Scientific Research Publishing

World Journal of Cardiovascular Diseases, 2023, 13, 619-631
https://www.scirp.org/journal/wjcd
ISSN Online: 2164-5337
ISSN Print: 2164-5329

Heart Failure: Organization of Care after Hospitalization at the Abidjan Cardiology Institute

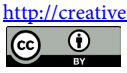
Djenamba Bamba-Kamagaté[1*], Esaïe Soya[1], Mbe Dagnogo[1], Kouassi Florent Koffi[1], Parfait Kouame[1], Jean Baptiste Anzouan-Kacou[2]

[1]Medical Service, Cardiology Institute of Abidjan, Abidjan, Côte d'Ivoire
[2]Functional Investigation Service, Cardiology Institute of Abidjan, Abidjan, Côte d'Ivoire
Email: *djeneba.bamba@hotmail.fr

How to cite this paper: Bamba-Kamagaté, D., Soya1, E., Dagnogo, M., Koffi, F., Kouame, P. and Anzouan-Kacou, J.B. (2023) Heart Failure: Organization of Care after Hospitalization at the Abidjan Cardiology Institute. *World Journal of Cardiovascular Diseases*, **13**, 619-631.
https://doi.org/10.4236/wjcd.2023.139055

Received: July 27, 2023
Accepted: September 25, 2023
Published: September 28, 2023

Copyright © 2023 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
http://creativecommons.org/licenses/by/4.0/



Open Access

Abstract

Introduction: The care pathway for heart failure (HF) patients is poorly documented in sub-Saharan Africa. A multidisciplinary management reduces hospitalizations and mortality. In our context of frequent rehospitalization of heart failure patients, the objective of this study was to analyse the post-hospital follow-up health care. **Methods:** We conducted a prospective study in the medical department of a Heart Institute from January 1st to December 31, 2015. Patients over 18 years of age, hospitalized for heart failure, consenting and followed up on an outpatient basis for 2 years were included. **Results:** We collected 396 patients hospitalized for HF. The mean age was 57.4 ± 16 years with a male predominance (59.3%). Retired and unemployed people represented 27% and 16.2% respectively. During the post-hospitalization follow-up, patients who were regularly followed up represented 10.8% of the cases. 74.1% of the cases were regular patients. Patients were not followed up by the usual practitioner (58.2%). Only 94 patients had undergone a cardiovascular rehabilitation programme, of which 21.3% for exercise rehabilitation and 78.7% for therapeutic education. Patients who had attended titration sessions (n = 59) had reached optimal doses of ACE inhibitors, ARB II and beta blockers in 67.8%, 7.3% and 38.5% respectively. The rates of decompensation (73.3%) and rehospitalization (49.5%) were higher. The paraclinic check-up (ECG, X-ray, Cardiac Doppler ultrasonography, Biology) was rarely requested. The probability of survival was higher in patients regularly monitored than in those irregularly monitored. **Conclusion:** The organisation of care and coordination between professionals should be structured or planned. Therapeutic strategies need to be intensified in order to optimise their long-term benefits.

Keywords

Care Pathway, Hospitalization Suites, Heart Failure, Outpatient

1. Introduction

Heart failure (HF) is the inability of the heart to provide, the blood flow necessary for the metabolic and functional needs of the various organs under normal conditions, with unincreased upstream venous pressures. It is the complication of many cardiovascular diseases. It is a public health problem.

Over the last three decades, major advances in the drug (renin-angiotensin-aldosterone system and the sympathetic system blocking) and non-drug (electrical, interventional and surgical treatment) management of HF have contributed to a reduction in overall morbidity and mortality [1]. Well-structured follow-up programmes (cardiovascular rehabilitation, telemedicine) have led to a reduction in rehospitalization and improved quality of life for patients in Europe [2]. However, in sub-Saharan Africa, post-hospital follow-up seems unstructured. Yet, HF is a frequent reason for hospitalization [3], and particularly in Côte d'Ivoire. Also, in our daily practice, we are witnessing a recrudescence of rehospitalisation whose factors seem unknown.

In this context of frequent rehospitalization of HF patients at the Abidjan Heart Institute (AHI), this study was conducted to analyse the quality of post-hospitalization health care follow-up during heart failure at the Abidjan Heart Institute.

2. Methods

We conducted a prospective descriptive study of patients hospitalised for heart failure in the medicine department of the Abidjan Heart Institute from January 1st to December 31, 2015.

The HF Patients included were over 18 without sex distinction, had been hospitalised for heart failure in the medicine department and discharged during the study period; had a clinic and paraclinic check-up (chest X-ray, ECG, echocardiography, biology); followed up as an outpatient for at least two years. Patients who did not give informed consent and patients who died in hospital prior to outpatient follow-up were not included.

For each patient, after verbal informed consent, data was collected using a standardised survey form developed with Epi Data 3.1 software. We recorded consecutively the socio-demographic, clinical, paraclinic, therapeutic and the post-hospital follow-up data. We analysed socio-demographic parameters, consultations, clinic and paraclinic data, rehabilitation program (therapeutic education and exercise training) and titration program (Angiotensin-converting enzyme: ACEI, Angiotensin receptor blockers: ARBs, Beta-blockers). Death rates are at 6 months, 9 months, 12 months and 24 months.

The consultation was said to be regular, when the patients respected the periodicity of the appointments fixed by the doctor. It was said to be irregular when the patients did not respect the periodicity of the appointments fixed by the doctor. A person "lost to follow-up" was a patient for whom we had no information after at least one consultation despite reminders.

Data entry was performed using Epi Data 3.1 software and statistical analysis by Stata 12.0 software. Quantitative variables were expressed as mean ± standard deviation. While qualitative variables were expressed as a proportion or percentage, survival curves were compared according to Kaplan Meier.

3. Results

3.1. Prevalence

During the study period 396 heart failure patients were identified out of 1127 admissions to the medical department. The frequency of HF was 35% for the one year.

3.2. Socio-Demographic Characteristics

The average age of the patients after hospitalization was 57.4 ± 16.4 years with the extremes of 18 and 91 years.

The population aged over 50 represented two third of the patients (67.2%). There was a male predominance (59.3%) with a sex ratio of 1.5.

The study revealed that 48% of the patients had a secondary education level and 34.3% had an academic level.

The working population represented 56.8% of the patients. Patients residing in Abidjan represented 73.5% of the cases. The most common risk factor for heart failure was hypertension (49%), followed by smoking (16%) and diabetes (15%; Table 1).

3.3. Clinic

The majority of patients had a history of hospitalization for HF (45%). The study revealed that 36.1% of the patients had systolic blood pressure (SBP) ≥ 140 mmHg and 43.4% had diastolic blood pressure (DBP) ≥ 90 mmHg. Tachycardia was observed in 74% of our patients. Polypnea was present in 53% of cases (Table 1). Obesity was found in 36.9% of patients and overweight was recorded in 28.3% of patients. The frequent mode of decompensation on admission was the global HF (61.9%), followed by the right HF (23.5%) and the left HF (14.6%). In descending order, the frequent triggering factors were infectious syndrome (27.8%), therapeutic non-compliance (25.2%), rhythm disorders (17.7%), pulmonary embolism (6.8%) and myocardial ischemia (6.1%, Table 1).

3.4. Paramedical Assessment

Cardiomegaly was found in 98.3% with a mean of 0.7 ± 0.4.Sinus rhythm (56.1%) and sinus tachycardia (44.9%) was frequently reported. The most

Table 1. Socio-demographic, clinical, echocardiographic, therapeutic and evolutionary parameters.

Settings	N = 396	%	M ± ET
Socio-demographic			
Age (years)			57.4 ± 16.4
Sex (M)	235	59.3	
Employment status			
Active	225	56.8	
Retired	107	27	
Clinical (mode of decompensation)			
Global HF	245	61.9	
Right HF	91	23	
Left HF	58	14.8	
OAP	23	5.8	
Cardiogenic shock	7	1.8	
Echocardiography			
LVDTD (mm)			60 ± 28.3
DTD ≥ 56 mm	176	55	
LVEF< 45%.	236	60.4	
Underlying heart disease			
Dilated cardiomyopathy	143	36.1	
Hypertensive cardiomyopathy	86	21.7	
Ischemic cardiomyopathy	64	16.2	
Valvulopathies	39	9.8	
Pulmonary arterial hypertension	24	6.1	
Peripartum cardiomyopathy	17	4.3	
Pericarditis	15	3.8	
Others	8	2	
Treatment			
Furosemide	361	91.2	
Mineralocorticoid receptor antagonists (MRAs)	46	11.6	
Beta-blockers	183	46.2	
Angiotensin-converting enzyme inhibitors (ACEI)	288	72.7	
Angiotensin receptor blockers (ARBs)	34	8.6	
Others therapies			
Calcium Channel blockers (CCBs)	28	7.1	

Continued

Anticoagulants	36	9.1
Nitro derivatives	90	22.7
Aspirin	102	25.8
Statins	75	18.9
Intra-hospital Outcome		
Favourable	374	94.4
Complications	41	10.4
death	22	5.5

important supra-auricular disorder was atrial fibrillation (23.7%) and the predominant supra-ventricular disorder was ventricular extrasystols (23%). The study population had atrioventricular block 1 (AVB1) in 10.3%.

Bundle branch block was most represented by Incomplete Right Bundle-Branch block (IRBBB) (27.4%) followed by complete Right Bundle-Branch block (CRBBB) (22.2%).

Left ventricle telediastolic diameter (LVTDD) and Left ventricule telesystolic diameter (LVTSD) were elevated in 55% and 59.1% of cases respectively. LVEF was impaired in Simpson biplane (55.5%) and Tm (84.5%) respectively. Among the underlying heart diseases, dilated cardiomyopathies predominated (36.1%) followed by hypertensive (21.7%), ischaemic (16.2%) and valvular (9.8%) heart diseases (Table 1).

The biology showed hyponatremia (37.7%), hypokalemia (8.7%) and hyper creatinin (1.9%). The blood level of NT-proBNP was high in 95% of cases.

3.5. Treatment

The main drugs prescribed were furosemide (91.2%), ACE inhibitors (72.2%) or ARBs (8.6%), beta-blockers (46.2%) and Mineralocorticoid receptor antagonists: MRAs (11.6%). Associated treatment included Calcium Channel inhibitors (7.1%), statins (18.9%), nitrates (22.7%), aspirin (25.8%) and curative anticoagulant therapies (31.6%, Table 1).

3.6. Post-Hospitalization

1) Follow-up consultations

During the posthospital heath care follow-up, more than half of the patients (74.1%) were non-compliants. The majority of patients (58.2%) were not followed up by the usual practitioner (Table 2).

2) Titration session

Patients who completed the post-hospital titration sessions achieved optimal doses of ACE inhibitors, ARBs and Beta-blockers in 54.1%, 7.3% and 38.5% of cases respectively.

3) Cardiovascular rehabilitation

In cardiovascular rehabilitation, 94 patients had completed their program, 21.3% of whom had received exercise training and 78.7% therapeutic education.

4) Imaging and biological parameters

The ECG was monitored in 14 outpatients. The chest X-ray and cardiac Doppler ultrasonography were requested in 5 and 25 of the outpatients respectively. Biological monitoring was rarely performed during the post-hospital follow-up (Table 2).

3.7. Evolution

At 2-years post-hospitalization heath care follow-up, rehospitalized patients

Table 2. Post-hospital follow-up parameters.

Post-hospitalization follow-up	N = 374	%
Consultations		
Regular	41	10.9
Irregular	53	14.1
Poor compliants	280	74.8
Attending physician		
Usual practitioner	41	10.9
Others	53	14.1
Titration sessions		
Reaching the target dose		
Reaching the target dose	40	10.7
ARBs	6	1.6
Beta blockers	34	9.1
Stationary dose		
ACE Inhibitors	15	4
ARBs	2	0.5
Beta blockers	7	1.9
Cardiovascular rehabilitation		
Therapeutic education	74	19.4
Exercise training	20	5.3
Paraclinical control balance sheet		
ECG	14	3.7
Cardiac X-ray	5	1.3
Echocardiography	25	6.7
Outcome at 2 years follow-up		
Rehospitalizations	185	49.5
Death	113	30.2

represented 49.5%, the number of decompensations was 77.3% and deaths were estimated at 30.2% of cases.

During the first year of follow-up, the mortality was 48.2%, 67% and 72.3% at 6 months, 9 months and 1-year at 6 months, 9 months and 1-year respectively.

The probability of survival was higher in patients regularly monitored than in irregularly monitored (Figure 1).

4. Discussion

4.1. Limitations of Study

This work is of scientific and pragmatic interest because of its originality on the one hand and on the other hand, the significant data concerning the care pathway of heart failure patients in our context.

4.2. Prevalence

The hospital prevalence of HF in our study was 35%. This prevalence varies from 27.3% to 41% in some African series [4] [5] [6]. However, the prevalence of heart failure varies between 0.4% and 2% for the general population in Europe [7]. This difference in prevalence could be explained by the better management of coronary syndromes, which are the main cause of heart failure in the west. In Côte d'Ivoire, however, it is the complications of hypertension. The low socio-economic level makes access to health care difficult in our population.

4.3. Epidemiological Characteristics

The majority of patients in this study were aged over 50 (67.2%). The mean age of the patients was 57.4 ± 16.4 years. The average age generally observed in

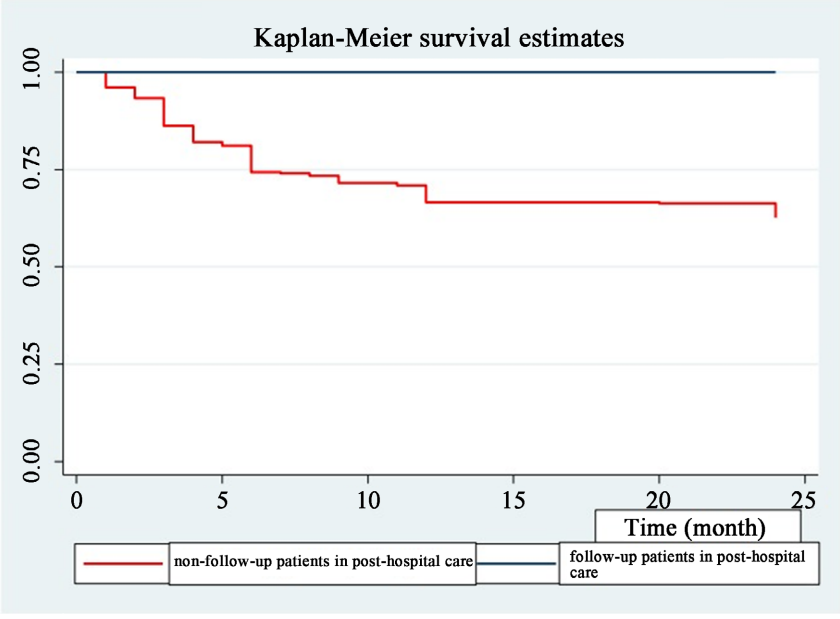


Figure 1. Comparison of survival of regular and non-regular post-hospitalization patients using Kaplan-Meier plan.

sub-Saharan Africa is around 55 years [8] [9]. In contrast, the average age was higher in the West at around 75 years [7] [10]. This age difference between African and Western data could be explained by the longer life expectancy in Europe. This condition contributes to lower life expectancy in our country in particular and in Africa in general.

The HF occurs in Africa in adults in their fifties or older, whereas in the West it is later in life, around the current septuagenarians.

Male predominance seems to be constant [8]. However, some African authors [11] and the ADHERE study [10] noted a female predominance in 56%, 59.6% and 52% respectively. A plausible explanation could be due to the better control of cardiovascular diseases in women who are traditionally known for better health behaviour leading to fewer complications such as HF.

4.4. Clinical Aspects

Congestive heart failure (61.9%) was the common clinical presentation in this study, followed by right heart failure (23%) and left heart failure (14.6%). Kheyi [6] in Morocco found that left heart failure was predominant (63%). Congestive heart failure was the predominant clinical presentation in sub-Saharan Africa [5] [12] [13] [14]. This would probably be justified by the delay in consultation, the insufficiency or even absence of financial means and the inappropriate therapeutic itineraries, which would explain the delay in consultation and the evolution towards severe forms.

4.5. Post-Hospital Care

After discharge from hospital, our patients were followed up on an outpatient basis for 2 years. This stage was marked by the high number of patients with very poor compliance (74.1%) and irregular consultations (15.1%) after 2 years of follow-up. This finding was the same in the N'cho-Motto prospective observational study carried out in the same department [16]. The author found 60.3% poor compliance with follow-up appointments. Indeed, this study reported that patients resorted to traditional medicine and prayers for healing, which led to poor compliance with therapeutics [16]. This attitude could be related to a low socio-economic status. More than half of our patients were retired or unemployed. This was a handicap for an adequate therapeutic follow-up in our context of lack of health insurance. Usually, their healthcare is provided by a third party or the family.

In addition to this primary difficulty, which would explain the lost of follow-up, there is also the lack of patient compliance. This situation has a negative impact for improving doctor-patient relationship. This disruption of the doctor-patient relationship was significant. Nearly two third of the patients were not followed up by the usual practitioner. This could explain the number of patients lost to follow-up and the irregular consultations in our study. The trust that develops in the doctor-patient relationship usually motivates patients to consult

their practitioner and avoids discordant discourse, attitudes and practices of practitioners. Awareness-raising actions aimed at the actors must be undertaken.

The titration of certain therapies such as Beta-blockers, ACE inhibitors and ARBs is a necessary therapeutic objective for the optimisation of patients' treatment. During this follow-up period, only 59 patients had received from titration sessions. It was significant for betablockers (81%) and ACE inhibitors (67.6%). At optimal doses, ACE inhibitors or ARBs and betablockers have been shown to be effective in reducing morbidity and mortality in HF [1]. This optimal tolerated dose is not often reached at discharge because of low arterial blood pressures [19]. Thus, post-hospitalization follow-up turns out to be an opportunity for complicity between the doctor and the patient in the search for the target dose. However, we noted that few of the regular patients in the study underwent it. Lack of time and sufficient doctors, episodes of decompensation and sometimes contraindications were noted as obstacles to the regularity of titration sessions.

This study also revealed that cardiovascular rehabilitation, including exercise training and therapeutic education, if necessary, in the post-hospitalization follow-up, was poorly practised, exposing a quantitative and qualitative insufficiency in the management of HF [10]. These beneficial effects have been demonstrated in several clinical trials [20] [21] [22] [23]. Giallauria, *et al.* [20] observed an improvement in peak of VO2, the 6-minute walk test and the quality of life of heart failure patients. Belardinelli [21] in a 10-year study showed an improvement in peak VO2, a decrease in resting heart rate, an improvement in LVEF and a reduction in the VE/VCO2 slope in patients admitted to an exercise training programme. He also reported a reduction in the rate of death and rehospitalizations in exercise-retrained HF patients [21].

Therapeutic education, leads to improved adherence and compliance, a reduction in the number of rehospitalizations and the cost of management, and an improvement in quality of life and survival [22] [23].

The lack of such operational cardiovascular rehabilitation facilities being in sub-Saharan Africa would certainly explain the high rates of rehospitalization and mortality in HF [1] [8]. However, cardiovascular rehabilitation was in its infancy and the additional costs faced by patients with low-income would explain the low proportion of participants in exercise training and therapeutic education sessions. Awareness of the benefits should allow us to overcome this difficulty.

Post-hospitalization follow-up is reinforced by paraclinical check-ups. These tests allow us to check the effectiveness and safety of the treatment and to look for secondary complications. This study showed that the request for ECGs, chest X-ray, cardiac echodoppler and biological control tests was weak. Also, NT-proBNP, which is a diagnostic, monitoring and prognostic marker, was only requested at admission. The NT-proBNP assay is only performed on admission for diagnosis. This relevant marker for follow-up and prognosis was neglected due to its high cost for outpatient with low income in Africa. The level of NT-proBNP at discharge predicts the prognosis of HF [24]. This test remains

costly in our practice setting and would represent one third of the minimum wage. This could be explained by the low rate of patients regularly followed up in post-hospitalization and the lack of planning of the demand for these examinations. In addition, the low socio-economic level of our patients makes it impossible to carry out these examinations in the majority of cases. It becomes difficult to monitor occurrence of complications and decompensation factors. The most common found decompensation factors of HF were bronchopulmonary infection (32.1%), treatment non-compliance (29%) and rhythm disorders (20.5%). Other authors found the same factors but in different proportions. Our results confirmed those of Soya [15] which were: non-compliance with treatment (48.7%), bronchopulmonary infections (33%), non-compliance with diet (23.7%), rhythm disorders (16.2%) and anaemia (11.8%). In our context, the factors of poor compliance with treatment, recourse to traditional therapy, non-compliance with consultations, poor therapeutic compliance and lack of social security coverage have also been identified [16]. These factors are the source of frequent rehospitalizations and the poor quality of life of heart failure patients. Oyoo and Ogola in Kenya [17] had identified irregularity of treatment (27.4%), arrhythmia (20.9%), infection (17.6%), and anaemia (13.2%) as triggering factors. The direct pathophysiological mechanism according to Dike [18] was severely elevated blood pressure.

In total, the decompensating factors are very diverse, including infection, rhythm disorders and non-adherence to therapy, which seem to be presentin almost all series. This is why therapeutic follow-up must systematically integrate relapse and the prevention of these triggering factors.

4.6. Post Hospital Outcome

Inadequate post-hospital follow-up and socio-economic factors in this study would explain the rehospitalization rate (40.5%). Indeed, the probability of survival was high in the regularly followed up patients compared to the non-observant group. We regretted 30.2% of deaths during follow-up over the period of this study. Our results are in agreement with those of some authors. In Europe, the EFICA registry noted 50% of deaths at one year. Zannad found 46.5% of mortality at one year [25]. On the other hand, Siirila-Waris found 27.4% after 12 months of evolution [26]. All these results showed a high mortality rate at one year of follow-up for heart failure patients. In Europe, this could be explained by the ageing of the population, making advanced age a poor prognostic factor. In Africa, it is a source of high morbidity and mortality among young people, leading to a drop in productivity.

This study also showed that this mortality rate had reached 30.2% at 2 years of follow-up. It is higher in non-regularly followed up patients. Favouring factors would probably be the low socio-economic level, the irregularity of consultations, the lack of patient loyalty, the absence of therapeutic education and effort re-training.

5. Conclusion

The organisation of care and coordination between professionals should be structured or planed. Therapeutic strategies need to be intensified in order to optimise their long-term benefits.

Conflicts of Interest

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

References

[1] Ponikowski, P., Voors, A.A., Anker, S.D., *et al.* (2016) 2016 ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure. *European Heart Journal*, **37**, 2129-2200. https://doi.org/10.1093/eurheartj/ehw128

[2] Pavy, B., Iliou, M.C., Vergès-Patois, B., *et al.* (2012) Directives de la Société française de cardiologie pour la réadaptation cardiaque chez l'adulte. *Archives des Maladies Cardiovasculaires*, **109**, 309-328.

[3] Damasceno, A., Mayosi, B.M., Sani, M., *et al.* (2013) Readmissions and Death after an Acute Heart Failure: Predictors and Outcomes in Sub-Saharan African: Results from the THESUS-HF Registry. *European Heart Journal*, **34**, 3151-3159. https://doi.org/10.1093/eurheartj/eht393

[4] Kingue, S., Dzudie, A., Menanga, A., Akono, M., Ouankou, M. and Muna, W. (2002) Nouveau regard sur l'insuffisance cardiaque chronique de l'adulte en Afrique à l'ère de l'échocardiographie Doppler: Experience du service de médecine de l'Hôpital Général de Yaoundé. *Annales de Cardiologie et d'Angéiologie*, **54**, 276-283. https://doi.org/10.1016/j.ancard.2005.04.014

[5] Diallo, B., Sanogo, K., Diakité, S., Diarra, M.B. and Touré, M.K. (2004) L'insuffisance cardiaque à l'hôpital du Point G. *Mali medical*, **9**, 15-17.

[6] Kheyi, J., Benelmakki, A., Bouzelmat, H. and Chaib, A. (2016) Epidemiologic et prise en charge de l'insuffisance cardiaque dans un centre marocain. *The Pan African Medical Journal*, **24**, 1-10. https://doi.org/10.11604/pamj.2016.24.85.8521

[7] Nieminen, M.S., Brutsaert, D., Dickstein, K., *et al.* (2006) Euro Heart Failure Survey II(EHFS II): Une enquête sur les patients hospitalisés souffrant d'insuffisance cardiaque aiguë: Description de la population. *European Heart Journal*, **27**, 2725-2736. https://doi.org/10.1093/eurheartj/ehl193

[8] Damasceno, A., Mayosi, B.M., Sani, M., Ogah, O.S., Mondo, C., Ojji, D., Dzudie, A., *et al.* (2012) The Causes, Treatment, and Outcome of Acute Heart Failure in 1006 Africans from 9 Countries. *Archives of Internal Medicine*, **172**, 1386-1394. https://doi.org/10.1001/archinternmed.2012.3310

[9] Stewart, S., Wilkinson, D., Hansen, C., *et al.* (2008) Predominance de l'insuffisance cardiaque au sein de la cohorte d'étude de Soweto: défis émergents pour les communautés urbaines africaines. *Circulation*, **118**, 2360-2367. https://doi.org/10.1161/CIRCULATIONAHA.108.786244

[10] Adams, K.F., Fonarow, G.C., Emermann, C.L., LeJemtel, T.H., Costanzo, M.R., Abraham, W.T., Berkowitz, R.L., Galvao, M. and Horton, D.P. (2005) Characteristics and Outcomes of Patients Hospitalized for Heart Failure in the United States: Rationale, Design, and Preliminary Observations from the First 100,000 Cases in the Acute Decompensated Heart Failure National Registry (ADHERE). *American Heart*

Journal, **149**, 209-216. https://doi.org/10.1016/j.ahj.2004.08.005

[11] Ikama, M.S., Kimbally-Kaky, G., Gombert, T., *et al.* (2008) Heart Failure in the Elderly Subject in Brazzaville: Clinical, Etiological and Evolutionary Aspects. *Medecine Tropicale*, **68**, 257-260.

[12] Thiam, M. Heart Failure in African Cardiology (2003) *Bulletin de la Société de Pathologie Exotique*, **96**, 217-218.

[13] Ba, S., Kane, A., Hane, L., Diop, I.B., Sarr, M., *et al.* (1998) Rheumatic Heart Disease in Senegal: Clinical and Therapeutic Aspects. *Tropical Cardiology*, **24**, 31-36.

[14] Niakara, A., Belemwre, S., Nebre, L.V.A. and Drabo, Y.S. (2000) Postpartum Cardiomyopathy in Black African Women: Clinical and Evolutionary Epidemiological Aspects of 32 Cases. *Tropical Cardiology*, **26**, 69-73.

[15] Soya, E., Coulibaly, I., Bamba, D., *et al.* (2015) Decompensatory Factors for Heart Failure in Black African Subjects. *Biomedical Africa*, **20**, 25-29.

[16] N'Cho-Mottoh, M.P., Boka, B., Yayehd, K., Coulibaly, I., Traore, F., Bamba-Kamagate, D., Esaïe Soya, K. and Koffi, J. (2015) Evaluation of Compliance in Black African Heart Failure. *Tropical Medicine and Health*, **25**, 373-376. https://doi.org/10.1684/mst.2015.0516

[17] Oyoo, G.O. and Ogola, F.R. (1999) Clinical and Socio-Demographic Aspects of Patients with Congestive Heart Failure at Kenyatta National Hospital, Nairobi. *East African Medical Journal*, **76**, 23-27.

[18] Ojji, D.B., Alfa, J., Ajayi, S.O., Mamven, M.H., Falase, A.O., *et al.* (2009) Pattern of Heart Failure in Abuja, Nigeria: An Echocardiographic Study. *Cardiovascular Journal of Africa*, **20**, 349-352.

[19] Bamba-KamagatÉ, D., Traoré, F., Soya, E., *et al.* (2013) Résistances aux diurétiques au cours de l'insuffisance cardiaque aigue: Caractéristiques et pronostics à l'institut de cardiologie d'Abidjan. *Tropical Cardiology*, **139**, 19-26.

[20] Giallauria, F., Vigorito, C., Piepoli, M.F. and Stewart Coats, A.J. (2014) Effets de la modulation de la contractilité cardiaque par stimulation électrique non excitatrice sur la capacité d'exercice et la qualité de vie: Meta-analyse des données d'un patient individuel dans le cadre d'essais contrôlés randomisés. *International Journal of Cardiology*, **175**, 352-357.

[21] Belardinelli, R., Georgiou, D., Cianci, G. and Purcaro, A. (2012) 10-Year Exercise Training in Chronic Heart Failure: A Randomized Controlled Trial Belardinelli. *Journal of the American College of Cardiology*, **60**, 1521-1528. https://doi.org/10.1016/j.jacc.2012.06.036

[22] Juilliere, Y., Jourdain, P., Sulty-Selton, C., *et al.* (2013) Therapeutic Patient Education and All-Cause Mortality in Patients with Chronic Heart Failure: A Propensity Analysis. *International Journal of Cardiology*, **168**, 388-395. https://doi.org/10.1016/j.ijcard.2012.09.030

[23] Koelling, T.M., Johnson, M.L., Cody, R.J. and Aaronson, K.D. (2005) L'éducation à la sortie améliore les résultats cliniques chez les patients atteints d'insuffisance cardiaque chronique. *Circulation*, **111**, 179-185. https://doi.org/10.1161/01.CIR.0000151811.53450.B8

[24] Logeart, D., Thabut, G., Peter, S., *et al.* (2004) Predischarge B-Type Natriuretic Peptides Assay for Identifying Patients at High Risk of Re-Admission after Decompensated Heart Failure. *Journal of the American College of Cardiology*, **43**, 635-641. https://doi.org/10.1016/j.jacc.2003.09.044

[25] Zannad, F., Mebazaa, A., Juillière, Y., *et al.* (2006) Profil clinique, prise en charge

contemporaine et mortalité à un an chez les patients atteints de syndromes d'insuffisance cardiaque aiguë sévère. *European Journal of Heart Failure*, **8**, 697-705.

[26] Siirila-Waris, K., Lassus, J., Melin, J., *et al.* (2006) Characteristics, Outcomes and Predictors of 1-Year Mortality in Patients Hospitalized for Acute Heart Failure. *European Heart Journal*, **27**, 3011-3017. https://doi.org/10.1093/eurheartj/ehl407