

Therapeutic Routes of a Group of Heart Failure Patients Followed in a Cameroonian Urban Setting

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Abstract

Background: Heart failure (HF) is a rising global health problem. Patients with HF tend to use several therapies obtained via different treatment routes to relieve their symptoms. It is rampant in sub-Saharan Africa (SSA), leading to poor health-seeking behaviours and worsened HF health outcomes. We aimed to describe the different therapeutic routes of HF patients from the onset of their first symptom until treatment in a specialised cardiology centre to identify and rebuke harmful therapeutic routes. **Materials and Methods:** This was a cross-sectional study at the Yaoundé Central Hospital in Cameroon between December 2018 to July 2019. Patients were recruited by consecutive convenient sampling. Adult patients aged above 18 years with confirmed HF were included using the Framingham criteria. Variables relating to socio-demographic and clinical data and the health-seeking behaviours of HF patients were studied. **Results:** We included 132 patients with a mean age of 62.90 years (62.88% women). Very few patients (0.90%) followed an ideal route; 60.71% of subjects had a pseudo-ideal route, 19.64% accessed a specialised facility directly, and 21.42% used an erratic route. At the arrival time in a cardiology unit, 49.24% and 35.61% of our subjects were in NYHA stage III and IV HF compared to 15.15% for stage II. None of them was in Stage I. **Conclusion:** Most heart failure patients in Cameroon have resorted to non-specialised care, which worsens their clinical presentation. There is an urgent need for health education of HF patients in our context.

Keywords

Heart Failure, Therapeutic Care Route, Cameroon

1. Introduction

Heart failure (HF) is a large group of cardiovascular diseases, the leading cause of death worldwide [1]. It is distinguished by its frequency, mortality and poor prognosis [2]. It is a common disease that affects 1% to 2% of the adult population in developed countries [3]. This prevalence is steadily increasing with the ageing of the general population ages. It is worth mentioning that the diseases that lead to HF are often associated with ischemic heart disease and hypertension, which may cause HF [4].

In Africa, HF is the most common cause of hospitalisation in people suspected of cardiovascular disease [5]. In Cameroon, HF is a threaded public health issue due to its high prevalence rates, as evidenced by the in-hospital prevalence rates of acute HF found at 30% and 33.3%, respectively, in 2014 and 2015 Cardiology Department of Yaoundé Central Hospital [6]. Patients with HF tend to use several therapies to relieve their symptoms. Nowadays, their health-seeking behaviours, which include different therapeutic modalities, different places of care, and treatment care routes (hospitals and sites of complementary and alternative medicine), are multiple and give the patient a wide range of treatment options that are often harmful, not conventional. These different treatment care routes can be defined as the succession of care recourse from the beginning to the end of the disease. It comprises all the patient and his family's paths searching for health [7].

The factors that come into play in the choice of treatment are numerous. These include economic constraints, cultural beliefs, disease, and the health system's organisation and functioning [8]. According to the World Health Organization, a health system is a set of organisations, institutions, resources, and people whose main objective is improving health [9]. In Cameroon, it is organised around a pyramidal structure at three levels: the main level (decision-making), the intermediate level (regional), and the peripheral level (operational), each of which has administrative structures, health facilities and dialogue structures [10]. Public health facilities are classified into six categories, from general hospitals to integrated health centres. This system has certain limitations. In fact, in the organisation of African health services like those of Cameroon, the recovery of health costs is mainly provided by households [11]. In other words, the population (the patient and his family relatives) bears all health costs [11]. Also, some authors report unequal access to population care in health infrastructures. This inequality is due to insufficient first-referral health facilities and insufficient collaboration between first-category hospitals and lower-referral facilities [12]. Without, however, guaranteeing the quality of the services offered, accessibility to these healthcare infrastructures is some-

times synonymous with long waits, ineffective treatments and lack of medications [7]. Faced with these difficulties, patients' needs that cannot be met in certain hospitals are rising. We can observe a diversification of treatment courses that are sometimes very dangerous for patients' health [13]. Indeed, the treatment care routes do not always coincide with those predetermined by the health services. It is one of the significant determinants of the delay in access to specialized care due to the lengthening of treatment care routes. This delay is not without consequences on the evolution of a patient's state of health. It is responsible in some cases for diagnostic and therapeutic delays of pathologies, especially those of chronic evolution such as HF. Hence, the importance of knowing the therapeutic routes of patients. This study's main objective is to describe the therapeutic route of heart failure patients consulting in two central-level hospitals in Yaoundé, Cameroon.

2. Material and Methods

2.1. Study Design, Settings, and Participants

We conducted a prospective cross-sectional study between December 2018 and July 2019 (6 months) at two major cardiology and internal medicine departments of Yaoundé, Cameroon's political capital. These were the cardiology department of Yaoundé Central Hospital (YCH). The YCH, located in the district of Yaoundé 2, is a central-level hospital equipped with several units, including one of medicine and Specialties and an imaging department or additional examinations such as electrocardiography (ECG) echocardiography can be performed with a capacity of 650 beds in the whole hospital and 32 beds in the cardiology department. Using consecutive convenient sampling, we recruited all consenting patients aged ≥ 18 with HF confirmed based on Framingham criteria during the study period [14].

2.2. Data Collection Procedure and Studied Variables

After obtaining ethical clearance from the Institutional Review Board of the "Université des Montagnes" and research authorisation from the different the two hospitals included in the study: 1) we identified during outpatient consultations the patients meeting the various eligibility criteria; 2) then, we explained to the patients the purpose, importance and modalities of the conduct of the study and obtain their informed consent; 3) the participants were subjected to a questionnaire pretested and prevalidated, with the help of a language translator allowing information to be collected on socio-demographic data (age, sex, profession, level of education, ethnicity, religion, marital status), personal history (the circumstances of discovery of HF, initial symptoms such as dyspnoea, weight gain, oedema of the lower limbs, fatigue), consultation characteristics (the time elapsed between the onset of symptoms and the first medical consultation), the different types of care structure (district hospitals, regional hospitals, central hospitals and general hospitals), types of treatment (complementary and alterna-

tive medicine, auto-medication, religious, abstention from treatment), the patient's motivations for going to a facility, the interventions in each resort, the duration of treatment at each treatment station (the time spent in each treatment station from consultation to discharge), the time between each recourse, the clinical evolution (accentuation of clinical symptoms present at the start or reduction of clinical symptoms present at the beginning), diagnostic time (the time elapsed between the first medical consultation and the time when the diagnosis was made), total number of treatment options; 4) analysis of the data collected; 5) the interpretation of the results obtained.

2.3. Definitions of Operational Terms

The therapeutic route also called the treatment care route, is the path patients and their families take to search for health. The ideal route is a progressive referral approach between primary health care centres, usually run by state registered nurses and general practitioners, followed by secondary care hospitals like district hospitals and regional hospitals run by general practitioners and medical specialists and finally, tertiary care hospitals such as Central hospital or General Hospital. The pseudo-ideal route is one leap at most in the different stages of the health pyramid. The Erratic Route does not follow the various steps of the health pyramid. Recourse to care is a request for care addressed to people or institutions that do not always define themselves as caregivers. The consultation time is the halfway point between the onset of the initial symptoms and the first consultation in a care structure. The diagnostic delay is the time between the beginning of the initial signs and the HF diagnosis. Auto-medication is the use of drugs taken on the patient's initiative. The natural practice is an action that we carry in a banal way, either because we are used to it or because it takes away from us (our daily life or culture). The traditional healer or therapist is an individual who exercises an unconventional medical practice based on approaches presented as standard in some African communities. Non-specific treatment is patient management that has nothing to do with heart failure.

2.4. Statistical Analysis

Data entry and data analysis were done using EPI-INFO version 7.2 software. The results were expressed in terms of the mean \pm standard deviation for the quantitative variables and frequency and percentage for qualitative variables. The Student's t-test was used for normally distributed continuous variables. Nonparametric tests in case of constant variables not following a normal distribution law. P-values less than 5% were considered statistically significant.

2.5. Ethical Considerations

Ethics clearance was obtained from the Institutional Ethics Committee of the Université des Montagnes (Authorization No. 2019/153/UdM /PR /CIE), followed by securing research authorisations from the head management of each study hospital. The study was carried out following the fundamental principles

of medical research of the Declaration of Helsinki [4] and Good clinical practice principles.

3. Results

3.1. General Characteristics of Participants

Our population comprised 132 HF patients: 83 women (62.88%) and 49 men (37.12%). The average age of our patients was 62.90 years, with extremes ranging from 21 to 96 years. The most represented age group was 50 to 70 years old in 50.76% of cases. The majority level of education was primary (35.61%). Less than half (31.82%) had a fixed monthly income. Their average monthly income was 148,880 FCFA, equivalent to 270 US dollars, with a minimum of 30,000 FCFA, equivalent to 54 US dollars and a maximum of 450,000 FCFA, equal to 816 US dollars. The most common causes of HF were hypertension with 50%, dilated cardiomyopathy (15.15%), and valvular heart disease (12.12%). The most common comorbidity was chronic kidney disease (6.06%). The most common cardiovascular risk factors were high blood pressure 68.94%, obesity (18.94%), and diabetes (15.15%). NYHA Stage II (43.94%) and III dyspnea were the most represented (49.34%). See **Table 1**.

3.2. Therapy for Heart Failure

The most prescribed drug classes were diuretics (92.42%) and Angiotensin-converting enzyme inhibitors (ACEI)/Angiotensinogen II receptor antagonists (ARB II) (81.82%). The most prescribed molecules are respectively furosemide (93.44%) for the class of diuretics, nebivolol (52.54%) for the type of beta-blockers, perindopril (38.89%) for the class of ACEI/ARB II, digoxin (13.85%) for the digitalis class and spironolactone (14.06%) for the antialdosterone class. See **Table 2**.

3.3. The Different Stages of the Therapeutic Route and the Effects of Interventions Carried out on Patients

To describe HF patients' various steps in their different therapeutic routes, we excluded patients already followed for another cardiovascular pathology other than HF at YCH, *i.e.* 17 patients. The patients needed one (6.25%), two (62.25%), three (25.89%), and four resorted therapeutic routes (25.89%). Most of our patients (73.68%) resided in Yaoundé, and 70 (62.25%) resorted to two therapeutic routes. Regarding auto-medication, 48 patients (36.36%) resort to it. Modern self-medication (buying drugs from a pharmacy without a prescription by a treating staff) and complementary and alternative medication were found in 26 patients (57.78%) and 32 patients (72.73%), respectively. A statistically significant difference between the time elapsed between the first symptoms and the consultation of the first referral in patients residing in Yaoundé and those living far from Yaoundé with a p-value of 0.0033 (**Table 3**). Likewise, a statistically significant difference between the time elapsed between the first symptoms and the HF diagnosis in patients residing in Yaoundé and those living far from Yaoundé with a p-value of 0.003 (**Table 3**).

Table 1. General characteristics of the study population.

Variables	Categories	Frequency (n = 132)	Percentage (%)
Age	Less than 31 years	8	6.06
	31 - 50 years	17	12.88
	51 - 70 years	67	50.76
	71 - 90 years	35	26.52
	More than 90 years	5	3.79
Gender	Male	49	37.12
	Female	83	62.88
Level of education	Not formal	27	20.45
	Primary	47	35.61
	Secondary	29	21.97
Monthly income in F CFA	Less than 35,000	2	4.76
	35,000 - 70,000	7	16.67
	70,005 - 150,000	16	38.1
	150,005 - 200,000	10	23.81
	200,005 - 300,000	6	14.29
	More than 300,000	1	2.38
Aetiology of Chronic Heart Failure	Hypertensive cardiopathy	66	50
	Dilated cardiopathy	20	15.15
	Valvular heart disease	16	12.12
	Arrhythmia	11	8.33
	Ischemic heart disease	5	3.79
	Unknown aetiology	2	1.52
	Toxic cardiopathy	1	0.56
Comorbidities	None	77	58.33
	Chronic Kidney disease	8	6.06
	Hyperthyroidism	1	0.75
	Others	9	6.81
Cardiovascular risk factors	Hypertension	91	68.94
	Obesity	25	18.94
	Diabetes	20	15.15
	Dyslipidemia	18	13.64
	Tobacco abuse	17	12.88
NYHA dyspnea Stage	I	0	0
	II	66	43.94
	III	65	49.34
	IV	47	35.61

1 US dollar = 553.89 at the time of this study.

Table 2. Treatment of heart failure.

Variables	Categories	Frequency (n = 132)	Percentage (%)
Drug Class	Diuretics	122	92.42
	ACEI and ARB II	108	81.82
	Beta-blockers	59	45.38
	Digitalis	18	13.85
	Potassium-sparing Diuretics	16	14.06
Diuretics	Furosemide	114	93.44
	Hydrochlorothiazide	5	4.1
	Indapamide	1	0.82
	Bumetanide	2	1.64
ACEI and ARA II	Perindopril	42	38.89
	Ramipril	34	31.48
	Losartan	26	24.07
	Candesartan	3	2.78
	lisinopril	2	1.85
	Telmisartan	1	0.93
Digitalis	Digoxin	18	13.85
Beta-blockers	nebivolol	31	52.54
	bisoprolol	27	45.76
	Carvedilol	1	1.69
Potassium-sparing Diuretics	spironolactone	16	14.06

ACEI: Angiotensin-converting enzyme inhibitors, ARB II: Angiotensin II receptor blockers.

Table 3. Comparative table of the time elapsed between the first symptoms and the consultation in the first resort and the time elapsed between the first symptoms and the diagnosis in patients from Yaoundé and those living far from Yaoundé.

Variable	Yaoundé	Far from Yaoundé	p-value
The average time elapsed between the first symptoms and the consultation of the 1st referral (Days)	31.12	48.61	0.0033
Time from first symptoms to diagnosis of HF (Days)	54.16	72	0.0031

3.4. Therapeutic Routes of Patients with Heart Failure Followed in Yaoundé

Patients residing in Yaoundé resorted to more than ten therapeutic routes (see **Figure 1**). Patients spend an average of 30.18 days at home before seeking treatment. The first most frequented care structures are the integrated health centre (IHC) 35.71%, 15.47% in district hospitals (DH), and 15.47% at Jamot Hospital

(JH). After spending approximately 18.63 days on average in the first structure, some decided to resort to a second structure for better care, which was a specialised structure, YCH (72.72%) or JH (7.80%). See **Figure 1**. Half of our patients had a pseudo-ideal route, with one jump at most in the health pyramid's different stages.

A single patient had an ideal therapeutic route therapeutic routes following all the stages of the health pyramid in our health system, *i.e.* home → IHC (nurse) → primary care hospital/District Hospital → CMA / DH (general practitioner) → regional hospital or HR (general practitioner, specialist) → YCH (specialist). See **Table 4**.

Table 4. Summary of the itineraries of resident patients in Yaoundé.

Route	Frequency (n = 132)	Percentage (%)
Ideal route	1	1.19
Ideal pseudo route	42	50
Immediate access to specialised care	20	8.34
Erratic route	21	25

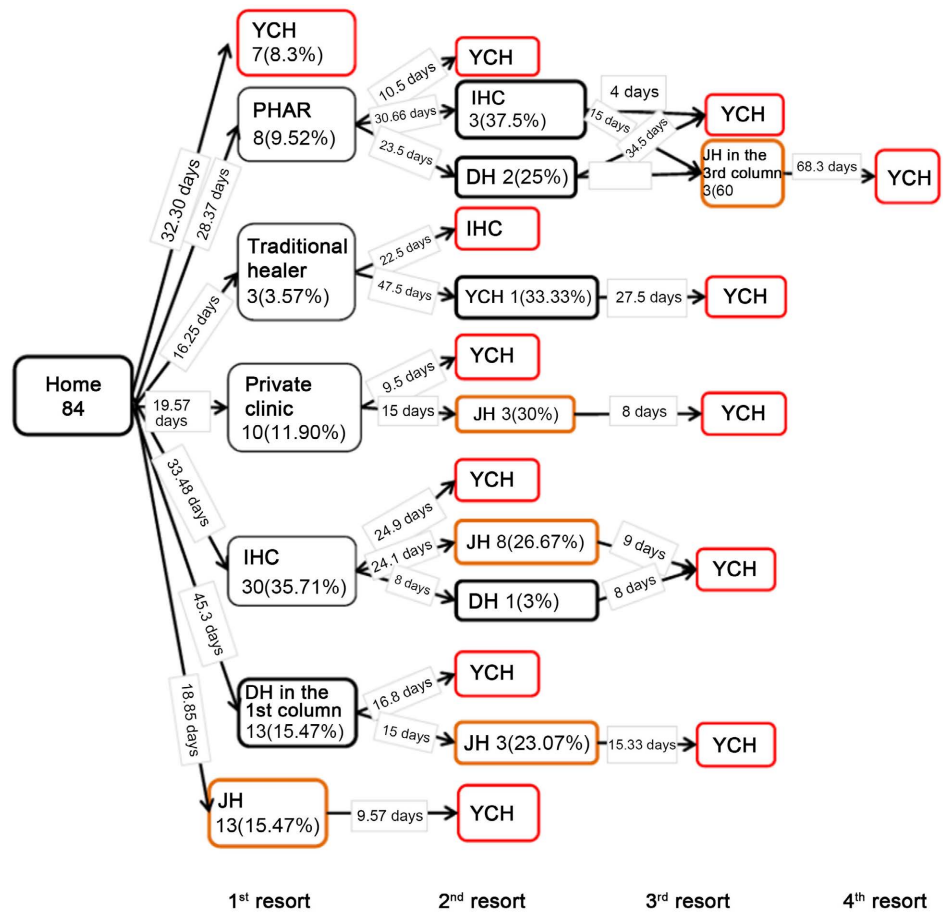


Figure 1. Summary of the therapeutic routes taken by patients residing in Yaoundé. Key: District Hospitals (DH), Jamot Hospital (JH), Yaounde Central Hospital (YCH), Integrated Health Centre (IHC).

The patients residing near Yaoundé (not longer than 30 km from their homes to a place of care) mainly had five therapeutic routes (**Figure 2**).

Patients spend an average of 9.21 days at home before seeking treatment. The first most frequented care structures are the IHC (69.23%), the DH (23.07%), and the traditional practitioner (23.07%). After having done about 41.30 days on average in the first structure, some decided to have recourse to a second structure to have better care, which, for the most part, was a specialised structure for YCH (81.81%) or JH (18.18%). Of the 13 patients living near Yaoundé, 11 patients (84.61%) had a pseudo-ideal itinerary. See **Table 5**.

Patients living far away from Yaoundé (longer than 30 km from their homes to a place of care) had different routes from patients residing in Yaoundé and near Yaoundé. We have listed more than ten routes (**Figure 3**).

Patients spend an average of 48.66 days at home before seeking treatment. The first most frequented care structures are the IHC (42.10%), the DH (22.23%), the Regional Hospital (RH) (11.12%) and the JH (11.12%). After having done about 89.11 days on average in the first structure, some decided to have recourse to a second structure to have better care which, for the most part, was a specialised structure for YCH (61.12%) or the JH (16.67%). Of the 18 patients living far from Yaoundé, 15 patients had a pseudo-ideal itinerary (see **Table 6**).

Table 5. Summary of the itineraries of patients residing near Yaoundé.

Route	Frequency (n = 132)	Percentage (%)
Ideal route	0	-
Pseudo-ideal route	11	84.61
Immediate access to specialised care	0	-
Erratic route	2	15.38

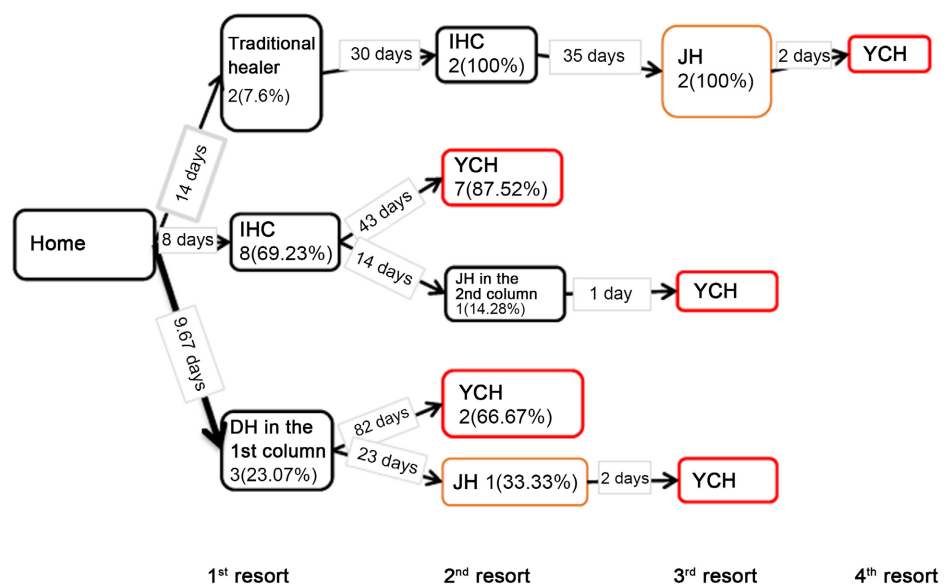


Figure 2. Summary of the therapeutic routes taken by patients residing close to Yaoundé. Key: District Hospitals (DH), Jamot Hospital (JH), Yaounde Central Hospital Hospital (YCH), Integrated Health Center (IHC).

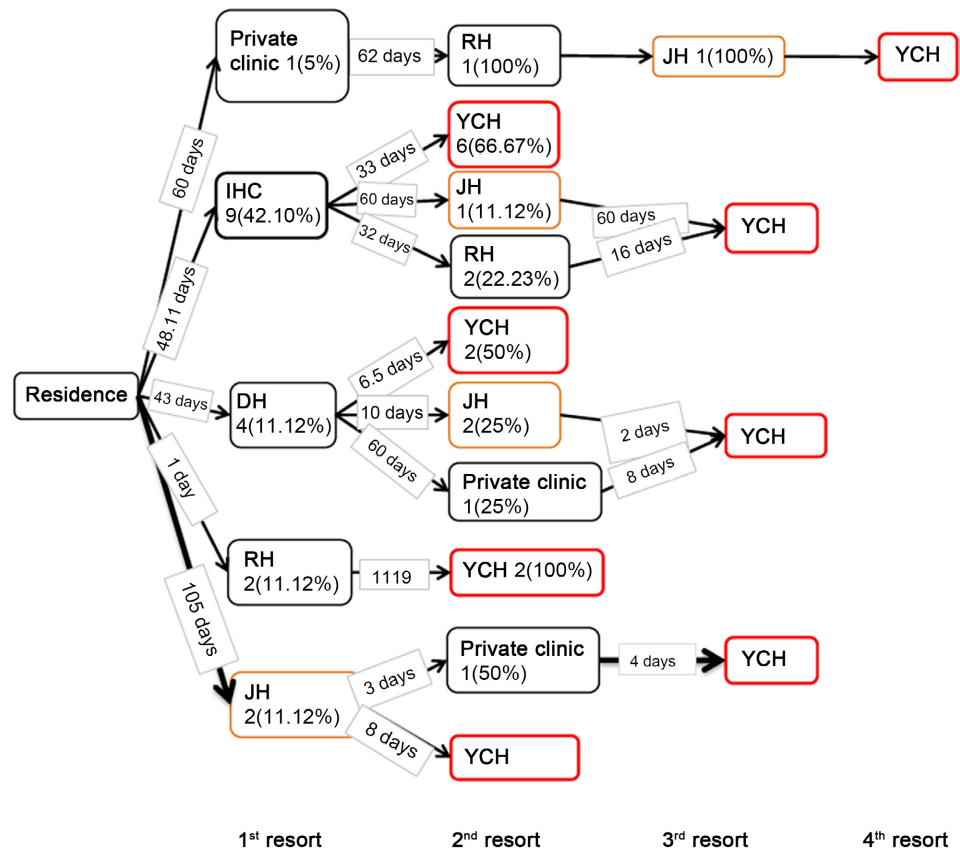


Figure 3. Summary of the therapeutic routes taken by patients residing far away from Yaoundé. Key: District Hospitals (DH), Jamot Hospital (JH), Yaounde Central Hospital Hospital (YCH), Integrated Health Centre (IHC).

Table 6. Summary of the routes of patients residing far from Yaoundé.

Route	Frequency (n = 132)	Percentage (%)
Ideal route	0	-
Pseudo-Ideal route	15	83.33
Immediate access to specialised care	2	11.12
Erratic route	1	5.56

3.5. Reason for Adopting a Remedy

Patients’ primary motivations for going to the first therapeutic resort were geographic proximity (52.57%) and advice from someone (31.82%). On the other hand, patients went to the second resort either because the symptoms persisted (44.76%) or because they had been referred by a health professional (14.28%) or because they considered that the disease was severe and therefore decided to go to a structure superior to the previous one for better management (see Table 7).

3.6. Determine the Effect of Therapeutic Routes on the Condition of Patients upon Their Arrival in a Cardiology Department

The time between the first symptoms and the first resort’s consultation was

longer in the group living far from Yaoundé than in Yaoundé, with a significant difference. Likewise, we note that the time elapsed between the first symptoms and the diagnosis of HF is higher in patients with NYHA stage III-IV HF at the time of diagnosis with a statistically significant p-value of 0.0019 (see **Table 8**).

4. Discussion

This prospective cross-sectional study's objective was to describe the therapeutic routes of patients with heart failure from the onset of the first symptoms until the moment of treatment in a specialised cardiology unit to determine this impact on the patient's condition at the time of diagnosis. Our findings were that very few patients (0.90%) followed an ideal route, 60.71% of subjects had a pseudo ideal route, 19.64% went directly to a specialised structure, and 21.42% used an erratic route. On arrival in a cardiology setting, 49.24% and 35.61% of our patients were in severe stage III and IV IC according to the NYHA classification, compared to 15.15% for stage II. None were in stage I.

We observed that most (63.64%) opted to abstain from therapy before being consulted regarding patients' therapeutic routes. Therefore, auto-medication does not occupy a prominent place in the treatment of HF in the current study. Indeed, very few subjects (36.36%) resorted to auto-medication; in its investigation of the therapeutic route of HF patients in Cameroon, Nkoma *et al.* in 2015

Table 7. Difference from the motive of patients to visit the different healthcare structures.

Recourse	Recourse 1 n (%)	Recourse 2 n (%)
Geographic proximity	59 (52.57%)	2 (1.90%)
Advice from someone	42(37.50%)	7 (6.67%)
Illness considered serious	7 (6.25%)	15 (14.28%)
Advice from a healthcare professional	2 (1.78%)	3 (2.67%)
Referral from a healthcare professional	2 (1.78%)	22 (19.64%)
Persistence of symptoms	-	3 (2.67%)
Dissatisfaction with the previous structure	1 (0.89%)	47 (44.76%)

Table 8. Comparative table of the time elapsed between the first symptoms and the consultation in the 1st resort and the time elapsed between the first symptoms and the diagnosis in patients with stage I-II and stage III-IV HF on arrival.

Variables	Median NYHA I to II (\pm IQI)	Median NYHA III to IV (\pm IQI)	p-value
Time elapsed between the first symptoms and the consultation of the 1st resort (days)	14 (7 - 30)	30 (9 - 60)	0.0546
Time from first symptoms to diagnosis of heart failure (days)	23 (14 - 34)	44 (24 - 33)	0.0019

IQI: interquartile interval.

established that auto-medication represented 51.9% of intentions to use and that only 3.4% of patients opted for abstention from treatment [7]. The study participants chose to abstain from therapy because of the progressive onset of HF's clinical picture; symptoms are very mild initially and will gradually worsen. Patients do not even recognise the signs of the disease. Therefore, taking any medication is seen as an additional risk of the condition worsening.

At the first therapeutic resort, most patients went to modern health structures (80.63%); only 4.46% resorted to complementary and alternative medicine (CAM), and 16.96% went to other remedies (pharmacies and private hospitals or clinics). These results show a high frequency of modern consultations. It can be explained by the geographical proximity between the patient's residence and the health facilities attended. In his study of the therapeutic route of epilepsy patients in Yaoundé, Mbonda *et al.* 2008 also demonstrated that at the first therapeutic resort, 72.5% of patients were consulted in modern health facilities [15]. On the other hand, in the same study, he observed that 25.5% of patients had recourse to CAM [15]. CAM is more frequent in epileptic patients because epilepsy is perceived as a pathology with supernatural origins. The many beliefs surrounding this condition make this remedy a persistent remedy by those patients [15]. The most frequented modern health structures are the CSI, the HD, and the JH (a second category hospital specialising in pulmonology), respectively 41.96%, 17.85%, and 13.40% resorts. The main reasons are geographical proximity in 52.57% or someone's advice in 37.50%.

The most consulted health structure was the JH (19.04%) at the second and third therapeutic options. The main reasons mentioned, among others, are the persistence of symptoms such as dyspnea (44.76%), referral by a health professional (19.64%) or fear of the severity of the disease (14.28%). At least one of these reasons persuaded them to go to a higher structure than the previous one for better care. The clinical presentation of HF mimics a respiratory problem that leads patients to believe that they have a lung problem and seek a pulmonologist. At the fourth resort, patients choose between the YCH because of the availability of quality infrastructure and specialised doctors; the one hand, as a last therapeutic resort referred by the health structures.

Upon arrival in a cardiology unit, more than half of the HF patients (84.85%) were at a late stage (49.24%) for NYHA stage III and 35.61% for NYHA stage IV against 15.15% for NYHA stage II. Kingue and al. in 2005 obtained only 53% of patients with NYHA stage III and IV of [16]. Heart failure is a condition still unknown to the population nowadays, and most of the time, they access specialised care late. The factors associated with the delay in diagnosis were an elevated time between the first symptoms and the consultation of the first referral high (p statistically significant at 0.0546). A time elapsed between the first symptoms and high HF diagnosis (statistically significant p to 0.0019). In other words, the longer the patient takes to see an appropriate health facility, the more likely he is to be late when the disease is diagnosed.

Our study's limitations are its small sample size ($n = 132$), making our results generalised with caution to all HF patients in Cameroon. However, this study is one of the first to concisely describe the different therapeutic routes taken by HF patients from symptom onset to specialised cardiology treatment. Hence, it identifies poor health-seeking behaviours that should draw HF patients' attention to the necessity of timely hospital presentation for early treatment and management. These are two significant determinants of HF patients' good prognosis.

5. Limitations

Our study has some limitations, notably the sample size, which remains modest, as well as its implementation in intrahospital and urban settings.

6. Conclusion

The current study findings suggest that few HF patients follow an ideal course; most have had a pseudo-ideal or erratic route. It results in a diagnosis of severe HF on arrival in a specialised health centre for more than half of the patients. This delay in therapy was associated with a long time between the first symptoms and the consultation of the high first resort on the one hand, and a long time between the first symptoms and the diagnosis of HF on the other hand, as well as a total number of appeals greater than one. Based on these results, we should intensify therapeutic education on HF patients and promote postgraduate formation on HF for healthcare providers.

Declaration

Authors Contribution

Conception and design: CNNG, SK;
Data collection: CNNG, MDD, BH;
Data analysis and interpretation: MDD, JNT;
Manuscript drafting: CNNG, JNT;
Manuscript revision: CNNG, JNT;
Approval of the final manuscript: All the authors.

Availability of Data and Materials

The datasets used for this study are available from the corresponding author upon request.

Ethical Approval and Consent to Participate

The Institutional Ethical Review Board of the Université des Montagnes (Cameroon) approved the study. All the participants read and signed informed consent before their inclusion in the study.

Conflicts of Interest

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

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