic level (70.22%).

Patients came respectively from home (65.07%), public health facilities (23.16%), and private health facilities (11.76%).

Transport was medicalized (96.32%) and non-medicalized (3.67%).

Clinical features

The average consultation time was 77.45 ± 5.2 hours. Comorbidities were dominated by arterial hypertension (30.5%) and diabetes (14.7%). In 28.6% of cases, patients were smokers. On admission, the majority of patients had NYHA stage 4 dyspnea (40%). Other functional signs associated with dyspnea were cough (64%), chest pain (53%), sputum (18%), and hemoptysis (2.2%).

Fever (68%), asthenia (60%), and weight loss (47%) were the main general signs found on patient admission. Vital signs revealed arterial hypotension (45.5%), tachycardia (43.75%), tachypnea (66.9%), desaturation (52.2%), and disturbed consciousness (28.3%). Physical examination revealed edema of the lower limbs (35%),

digital hippocratism (13%), and pulmonary condensation syndrome in 166 patients (61%). Pleural puncture was performed in 22 patients (8%).

Paraclinical features

Biologically, biological inflammatory syndrome was observed in 170 patients (62.5%). Genexpert was performed on the sputum of all patients. In 13% of cases, Genexpert was positive. Arterial gasometry was performed in 36 patients (13.23%). In terms of imaging, the investigations performed were the thoracic radiography (44.48%), thoracic computed tomography (9.9%), and cardiac echodoppler (3.67%). The etiological diagnosis was dominated by bacterial pneumonia (35%), covid-19 pneumonia (22.4%), heart failure (21.7%), and pulmonary tuberculosis (13%).

Therapeutic features

The mean time to therapeutic management was 3 hours and 23 minutes. Oxygen therapy was used in all patients. The different means of administration were goggles (32.35%), medium concentration masks (40.07%), and high concentration masks (27.68%). In 30% of cases, orotracheal intubation was performed. Of the 85 patients requiring blood transfusion, only 35 (41.17%) could be transfused. The various therapeutic modalities were probabilistic antibiotic therapy (45.22%), diuretic treatment (22.05%), and aerosol therapy (17.27%)

Evolving features

The average length of stay in the medical emergency department was 4 days ± 2 days, with a median of 3 days between 1 and 9 days. On discharge, 107 patients (39%) were referred home, and 81 (30%) to hospital. Five patients were discharged against medical advice (1.8%). Mortality was 29% and was statistically associated with the existence of comorbidities (< heart disease, arterial hypertension, tuberculosis, and diabetes), tachycardia (heart rate above 120 bpm), arterial hypotension (MAP below 60 mmhg), tachypnea (respiratory rate above 30 cycles per minute), saturation below 80%, and impaired consciousness (Glasgow score below 14) (Table 1).

Discussion

Among 4036 patients admitted to the emergency department, 272 cases of dyspnea were recorded, representing a prevalence of 7%. This is considerably higher than the 3% prevalence obtained in a Swiss series [13], but it is close to that found by several authors, both African and Western, who found a prevalence ranging from 5% to 9.07% [9,12,14].

The average age was 49, with a standard deviation of 16 years. The most represented age group was 45-60 (30%). Our results are identical to those obtained in studies from Benin and Côte d'Ivoire [10,12].

In Belgium, Pfendler M's study of the epidemiology of patients presenting to emergency departments with dyspnoea found an average age of 62, with a quarter of patients aged over 80 [15].

These results only reflect the population living in these different regions of the world. Male predominance was observed in both our study and that of Mockel [14]. In their respective studies, Pfendler M and Laribi recorded a female predominance [8-15]. Patients came respectively from home (65.07%), public health facilities (23.16%), and private health facilities (11.76%). Transport was medicalized (96.32%) and non-medicalized (3.67%). A study carried

out in Belgium showed that the majority of patients (74%) came to the emergency department by their own means of transport, while 26% were admitted by ambulance. Of the 99 patients who presented by their own means of transport, only 12 were referred by an attending physician [15]. This high percentage of non-medicalized transport in our study has been reported by several African authors and can be explained by the high cost of medicalized transport [16-17].

In our study, the average consultation time was 77.45 ± 5.2 hours. In Congo, the average delay was 5 days [18]. Lack of financial means, ignorance, and the use of traditional medicines by our populations could explain this long delay in consultation at the emergency medical service. In sub-Saharan Africa,

Recourse to quality health care services only occurs when both modern and traditional self-medication fail [19].

Comorbidities were dominated by arterial hypertension (30.5%), diabetes (14.7%), and tuberculosis (11%). In 28.6% of cases, patients were smokers. In the Bouake medical emergency department in Côte d'Ivoire, Achi V recorded HIV infection (28.28%), smoking (21.46%), asthma (17.42%), and sequelae of tuberculosis (4.8%) as comorbidities [12]. In Europe and Belgium, the main comorbidities were arterial hypertension (44%), smoking (36%), chronic obstructive pulmonary disease (COPD) (34%), and heart failure (29%) [8-15]. A sedentary lifestyle, poor diet, and stress are all factors that would explain the predominance of hypertensive pathology as a major antecedent in our populations.

The majority of patients arrived at the emergency department at NYHA stage IV in 41% of cases. Our results differ from those of J.L. Januzzi et al., who reported a predominance of NYHA stage 3 patients [20]. In our study, many patients consulted us at this advanced dyspnea stage due to lack of financial means and the absence of effective universal health insurance, but also because of the use of traditional African pharmacopoeia, which is the first recourse of patients in our context. Cough and fever were the most common complaints, with 64% and 68% of patients, respectively. These figures were higher than those of Kombila Ud. et al. [21]. This

difference in results may be due to the difference in the study population. Vital signs revealed arterial hypotension (45.5%), tachycardia (43.7%), tachypnea (66.9%), desaturation (52.2%), and impaired consciousness (28.3%). In a Belgian series, an abnormality of vital signs, reflecting the severity of the clinical situation, was regularly mentioned: arterial hypotension < 100 mmHg in 3% of cases, tachycardia > 120 bpm in 7% of cases, tachypnea > 30 cycles per minute (cpm) in 7% of cases, desaturation < 90% in 17% of cases, and confusion in 6% of cases [15]. Our study population showed greater vital sign abnormalities than the Belgian population. This may be due to a number of factors, such as the impoverishment of our populations, lack of health insurance, and long consultation times.

Physical examination revealed edema of the lower limbs (35%), digital hippocratism (13%), and pulmonary condensation syndrome in 166 patients (61%). Pleural puncture was performed in 22 patients (8%). Biologically, blood counts were performed in all patients. A biological inflammatory syndrome was identified in 170 patients (62.5%). Genexpert was performed on the sputum of all patients. In 13% of cases, Genexpert was positive. PCR testing for covid-19 was carried out in 98 patients, 61 of whom were covid-19 positive. Arterial blood gas analysis was performed in 36 patients (13.23%). No biomarkers of dyspnea were measured in our study or in that of Codjo [10]. This is not in line with the 2016 recommendations of the European Society of Cardiology, which advise dosing these biomarkers for any patient with acute dyspnea and signs of cardiac decompensation [22]. According to Codjo LH, lack of awareness of dyspnea management recommendations, reagent supply difficulties, and equipment maintenance problems in laboratories would also be factors reducing the rate of completion of complementary examinations [10].

In terms of imaging, the investigations carried out were thoracic radiography (44.48%), thoracic computed tomography (9.9%), and cardiac Doppler echocardiography (3.67%). In Benin, the rate of completion of assessments in ascending order was 50% for cardiac Doppler echography, 84.8% for thoracic radiography, and 86.7% for ECG [10].

Table 1- Prognostic factors for acute dyspnea in patients admitted to medical emergency

	Alive	**Deceased**	**P value**
Comorbidity			
Tuberculosis	20	10	0,024
Diabetes mellitus	37	13	0,011
Arterial Hypertension	53	30	0,00
HIV	0	9	0,284
Heart disease	16	6	0,04
Vital parameters			
Heart Rate			
≤ 120	133	20	0,000
>120	76	43	
Average Blood Pressure			
≤ 60	113	11	0,000
>60	80	62	
Pulsed Oxygen Saturation			
≤ 80	87	55	0,000
> 80	112	18	
Glasgow			
≤14	50	27	0,03
>14	149	46	
Breathing Frequency			
≤30	77	13	0,0000
>30	122	60	

These results show that ultrasonography is not widely used in current practice. The gradual introduction of ultrasonography in the emergency department has revolutionized practice. Its role in the diagnostic approach to dyspnea and common cardiopulmonary pathologies has been established, making ultrasonography an alternative to conventional imaging. Rapidly accessible, high-performance ultrasound is proving to be a major asset in the management of patients with dyspnea [2].

The etiological diagnosis was dominated by bacterial pneumonia (35%), covid-19 pneumonia (22.4%), heart failure (21.7%), and pulmonary tuberculosis (13%). In the medical emergency department of Bouaké University Hospital, the main etiological diagnoses were acute severe lung disease (33.58%), acute asthma attack (20.70%), pulmonary tuberculosis (20.20%), pleural

disease (14.89%), and decompensated COPD (14.14%) [12]. In Europe, data from the Euroderm study recorded lower respiratory tract infections (30.6%), acute cardiac decompensation (20.1%), COPD exacerbation (18.5%), and asthma (7.8%) as the main etiological diagnoses of dyspnea [8]. Whatever the study, lower respiratory tract infections remain the primary etiology of dyspnea in patients admitted to medical emergency departments.

The mean time to therapeutic management was 3 hours and 23 minutes. This long management time was observed in the Metogo study in Cameroon [23].

Other African series had obtained significantly shorter treatment times than ours [24-25]. In our context, the long queues at drug sales counters, the unavailability of certain products in hospital pharmacies, the lack of financial resources, and the limited number of emergency nurses could be the causes of this long response time.

Oxygen therapy was used in all patients. The different means of administration were goggles (32.35%), medium concentration masks (40.07%), and high concentration masks (27.68%). In 30% of cases, orotracheal intubation was performed. Therapeutic options included probabilistic antibiotic therapy (45.22%), diuretic treatment (22.05%), and aerosol therapy (17.27%).

For Pflender M, apart from the administration of oxygen, treatments administered pre-hospital by the SMUR medical-nursing team were infrequent: diuretics in 4 cases, vasodilators in 4 cases, NIV in 2 cases, and antibiotics in 1 case. Only one patient was intubated pre-hospital. In the same study, the most common treatments administered in the emergency department were oxygen (34% by goggles, 19% by mask), aerosolized beta-2 agonists (37%), antibiotics (29%), and diuretics (16%). NIV was used in 2% of cases [15].

The absence of pre-hospital management, use of non-invasive ventilation, and even optiflow could explain the high mortality in our work. Of 85 patients requiring blood transfusion, only 35 (41.17%) could be transfused. Our results were close to those of Bolandard [26]. Although it is true that not all our patients were able to benefit from a blood transfusion, it is important to note that this rate is significantly higher than that obtained by Kouakou [27]. These results can be explained by the change in policy for the collection and distribution of labile blood products in Côte d'Ivoire.

The average length of stay in the medical emergency department was 4 days ± 2 days, with a median of 3 days ranging from 1 to 9 days. This average length of stay was close to that of several African studies [28-29]. The lack of space in inpatient wards could explain the long stay of patients in medical emergencies in our series. On discharge, 107 patients (39%) were referred home, and 81 (30%) to hospital. Five patients were discharged against medical advice (1.8%). In the EURODEM study, patients discharged from the emergency department were referred to home (38.4%), hospital (53.1%), and intensive care unit (7.5%) [8].

Mortality was 29% and was statistically associated with the existence of comorbidities, age group (45 and 55 years), saturation below 80%, and disturbed consciousness($P<0.05$). Achi V's results in the medical emergency department of Bouaké University Hospital differed from ours. In his study, the immediate evolution was marked by an in-hospital mortality rate of 14.64% [12].

Western series have obtained significantly lower results than our African studies [8-15]. In the Belgian series, death did not occur in any of the emergency patients, but in-hospital mortality was 3% and 30-day mortality 5% [15]. The Euroderm study recorded an emergency department mortality of 1%, with a 30-day mortality of 6.5% [8]. Long consultation times, lack of pre-hospital care, absence of health insurance, and lack of suitable technical facilities could explain the high mortality observed in our series.

Conclusion

Dyspnea is a frequent reason for admission to the emergency department. It is responsible for a high mortality rate. Etiological research remains difficult in our resource-constrained countries. Several poor prognostic factors have been identified. Management of these would help reduce mortality.

Abbreviations

HR: Heart rate
ABP: Average blood pressure
BF: Breathing frequency
GS: Glasgow score
POS: Pulsed oxygen saturation
AH: Arterial hypertension
HIV: Human immunodeficiency virus

Author's Contributions

Each author contributed in the following areas: Design was carried out by Dr. ANGO PRIVAT. Data manipulation, collection, and statistical analyses were performed by Dr. Mobio N'kan Michael Paterne and Kouame Koffi Isidore. Discussion of the results and drafting of the text were carried out by Dr. Coulibaly KT and Kouassi Konan Jean. The document was revised by Bédié Yao Vianey. All authors approved the final, revised version of the manuscript.

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