THERAPEUTIC ITINERARY OF PATIENTS WITH CHRONIC HEART FAILURE AT THE BAFOUSSAM REGIONAL HOSPITAL, WEST REGION, CAMEROON

Abstract

Background: Cardiovascular diseases have emerged as a growing public health problem worldwide, with heart failure being the end point of a greater majority of poorly diagnosed and managed heart diseases. In Sub-Saharan Africa, traditional medicine still has a remarkable influence on health care systems, and in Cameroon, the referral/counter-referral system thought to be implemented is not efficiently applied. Heart failure patients fall amongst the group of victims affected by this problem. Many studies have been carried on heart failure in Cameroon, but data on this subject remains sparse.

Objective: To identify the therapeutic itinerary adopted by symptomatic patients with chronic heart failure seen at the Bafoussam Regional Hospital (BRH) and determine the outcome following management by cardiologists, so as to provide results-driven interventions to increase the rate of early management of heart failure by appropriate health services and limit complications due to wrong therapeutic orientations.

Methods:A hospital-based cross-sectional descriptive study was carried, from February 2019 to May 2019 at the Bafoussam Regional Hospital. A consecutive sampling technique using objective-related structured questionnaire was used to select patients aged above 18 years seen at the study site. Data was analyzed using SPSS (Statistical Package for Social Sciences) version 23. A p-value less than 0.05 was considered statistically significant.

Results: The BRH Cardiologist consultation was the 1st station sought by 32 (23.7%) of patients. We found 14.8% of cases and 8.9% who had as first therapeutic stations home management and traditional healers respectively. Majority of participants went through a total of 2 stations, 60 (44.4%), and only 5 (3.7%) went through 5 therapeutic stations. Most participants (36.3%), delayed for 1-3 weeks after onset of symptoms before seeking a means of intervention. NYHA (New York Heart Association) stages were generally improved after cardiologists' follow up (54.1% and 26.7% for stages I and II respectively), compared to that before entry (0.7% stage I, 41.5% stage II, 38.5% stage 3, and 19.3% stage IV), which was statistically significant with $P < 0.0005$.

Conclusion: There is a high proportion of HF patients who do no adopt an ideal therapeutic itinerary following the health pyramid from the onset of symptoms, hence the need to educate the population on cardinal signs of heart failure, especially patients with known risk factors, and to encourage the referral of patients in order to limit complications between the onset of symptoms till cardiologist consultation.

Keywords: Chronic heart failure, Therapeutic itinerary,Bafoussam Regional Hospital, West Region, Cameroon

Introduction

According to the American Heart association/American College of Cardiology (AHA/ACC) guidelines, heart failure (HF) is defined as a complex clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricles to fill or eject blood. Notably, HF is the leading cause of hospitalization in patients over 65 years of age globally (1). HF is currently a pandemic, in 2019 approximately 63.9 million people were suffering from HF [2].

Its prevalence is expected to increase due to the improved survival following a HF diagnosis associated with the availability of life-saving evidence-based treatments and overall longer life expectancy of the general population [2]. The burden of HF on health care expenditures globally is alarming. In 2012, the total cost for HF was estimated to be 30.7 billion in the United States, with increment of about $244 by 2030[2]. Heart failure is associated with a high health expenditure, mostly because of the cost of hospitalizations; costs have been estimated to 2% of the total budget of the National Health Service in the United Kingdom, and more than $35 billion in the United States [2].

In Sub-Saharan Africa (SSA), traditional medicine is still being used and preferred by the population, thus interfering with modern health care. Moreover, superstitious beliefs about the origin of illnesses, educational level, religion, and other social aspects have a great influence on the choice of the type of health care sought by patients, thereby greatly impacting their morbidity and mortality [3]. Cameroon adopted the pyramidal health system comprising the peripheral, intermediate, and central levels.According to Cameroonian patients with HF usually present in the 6th decade of life. Accordingly, early diagnosis and proper treatment are critical as they both influence prognosis in these patients [4]. The role of traditional medicine is not neglected and it is classified under the private sector [5]. The pyramidal health system adopted by Cameroon came in after the traditional health system to which many citizens still hold on to. Many patients have superstitious beliefs about the source of their illness and delay seeking medical attention while attempting other solutions (traditional healers, family, friends, lay consultants, or pastors) to their health problem [6].In SSA cardiovascular diseases are progressively taking over infectious diseases as leading cause of morbidity and mortality with HF being a major public health problem in this area [7]. In developing countries, HF is fueled mainly by systemic hypertension, valvular heart disease, and cardiomyopathies [8].

The referral / counter – referral system (where patients that cannot be managed at a lower level of health system are sent to the next superior station according to the health pyramid, and feedback is sent to the referring health unit after termination of management) applied in our context seems to be handicapped due to lack of proper implementation at various health units. It has been noticed that a good number of HF patients often make their way to cardiologists as last resort, when the disease is already at an advanced stage. We have noticed that an increasing number of patients coming with advanced HF stages, some of who report trying alternative means of treatment before being seen by a cardiologist. This prompted us to try to identify the therapeutic habits and pathway they adopt once they experience HF symptoms.

MATERIAL AND METHODS

Study Site

The study was carried at the Bafoussam Regional Hospital. Given that this is a referral hospital, the presence of cardiologists in this hospital eased attainment of our sample size. Bafoussam is the capital and largest city of the West Region of Cameroon. It is the 3rd most financially important city in Cameroon after Yaounde and Douala the Urban Community is decentralized born after Presidential decree No 2008/022 of January 17, 2008 and made up of of Bafoussam 1(Bafoussam proper), Bafoussam 2 (Baleng), and Bafoussam 3 (Bamougoum). BRH is a tertiary hospital which was created around 1953.

The administration is constituted by a director, general supervisors, a bursar, and an accountant. There are 34 health technicians, 24 medical doctors (of which 03 cardiologists, one being Pediatric Cardiologist), 149 nurses, 03pharmacists, 01 mortuary attendant, and 24 administrative personnel.

The hospital has a total capacity of 298 beds. The Cardiology unit comprises out-patient and in-patient services. Out-patient consultations are on appointment, with a maximum of 20 patients booked per consultation day which are four days a week. Registered patients are received by the attending nurses and their vital parameters and body mass index measured. Cases requiring the cardiologist's attention are prioritized. The doctor spends about 20mins per patient consulting, reviewing previously requested para-clinical investigations, evaluating the evolution of the disease, and encouraging them on lifestyle modification and adherence to medications. At the end of the session in the cardiologist's office, the principal investigator accompanied HF patients out to a convenient place within the hospital for recruitment depending on the patient's willingness. Those who were already being followed up were systematically enrolled in our study. All patients who were seen for the first time by the cardiologists were scheduled for the interview during their next appointment upon presentation of echocardiography results which was generally within two weeks. Admitted patients who were diagnosed of HF during hospitalization or at the emergency unit were enrolled in this study, assisted by a care giver of their choice.

Study population

All HF patients of both sex aged above 18 years who deliberately accepted to participate in our study were included after signing the informed consent form. Patients with incomplete data and those who have never been symptomatic were excluded

Sampling technique

This study was carried out for a period of 4months from February to May 2019. A consecutive random sampling method was used to select all patients consulting at the cardiology and internal medicine unit of the Bafoussam Regional Hospital, during the study period. Our references for sample size determination was the Cochrane's formula, and a study done by Kingue *et al*.[2] on Clinical Pattern and Outcome of Heart Failure at the Yaounde Central Hospital, which stated that globally the prevalence of heart failure is less than 10. Hence, P= 0.1 was used, giving us a minimum sample size of 135**.**

Study procedure and data collection

We made the patients comfortable and proceeded to a thorough clinical observation. The diagnosis of heart failure was established based on clinical symptoms of fatigue, dyspnea, palpitations, lower limbs swelling, or abdominal swelling, S3 gallop rhythm, and echocardiographic findings of cardiomyopathies and a left ventricular ejection fraction of less than 40%. A pilot study was carried out with 10 participants selected randomly at the BRH, using a pre-structured questionnaire manually designed by the authors. Relevant adjustments were made to improve the quality of the questionnaire which was divided into 3 sections; the demographic characteristics of participants, the therapeutic stations consulted, and NYHA stage of HF at onset and at time of interview. After obtaining a signed informed consent form by the participants, these questionnaires were administered verbally, taking averagely 5 minutes, while other patients filled their forms individually. Patients who were unable to respond to the study due to poor health status authorized their next of kin to assist in giving necessary information.

Data Management and Analysis

Participants' responses were entered into coded questionnaires. The information was entered in a secured computer and backed up in USB flash drives. CSPro 7.2 was used for saving and SPSS 23 for analyzing data. Analysis of the data was done using SPSS version 23. Categorical variables were presented as frequencies and their proportions. Continuous variables were presented as means. We identified the total number of therapeutic pathways and considered those with more than 2 cases to

be the main pathways. We calculated the frequencies of events and interventions surrounding each therapeutic station, and calculated proportions of the outcome variables (effect on patient status), the therapeutic stations being the predictor variable. Four systematic therapeutic pathways were proposed as follows; Ideal itinerary (consultation at an integrated health center through a district hospital to referral at the Regional Hospital); pseudo-ideal (resorting either an integrated health center, a private clinic, pharmacy, or a district hospital, without respecting the health pyramid, before eventually reaching the Regional Hospital; erroneous pathways (any therapeutic itinerary that included auto-medication at home, or traditional healers; and the 4th being direct access to Cardiologists at the Regional Hospital following onset of symptoms. Results were presented using charts and tables. Chi square was used to compare proportions. A difference was considered statistically significant if the p-value was less than or equal to 0.05.

RESULTS

SOCIO-DEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS

Out of 140 patients approached, we recruited a total of 135 patients with 86 (63.7%) females and 49 (36.3%) males.The mean age was 67.58 (±13.5SD) years and ranged from 22 to 95 years. Table 1 summarized the characteristics of participants.
Table 1: Socio-demographic characteristics of participants

Table 1

CHARACTERISTIC	No (%)
Age (years)	**Mean±SD (67.58 ±13.5)**
21-40	7 (5.18)
41-60	25 (18.52)
61-80	87 (64.44)
81+	16 (11.86)
Gender	
Female	86 (63.7)
Male	294 (36.3)
Level of Education	
No formal education/Primary education	97(71.9)
Secondary education	32(23.7)
University	6(4.4)
Area of residence	
Bafoussam	44(32.6)
Around Bafoussam	52(38.5)
Far from Bafoussam	39(28.9)
Monthly income (in USD)	
100 -200	8(5.9)
>200-500	10(7.4)
>500	5(3.7)

None	67(49.6)
Hospital bill settlement	
Self	24
Insurance	2
Family	109

SD= Standard deviation

No= Frequency

The main HF symptoms noticed by patients were fatigue (71.1%), dyspnea (68.9%), and leg swelling (43%) as presented in Table 2. As further illustrated in this table, majority delayed for 1 to 3weeks before seeking an intervention to relieve their symptoms at any therapeutic station, either home medication, traditional healers, or health facilities.

Table 2 : Symptoms at onset of suspected HF

Symptoms at onset of suspected HF	
Fatigue	96(71.1)
Dyspnea	93(68.9)
Leg swelling	58(43)
Palpitations	45(33.3)
Coughing	44(32.6)
Paroxysmal nocturnal dyspnea	30(22.2)
Abdominal weight gain	11(8.1)

Delay before first intervention sought(1st therapeutic station)	
0 to 5hrs	3(2.2)
6 to 24hrs	3(2.2)
1 to 6 days	28(20.7)
1 to 3 weeks	49(36.3)
1 to 2 months	23(17)
Above 2 months	29(21.5)

Identification and description of therapeutic itineraries

The therapeutic stations, were defined as the points or facilities patients resorted to with the hope of relieving HF symptoms. We traced a therapeutic itinerary by linking up the succession of these stations that were adopted by patients. The therapeutic stations we identified in our study were: auto-medication, traditional healer, integrated health center, district hospital, private clinics/pharmacies (others), Bafoussam Regional Hospital

From table 3, we note that 60(44.4%) of patients went through a total of 2 therapeutic stations. 5(3.7%) people went through 5 stations.

Table 3:Distribution of participants according to total number of therapeutic stations they went through.

Number of stations attended	Frequency	%
1 station	32	23.7
2 stations	60	44.4
3 stations	31	23.0
4 stations	7	5.2
5 stations	5	3.7
Total	135	100

Figure 1 illustrates the order in which the various therapeutic stations were accessed by patients. We noticed a pattern of gradual drift away from home medication and traditional healers, and an increase in the number of those reaching the Bafoussam Regional Hospital as they moved from one station to the next until they all got to BRH where they met the cardiologists.

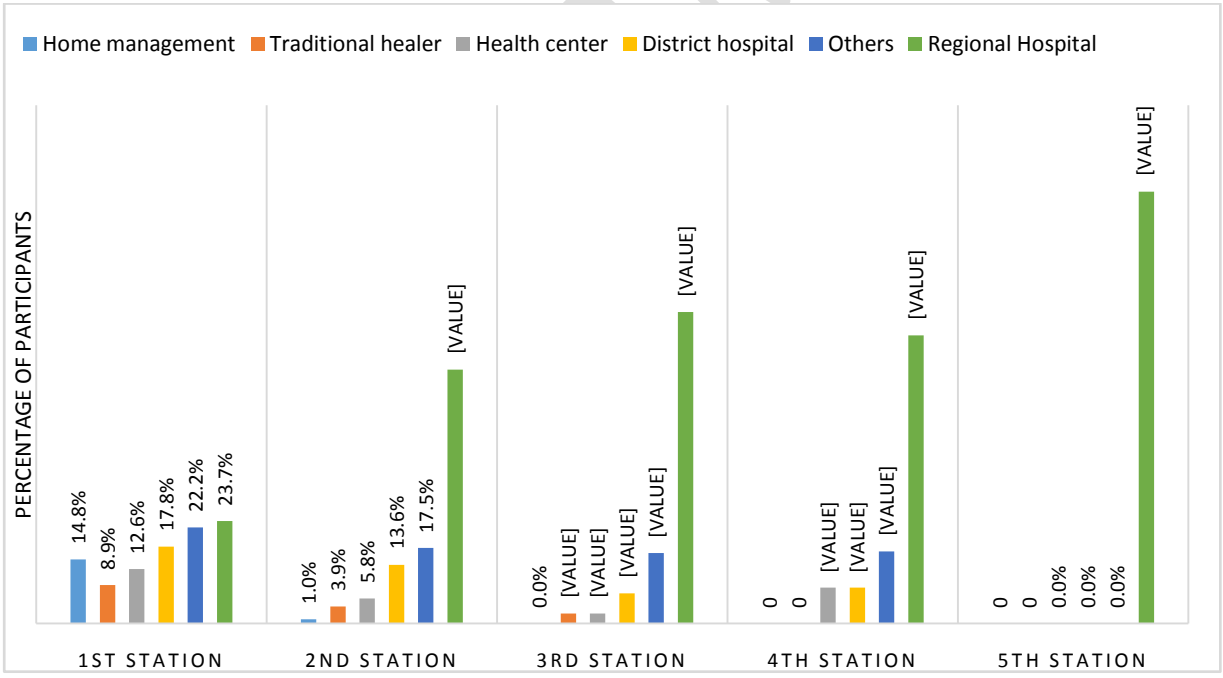


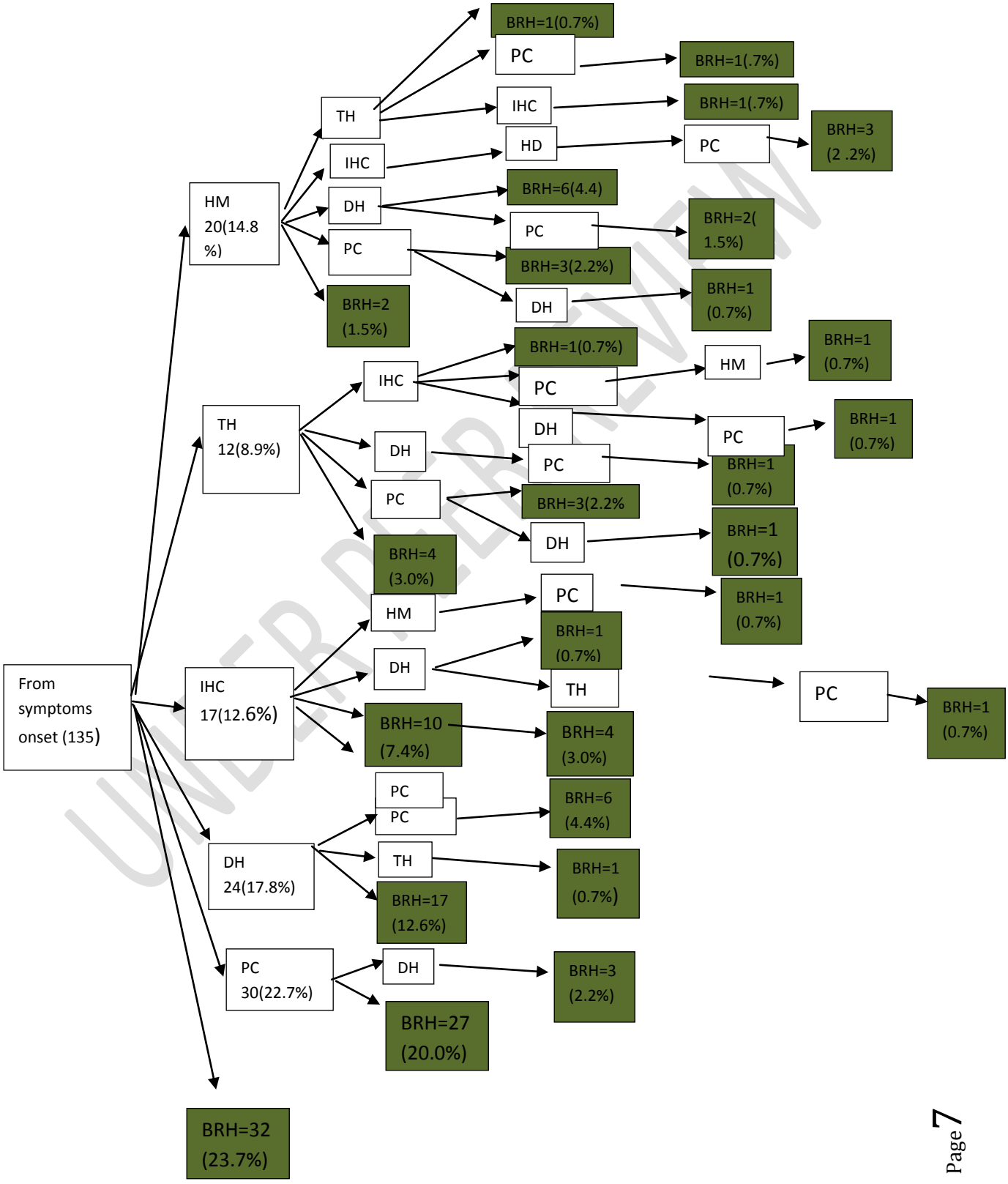
Figure 1:Distribution of the order in which each station was accessed among participants

Figure 2 is a representation of the various therapeutic pathways traced among participants. The green boxes represent the end of the itinerary at the time of recruitment which was the BRH (as well as figures 3-5 below). A total of 27 pathways which were traced in our study. The abbreviations in the diagrams are as follows;

HM=home management, TH=traditional healer, IHC=integrated health center, DH=district hospital, PC=private clinics, BRH= Bafoussam Regionam Hospital

Figure 2: Therapeutic itinerary for all patients recruited.

1st station 2nd station 3rd station4th 5th



Key: *End of itinerary in green  *Intermediate pathway represented by white 

Table 4 further summarizes the itinerary adopted by all participants according to category from ideal to erroneous. Only 1 (0.7%) subject adopted an ideal itinerary; from an integrated health center through a district hospital to the Bafoussam Regional Hospital, and up to 25.9% resorted at one point to auto-medication or traditional healers, thereby categorizing them in the erroneous itinerary

Table 4: Itinerary summary for all recruited patients.

Itinerary	Frequency	%
Ideal itinerary	1	0.7
Pseudo-ideal itinerary	67	49.6
Direct access to cardiologist at BRH	32	23.7
Erroneous itinerary	35	25.9
Total	135	100

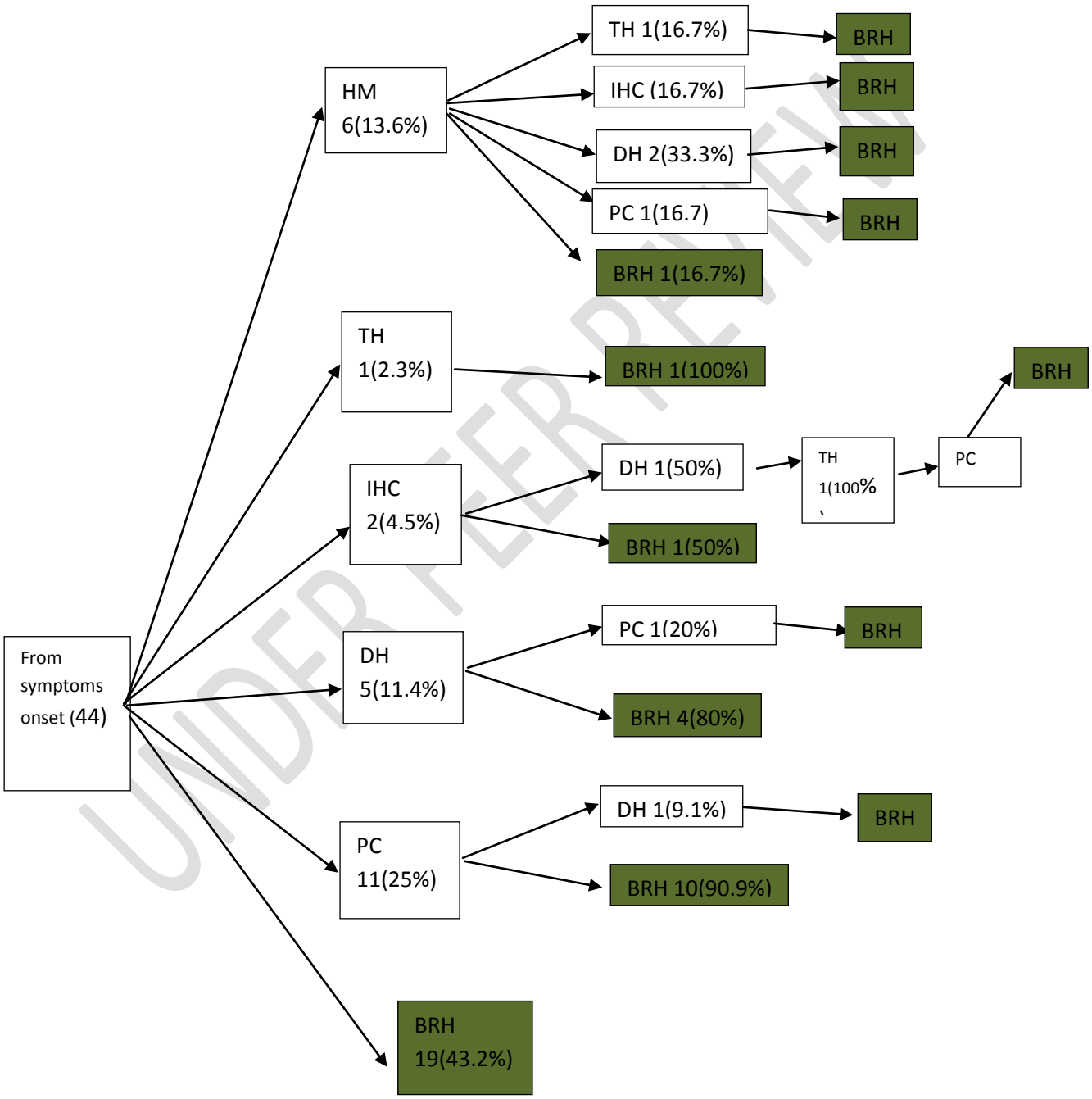
Among those participants who resided within Bafoussam, no patient had an ideal itinerary, 38.6% had adopted a pseudo-ideal itinerary and 18.2% had an erroneous therapeutic itinerary (table 5).

Table 5:Itinerary summary for patients living within Bafoussam.

Itinerary	Frequency	%
Ideal itinerary	0	0
Pseudo-ideal itinerary	17	38.6
Direct access to cardiologist at BRH	19	43.2
Erroneous itinerary	8	18.2
Total	44	100

A total of 12 therapeutic pathways was traced for patients who resided within Bafoussam (figure 3). Majority (43.2%) of these patients sought consultation with a cardiologist at the BRH after they noticed symptoms. This was followed by private clinics (25%) being attended as first therapeutic station. The lowest percentage (2.3%) of these cases sought traditional healers in first position.

Figure 3: Therapeutic itinerary for patients residing within Bafoussam



Key: *End of itinerary in green *Intermediate pathway represented by white

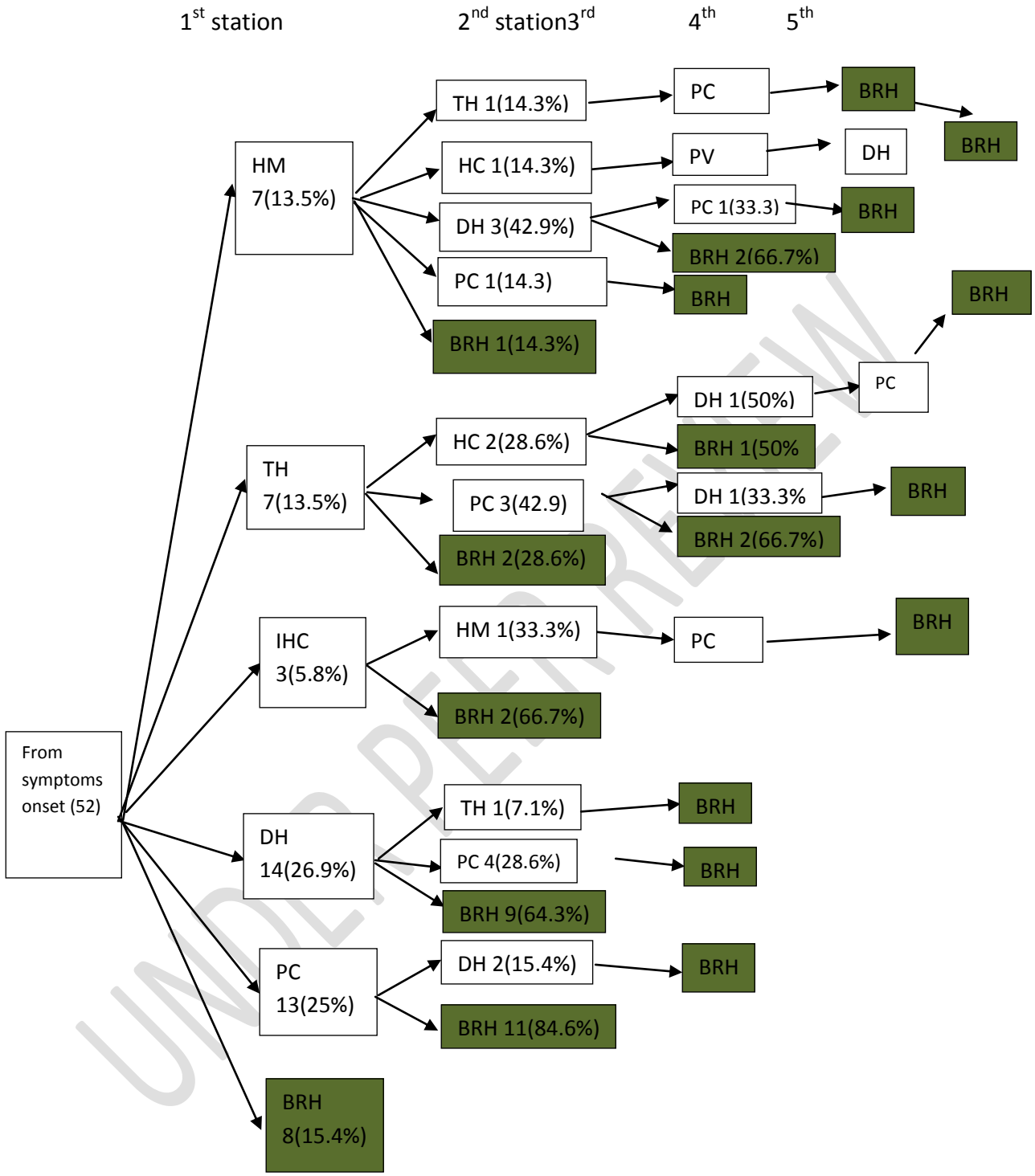
Table 6 presents the itinerary summary of all patients who resided around Bafoussam neighborhood, basically the areas considered as semi-urban zones. No participant had an ideal itinerary, 53.8% of cases were found to have adopted a pseudo-ideal itinerary, 30.8% were went through an erroneous itinerary, and just 15.4% had direct access to cardiology consultation at the Bafoussam Regional Hospital.

Table 6*:* Itinerary summary for patients living around Bafoussam neighborhood.

Itinerary	Frequency	Percentage
Ideal itinerary	0	0
Pseudo-ideal itinerary	28	53.8
Direct access to cardiologist at BRH	8	15.4
Erroneous itinerary	16	30.8
Total	52	100

Figure 4 below further expands the therapeutic itinerary of patients resident in semi-urban areas (living around the Bafoussam neighborhood). 20 pathways are traced from this figure, with most of the patients having as first station district hospitals (26.9%), closely followed by private clinics or others (25%). Some of these subjects auto-medicated as their first therapeutic station (13.5%), and 13.5% equally went to traditional healers as first stations.

Figure 4: Itinerary for participants residing around Bafoussam neighborhood



Key: *End of itinerary in green *Intermediate pathway represented by white

Just 1 (2.6%) out of 39 participants residing in villages adopted an ideal itinerary, majority (56.4%) adopted a pseudo-ideal itinerary, and 28.2% had an erroneous itinerary as presented in table 7.

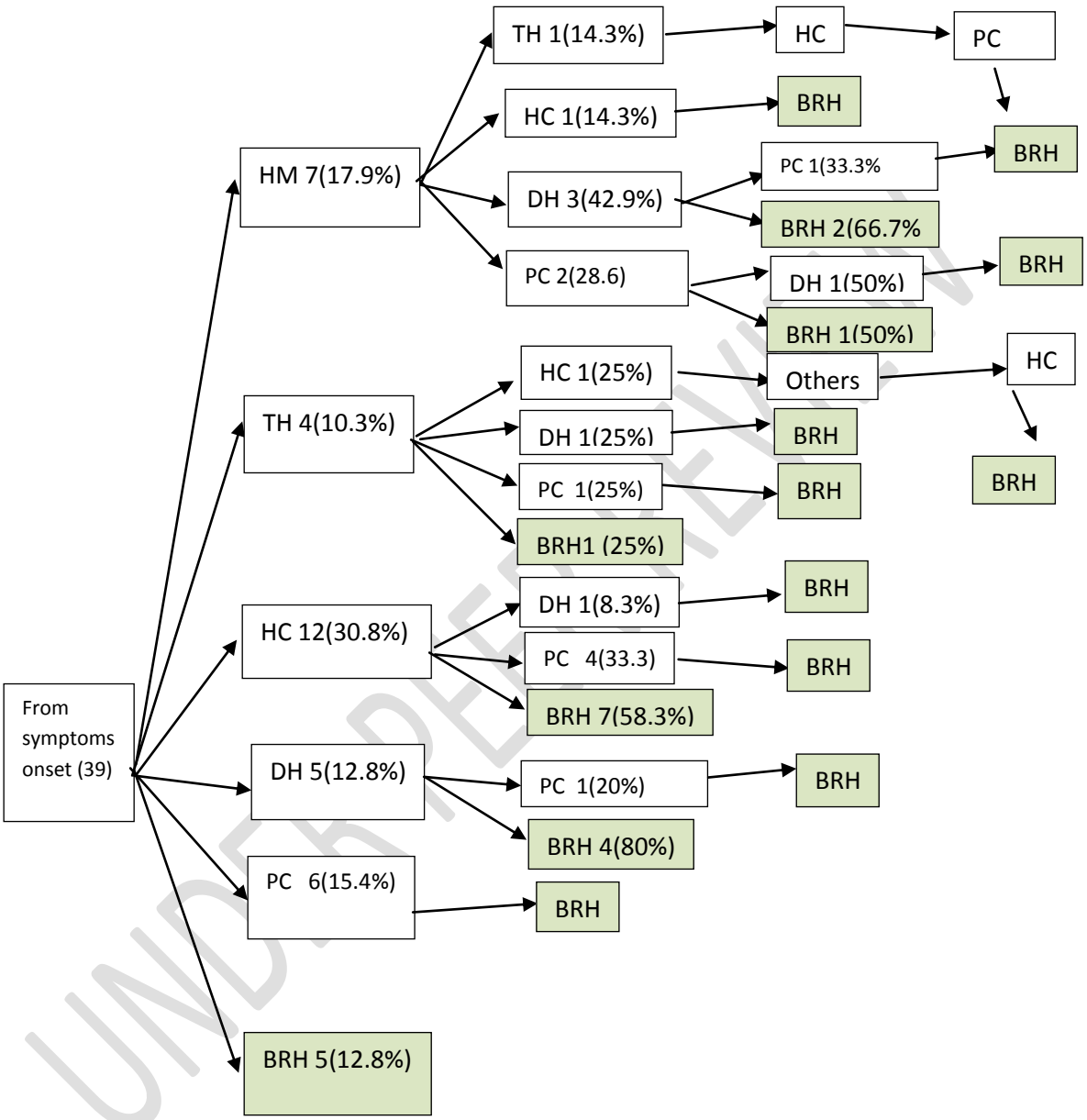
Table 7: Itinerary summary for participants residing in villages.

Itinerary	Frequency	Percentage
Ideal itinerary	1	2.6
Pseudo-ideal itinerary	22	56.4
Direct access to cardiologist at BRH	5	12.8
Erroneous itinerary	11	28.2
Total	39	100

Figure 5 is a representation of the therapeutic itinerary adopted by patients who resided in the rural areas, notably villages. A total of 17 pathways were traced as seen in this figure. Out of 39 cases in this category, the greatest proportion of these cases 12 (30.8%), firstly went to integrated health centers after the onset of symptoms. This was followed by 7 (17.9%) of patients who preferred to start managing symptoms at home. Four (10.3%) subjects went in first position to consult traditional healers and 12.8% went directly to the Bafoussam Regional Hospital at the cardiology consultation.

Figure 5*:* Itinerary for participants residing in villages

1st stations 2nd stations3rd 4th



Key: *End of itinerary  *Intermediate pathway represented by white 

Generally there was marked improvement in the NYHA stages of HF of participants from the beginning of their follow up by the specialists at the BRH. They were differences statistically significant with P < 0.0005 at 95% confidence interval. Table 8 summarizes the comparison of the NYHA stages among participants upon arrival at the BRH cardiology consultation and after specialist care at the time of recruitment, irrespective of the length of time they had been followed up.

Table 8: Evolution of stages of heart failure among participants from arrival at the specialist consultation at BRH to time of recruitment following management at the BRH

On entry	Upon Cardiologist care	Frequency	Percentage	P-value
NYHA I 1(0.7%)	II	01	100	
NYHA II	I	44	84.6	< 0.0005
52(38.5%)	II	08	14.4	
NYHA III	I	29	51.8	
56(41.5%)	II	18	32.1	<0.0005
	III	07	12.5	
	IV	02	1.5	
NYHA IV	II	09	34.6	
26(1.9%)	III	14	53.8	<0.0005
	IV	03	11.5	

According to Table 8, 86.4% of patients who were at NYHA stage II upon initiation of follow up by cardiologists at the BRH were found at stage I at the time of recruitment into our study. Of those who entered at NYHA III, near 50% were at stage I and just 12.5% still at stage III at the time of enrollment. About half of patients who entered the BRH at stage four had improved to stage III, and only 3(11.5%) out of these 26 cases were at stage IV. However, none was found at HF stage I. All these outcomes were statistically significant with P-value less than 0.0005.

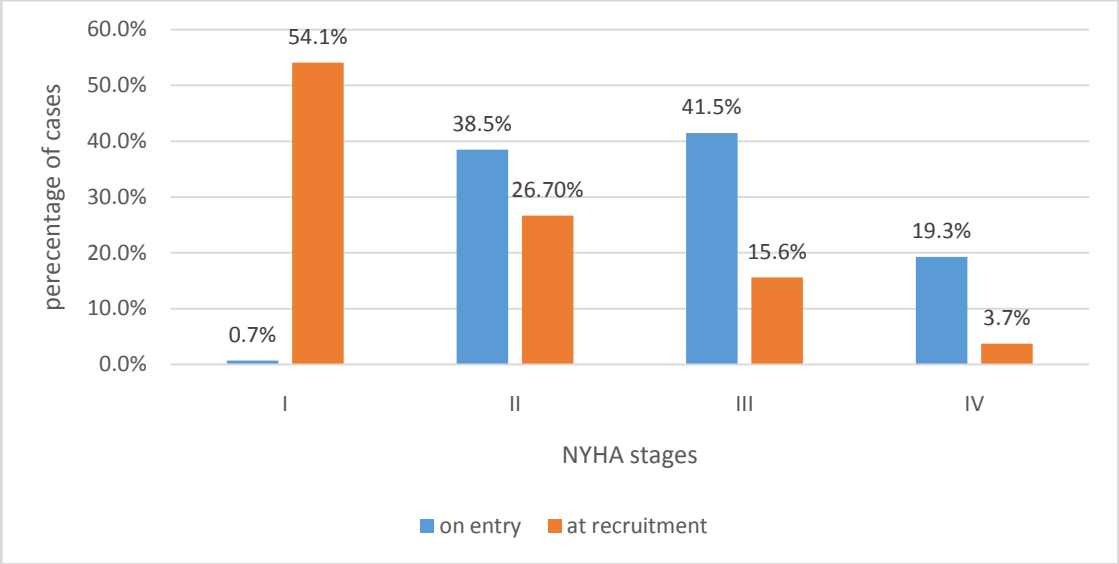


Figure 6: Evolution of the HF stage of participants from entry and at recruitment at BRH

Figure 6 compares the overall percentages of HF stages found among all participants upon entry and upon recruitment after being attended to by cardiologists. For instance, up to 54.1% of patients were at NYHA stage 1 as opposed to just 0.7% upon entry; also only 3.7% were found at stage IV compared to an overall percentage of 19.3% upon first contact with the cardiologists.

DISCUSSION AND LIMITATIONS

General characteristics of the study population

The most represented age group was 71-80 years, the mean age was 67.58±13.5 years, and age range was from 22 to 95 years. This is similar to a study carried out by Nlo'o *et al.* [2] in 2014 among 86 HF patients in Yaounde General Hospital, who obtained a mean age of 64.8±13 years. There was female predominance with a sex ratio of 1.75:1. Nkoke *et al* in 2019 equally had a female predominance among a study on HF patients in a semi-urban setting in Cameroon [6]). Half of participants had very little or no monthly financial income. Consequently, hospital bills were mostly handled by family members, (80.7%). The low level of formal education and financial income possibly has an impact on the choice of the itineraries. This could explain why a group of participants visited traditional healers or auto-medicated as their first therapeutic stations, since these stations are thought to be more affordable, and with less worries about being a financial burden to relatives. The highest symptoms patients suffered from at onset were fatigue, dyspnea, leg swelling and palpitation. This is similar to a study conducted by Nyoke C.*et al*[9], with the most common symptoms being pedal oedema, dyspnea and orthopnea, even though contrary to our study, fatigue was the least symptom reported by participants.

Therapeutic itineraries and various therapeutic stations

Summarily, out of the 135 participants in our study, just 1 (0.7%) went through the ideal itinerary, 67 (49.6%) had a pseudo-ideal pathway, 32 (23.7%) went directly to the BRH cardiologist consultation, and up to 36 (25.9%) had an erroneous itinerary. Most participants (36.3%), delayed for 1-3 weeks after onset of symptoms before seeking a means of intervention. This is close to a study conducted by Gravely-Witte *et al* [9] in 2010 to find the length of delay in seeking medical care in patients with heart failure symptoms, which showed a pre-hospital delay of 13 hours to 16

days. This delay could be justified by the fact that HF symptoms start gradually and many people tend to be ignorant on the cardinal signs of HF by patients, and low level of suspicion of HF by nurses at IHCs. Additionally, a lot of people in this area belief in spiritual origin of diseases

The BRH cardiologist consultation was the 1st station most patients 32 (23.7%). This could be because of the high prevalence of hypertensive patients who were already being followed up by the cardiologists, hence patients notify the cardiologists directly when new symptoms appear. Nearness to the BRH probably contributed to the number of patients who chose to meet the cardiologists directly. About 15% of cases and 8.9% had as first therapeutic stations home management and traditional healers respectively. A review by Tantchou *et al.* [10] in 2011 among HF patients at the Shisong cardiac center in the North West region of Cameroon reported that 45% of their patients were coming from traditional healers. This discrepancy could be from the difference in our study settings, Shisong being a rural zone with wider exposure to a variety of herbalists and traditional healers. Majority of participants went through a total of 2 stations, 60 (44.4%), and just 5 (3.7%) spanned through 5 therapeutic stations. By so doing, patients moved from one station to the next with the hope of relieving their symptoms until they reached a station where they could be appropriately managed.

Impact of itineraries on general state of patients

Upon being followed up at BRH by cardiologists, there was marked improvement of symptoms among participants compared to entry. This was confirmed by the NYHA stages at the time of recruitment (54.1%, 26.7% and 15.6% for stages I, II and III respectively), compared to that before entry (0.7% stage I, 38.5% stage II, 41.5% stage 3, and 19.3% stage 4). The differences were found to be statistically significant with p-values less than 0.0005 at 95% confidence interval. This favorable outcome can be justified by the fact that patients under specialists' care at the BRH were examined, requested to do various standard investigations related to heart failure, and to exclude other possible diagnosis. When placed on medication after confirmation of the disease, thorough counselling on lifestyle modification is done together with continuous follow up of patients and reminders of appointment dates, regardless of whether symptoms have fully regressed or not.

Limitations

- There was possibility of recall bias as patients were seen in the hospital after having gone through other hospitals, especially participants who had been diagnosed many years ago.
- The study was carried out over a period of just 4months, whereas given the chronicity of the disease some potential candidates might never visit our health facility before the end of our study period.
- One of the challenges faced was linguistic barrier with some participants, thereby causing us to involve intermediaries for translation, creating chances for reporting information inaccurately.

CONCLUSION

At the end of this study we identified 6 therapeutic stations identified which were auto-medication, traditional healers, integrated health centers, district hospital, private clinics, and Bafoussam Regional Hospital. Patients generally moved from one station to the next with onset of symptoms hoping to find a solution till they reached the BRH. We can conclude that less than 1% of symptomatic heart failure went through the ideal itinerary, 49.6% had a pseudo-ideal pathway, 23.7% went directly to the BRH cardiologist consultation, and up to 25.9% had an erroneous itinerary. Few (12.59%) participants were found to have visited traditional healers. Majority of participants went through a total of 2 therapeutic stations, 60 (44.4%), and just 5(3.7%) went through 5 therapeutic stations. Most participants arrived at the BRH at NYHA stage III (41.5%). Upon follow up at BRH by cardiologists, there was an overall improvement on their health status.

Ethical consideration

A research protocol was written and after validation by supervisors, deposited at the Scientific and Ethics committee of the Faculty of Health Science, University of Bamenda for approval. This was succeeded by a request for administrative authorization from the director of the Bafoussam Regional Hospital. Furthermore, all participants were informed of the aims and the procedures to be used in the study. They signed a consent form and were informed of their right to back out of the study at any time and that no personal identifying information would be collected from them.

Abbreviations

HF: Heart failure, WHO: World Health Organization, IHC: integrated health center, NYHA: New York Heart Association, PC: private clinic, TH: traditional healer, BRH: Bafoussam regional Hospital, DH: district hospital, YTS: Yimelong Tsayem Sibylle, SK: Samuel Kingue, KKC: Kouam Kouam Charles, NFN: Nguemaim Flore Ngoufo, MI: Mohamed Isah, ESE: Egbe Sangasu Eni, MKI: Misonge Kapnang Ivan, SNNE: Sintieh N.N, Ekongefeyin

REFERENCES

1. Ambrosy AP, Fonarow GC, Butler J, Chioncel O, Greene SJ, Vaduganathan M, et al. The global health and economic burden of hospitalizations for heart failure: lessons learned from hospitalized heart failure registries. J Am Coll Cardiol. 2014;63(12):1123–33.

2. Nlo'o AE, Kuate LM, Yayehd K, Nkoke C, Abissegue YG, Bell NW, et al. Management of Heart Failure in the Yaounde Military Hospital - Cameroon. Health Sci Dis [Internet]. 2016 Aug 14 [cited 2019 Jun 21];17(3). Available from: http://hsd-fmsb.org/index.php/hsd/article/view/676

3. Nlo'o AE, Kuate LM, Yayehd K, Nkoke C, Abissegue YG, Bell NW, et al. Management of Heart Failure in the Yaounde Military Hospital - Cameroon. Health Sci Dis [Internet]. 2016 Aug 14 [cited 2019 Jun 21];17(3). Available from: http://hsd-fmsb.org/index.php/hsd/article/view/676

4. Ozioma EOJ, NwamakaChinwe OA. Herbal Medicines in African Traditional Medicine. Herb Med [Internet]. 2019 Jan 30 [cited 2019 Jun 22]; Available from: https://www.intechopen.com/books/herbal-medicine/herbal-medicines-in-african-traditional-medicine

5. Cameroon_-_Health_System_Development_Project_-_Appraisal_Report.pdf [Internet]. [cited 2019 Jun 22]. Available from: https://www.afdb.org/fileadmin/uploads/afdb/Documents/Project-and-Operations/Cameroon_-_Health_System_Development_Project_-_Appraisal_Report.pdf

6. Vaughn LM, Jacquez F, Bakar RC. Cultural Health Attributions, Beliefs, and Practices: Effects on Healthcare and Medical Education. In 2009.

7. Payal Kohli. The heart: Anatomy, physiology, and function. Healthline Media.2020. Accessed 30 September 2020. Available from: https://www.medicalnewstoday.com/articles/320565.php

8. Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JGF, Coats AJS, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. Eur Heart J. 2016 Jul 14;37(27):2129–200.

9. Nkoke C, Jingi AM, Aminde LN, Teuwafeu D, Nkouonlack C, Noubiap JJ, et al. Heart failure in a semi-urban setting in Cameroon: clinical characteristics, etiologies, treatment and outcome. J Xiangya Med [Internet]. 2019 May 3 [cited 2019 Jun 22];4(0). Available from: http://jxym.amegroups.com/article/view/5054.

10. Gravely-Witte S, Jurgens CY, Tamim H, Grace SL. Length of delay in seeking medical care by patients with heart failure symptoms and the role of symptom-related factors: a narrative review. Eur J Heart Fail. 2010 Oct;12(10):1122–9

11. Cabral TTJ, Claude AJ, Samuel K, Alessandro G, Sylvia C, Alessandro F, et al. Occurrence, aetiology and challenges in the management of congestive heart failure in sub-saharan Africa: experience of the Cardiac Centre in Shisong, Cameroon. Pan Afr Med J. 2011.

APPENDIX 1: QUESTIONNAIRE

THERAPEUTIC ITINERARY OF PATIENTS WITH CHRONIC HEART FAILURE AT THE BAFOUSSAM REGIONAL HOSPITAL

This questionnaire is divided into 3sections. Read the instructions in each section carefully before filling in answers. Use only codes in the last column to fill your answers.

N°	Date of entry __/__/__	Code _____	code
	QUESTIONS		
	SECTION ONE :IDENTIFICATION/ SOCIODEMOGRAPHIC CHARACTERISTICS		
S1Q1	Age		
S1Q2	Sex	Male =1 female =2	
S1Q3	Residence	Bafoussam =1 Around Bafoussam =2 Far from Bafoussam (rural) =3	
S1Q4	Monthly income	<50 000 =1, 50 000-100 000 =2, 100 001-250 000 =3 >250 000 = 4 none= 5	
S1Q5	Who pays your hospital bills	Self= 1, insurance= 2, family= 3, others = 4	
S1Q6	Educational level	Primary =1 secondary=2 university=3 none= 4	
	SECTION 2 : Cardiovascular factors and therapeutic stations consulted		

S2Q0	Cardiovascular risk factors; HTN=1, diabetes mellitus=2, alcohol=3, smoking4, obesity=5, dyslipidemia=6		
S2Q1	What symptoms did you experience at onset?	Leg swelling =1, dyspnea= 2, PND =3 , coughing=4 fatigue= 5, abdominal distention=6 palpitation =7	
S2Q3	How long after symptoms onset did you attempt a means of intervention to relieve symptoms?	0-5hrs= 1, 6-24hrs= 2 , 1-6days= 3 , 1-3weeks=4, 1-2months= 5, >2months= 6	
S2Q4	Have you been diagnosed with any of these conditions?	Diabetes mellitus= 1, HTN= 2, valvulopathy= 3, Cardiac arrhythmia= 4, HIV= 5, Sickle cell disease= 6	
S2Q5	Identify your 1st station after symptoms onset .	Station 1 : home/self-management = 1, station 2: traditional healer =2 , station 3: health centre = 3, station 4 : district hospital= 4 , station 5: others= 5 , station 6: cardiologist= 6	
S2Q6	Identify the 2nd station you went to?	Station 1 : home/self-management = 1, station 2: traditional healer =2 , station 3: health centre = 3, station 4 : district hospital= 4 , station 5: others= 5 , station 6: cardiologist= 6	

S2Q7	Identify the 3rd staion you went to if any?	Station 1 : home/self-management = 1, station 2: traditional healer =2 , station 3: health centre = 3, station 4 : district hospital= 4 , station 5: others= 5 , station 6: cardiologist= 6	
S2Q8	Identify the 4th sation you went to if any.	Station 1 : home/self-management = 1, station 2: traditional healer =2 , station 3: health centre = 3, station 4 : district hospital= 4 , station 5: others= 5 , station 6: cardiologist= 6	
S2Q9	Identify the 5th station you went to if any.	Station 1 : home/self-management = 1, station 2: traditional healer =2 , station 3: health centre = 3, station 4 : district hospital= 4 , station 5: others= 5 , station 6: cardiologist= 6	
	, SECTION 3: Clinical stage of HF at onset and at time of interview, according to NYHA		

	NB: This section is to be filled by the investigator.		
SQ1	Stage at onset		
	Stage 1	No limitation of physical activity	
	Stage 2	Slight limitation of physical activity	
	Stage 3	Marked limitation of physical activity	
	Stage 4	Symptoms of heart failure at rest	
	Stage during recruitment		
	Stage 1	No limitation of physical activity	
	Stage 2	Slight limitation of physical activity	
	Stage 3	Marked limitation of physical activity	
	Stage 4	Symptoms of heart failure at rest	