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Prevalence of Re-Hospitalization for Heart Failure in a Cameroonian Tertiary Hospital: A Cross-Sectional Study

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Abstract

Aim: To determine the prevalence of re-hospitalization for heart failure in the cardiology unit of the Yaoundé General Hospital. **Study Design:** This was a retrospective cross-sectional study from January 2015 to December 2020. **Patients and Methods:** Patients aged at least 18 years who were hospitalized for heart failure during the study period were included. Data were collected using a predesigned form and were analyzed using Epi Info™ version 7.2.2. **Results:** We included a total of 160 patients. The prevalence of re-hospitalization was 30.6%. Re-hospitalized patients had a mean age of 71.0 ± 13.9 years and a sex ratio of 1.6. The most common etiologies of HF were hypertensive heart disease (36.7%), followed by dilated cardiomyopathy (22.5%), and atrial fibrillation (16.3%). More than two third had class IV NYHA disease (77.6%). Most of them also had HFrEF (71.4%) and anemia (77.6%). **Conclusion:** There is a high rate of re-hospitalization in the cardiology unit of the Yaoundé General Hospital with most of these patients having old age and severe HF.

Keywords

Re-Hospitalization, Heart Failure, Yaoundé, Cameroon

1. Introduction

Heart failure (HF) is a worldwide public health problem. Hospitalization for HF accounts for 6.5 million hospital days spent annually in the United States with nearly 50% of patients requiring readmission in the 6 months following initial

hospitalization [1] [2]. In addition to its high prevalence, hospitalization for decompensated HF is associated with extraordinarily high rates of morbidity and mortality. Aranda *et al.* analyzed Medicare data and found that in the 6 to 9 months following initial hospitalization for HF, 60% of the patients had readmission from any cause with HF accounting for 28% of readmissions [3]. In a recent meta-analysis, Lan *et al.* reported an all-cause readmission rate of 53% and 36% for HF [4]. The high prevalence and morbidity associated with decompensated HF combine to create a substantial economic burden on the healthcare system. The total yearly cost of HF reported in the United States in 2009 was estimated to be $37.2 billion of which $20 billion were related to hospitalization [5]. This social and economic burden of HF hospitalization is certainly greater in Africa where the disease affects men and women in their most productive years of life, at a median age of 55 years, and where many countries lack universal health care [6]. There is also a scarcity of updated data, especially related to heart failure readmissions. This study aimed to determine the prevalence of re-hospitalization for HF and to describe the clinical and paraclinical presentation of patients in the Yaoundé General Hospital.

2. Methods

2.1. Study Design and Setting

This was a cross-sectional retrospective study conducted in the cardiology unit of the Yaoundé General Hospital (YGH). The study involved the period spanning from January 2015 to December 2020. The YGH is a tertiary health institution in the political capital of Cameroon, sub-Saharan Africa. It has a catchment population of about 3 million inhabitants.

2.2. Participants

We included patients aged 18 years and above, followed up in the study setting during the study period. All those who had at least one readmission for HF were classified as re-hospitalized. Patients with incomplete charts were excluded.

2.3. Sampling

The sampling was random. The minimal sample size of 118 was calculated using Lorentz's formula with an error threshold of 5% and an estimated the prevalence of readmissions at the Yaoundé General Hospital of Yaoundé.

2.4. Data Collection

Files of patients who met inclusion criteria were reviewed. We used a predesigned data collection form. Socio-demographic parameters and Comorbidities including hypertension, diabetes, chronic kidney disease, COPD/asthma, HIV, alcohol consumption, smoking, and other chronic diseases were collected. Antecedents and clinical details of the last hospitalization were also collected. These included the stage of HF at the most recent admission for HF, symptoms and

physical signs of HF, associated diagnosis, and paraclinical workup including hemoglobin value, leucocyte count, sodium and potassium concentrations, creatinine values along with alanine and aspartate aminotransferase values. Chest X-ray, electrocardiogram, and echocardiographic results were also assessed.

2.5. Statistical Analysis

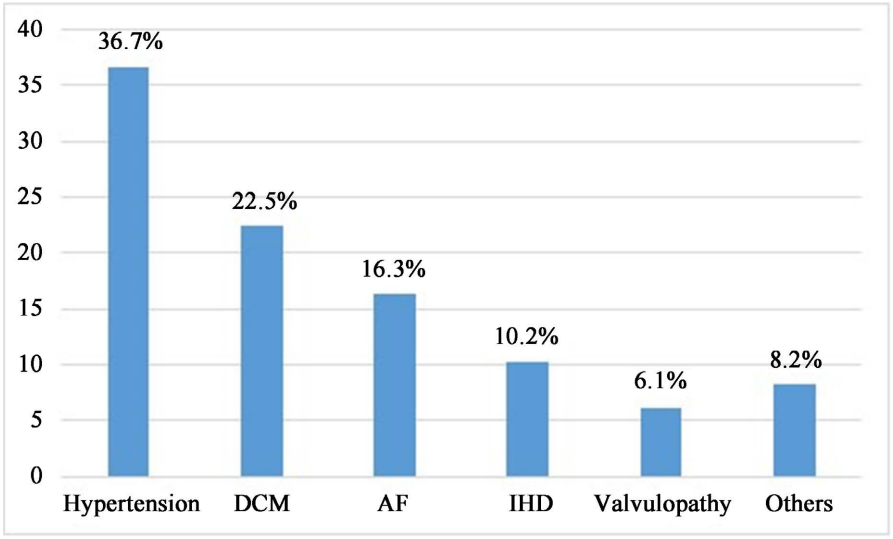
We used the software Epi Info™ version 7.2.2.6 for Windows®. Descriptive analysis was used to generate means and standard deviations for quantitative data and frequency distributions for categorical data.

2.6. Ethical Considerations

The study was carried out in full consideration of the ethical principles of the Helsinki declaration and strict compliance with the fundamental principles for human health research in Cameroon. Ethical approval was obtained from the Institutional Review Board of the Faculty of Medicine and Biomedical Sciences of the University of Bamenda. We also obtained administrative approval from the General Director of the YGH.

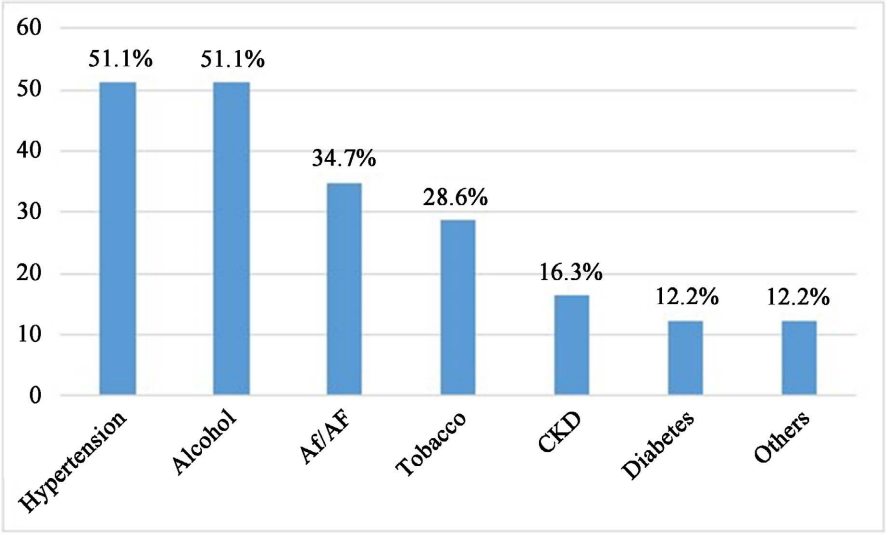
3. Results

A total of 160 patients were included in the study. Forty-nine (30.6%) were readmitted for HF. The sex ratio was 1.6 with a mean age of 71.0 ± 13.9 years, and almost two-thirds had > 70 years. Most of them (81.6) lived in urban areas. The most common etiologies (Figure 1) of HF in re-hospitalized patients were hypertensive heart disease (36.7%) followed by dilated cardiomyopathy (22.5%) and atrial fibrillation (16.3%). Associated comorbidities (Figure 2) were mainly hypertension (51.1%), alcohol consumption (51.0%), and atrial fibrillation (34.7%).



DCM: dilated cardiomyopathy; **AF:** atrial fibrillation; **IHD:** ischemic heart disease; **Others** (rheumatic heart disease, cor pulmonale, and hypertrophic cardiomyopathy).

Figure 1. Etiologies of HF of re-hospitalized patients.



Af/AF: atrial fibrillation/Flutter; **CKD:** chronic kidney disease; **others** (HIV/AIDS, COPD, Malignancy).

Figure 2. Comorbidities associated with HF in re-hospitalized patients.

Table 1 shows the clinical presentation of re-hospitalized patients. More than two third had New York Heart Association class IV disease. Laboratory studies revealed anemia in 77.6% of re-hospitalized patients, altered glomerular filtration rate < 60 ml/kg/m^2 body surface area in 32.7% and hyponatremia in 44.9%. Twenty-four (49.0%) patients had pleural effusion on chest X-ray and atrial fibrillation was the most common (46.9%) anomaly on electrocardiography. Evaluation of left ventricular ejection fraction on cardiac ultrasound showed that more than two third (71.4%) of the patients re-hospitalized had reduced ejection fraction (HFrEF). Table 2 shows the overall results from the paraclinical workup. The patients were treated using diuretics (93.4%), angiotensin-converting enzyme inhibitors (ACEI)/angiotensin II receptor blockers (ARB) (81.6%), beta-blockers (77.6%) and digoxin (48.9%).

4. Discussion

We found in this study a prevalence of re-hospitalization for decompensated HF of 30.6%. This prevalence was determined out of any timeframe since all readmissions during our study period were considered. Thus, it may be overestimated compared to other studies that often report the prevalence of re-hospitalizations within a certain timeframe. Some authors have reported a high readmission rate for HF in Africa. Okello *et al.* in Uganda reported a prevalence of readmissions of 31.4% within a 12-month study period, while Akpa and Iheji found 35.6% after 6 months in Nigeria [7] [8]. This prevalence in sub-Saharan Africa is higher than that reported in the United States of America where Aranda, J.M. *et al.* [3] found 16.8% of readmission for HF in the 6 to 9 months following initial HF hospitalization. One reason why we had a higher rate of readmission may be because not all our patients were receiving the evidence-based medications recommended for

Table 1. Clinical presentation of re-hospitalized patients.

Variables	Re-hospitalized (N = 49)
Mean Duration of Heart Failure (SD), Years	6.0 (5.7)
Age range, n (%), Years	
<40	2 (4.1)
40 - 49	1 (2.0)
50 - 59	8 (16.3)
60 - 69	8 (16.3)
70 - 79	16 (32.7)
≥80	14 (28.6)
Symptoms, n (%)	
NYHA II	1 (2.0)
NYHA III	10 (20.4)
NYHA IV	38 (77.6)
Dyspnea	49.0 (100)
Orthopnea	45.0 (91.8)
Paroxysmal nocturnal dyspnea	28.0 (57.1)
Cough	33.0 (67.4)
Pedal edema	43.0 (87.8)
Signs	
Mean Temperature (SD), ˚C	37.6 (0.8)
Mean Heart Rate (SD), bpm	107.6 (11.5)
Mean Respiratory Rate (SD), cpm	28.2 (4.4)
Mean SBP (SD), mmHg	12.5 (38.3)
Mean DBP (SD), mmHg	80.8 (22.3)
Mean Pulse Pressure (SD), mmHg	45.7 (20.4)
Mean Oxygen Saturation (SD), (%)	93.2 (3.1)
Distended Neck Veins, n (%)	40 (81.6)
Hepato-jugular Reflux, n (%)	37 (75.5)
Smooth Hepatomegaly, n (%)	24 (49.0)
Ascites, n (%)	15 (30.6)
Crackles, n (%)	44 (89.8)
Arrhythmia, n (%)	24 (50.0)
Murmur, n (%)	19 (38.8)

Bpm: beat per minute, **Cpm:** beat per minute, **SD:** standard deviation, **NYHA:** New York Heart Association.

Table 2. Results of paraclinical workup in re-hospitalized patients.

Variable	Re-hospitalized (N = 49)
Biology	
Mean Hemoglobin Conc. (SD), g/dl	10.8 (2.2)
Anemia n (%)	38 (77.6)
Mean WBC Count (SD), $\times 10^3/mm^3$	11.5 (14.0)
Mean Serum Creatinine (SD), mg/dl	13.8 (7.6)
Mean eGFR (SD), ml/min/1.73m^2	67.9 (22.7)
eGFR < 60, n (%)	16 (32.7)
Mean Sodium Conc. (SD), mmol/1	133.6 (6.4)
Hyponatremia, n (%)	22 (44.9)
Radiology (Chest X-ray)	
Cardiothoracic Index (SD)	0.69 (0.08)
Pleural Effusion, n (%)	24 (49.0)
Cardiac Ultrasound	
HFpEF, n (%)	5 (10.2)
HFmrEF, n (%)	9 (18.4)
HFrEF, n (%)	35 (71.4)
Left Ventricular Hypertrophy, n (%)	25 (51.0)
Left Ventricular Dilatation, n (%)	19 (38.8)
Left Atrial Dilatation, n (%)	31 (63.3)
Elevated Post Capillary Pressure, n (%)	30 (61.2)
Valvopathy, n (%)	34 (69.4)
Electrocardiogram	
Mean Heart Rate (SD), bpm	108.0 (14.1)
Atrial fibrillation/flutter, n (%)	23 (46.9)
Signs of Myocardial Ischemia, n (%)	10 (20.4)
Atrioventricular blocks, n (%)	6 (12.2)

SD: standard deviation, **WBC:** white blood cells, **GFR:** glomerular filtration rate, **HFpEF:** heart failure with preserved ejection fraction, **HFmrEF:** heart failure with mildly reduced ejection fraction, **HFrEF:** heart failure with reduced ejection fraction.

the reduction of hospitalization and death, even though most of them had HFrEF. In our study, we had 81.6% treated with ACEI/ARB, 77.6% with beta-blockers and none of them were treated with mineralocorticoid receptor antagonists or ivabradine. Similarly in the study of Okello, S. *et al.*, [7] only 32.9% and 27.0% of the patients were treated respectively with ACEI/ARB and beta-blockers. Most of our re-hospitalized patients were male, had old age, class IV

NYHA disease, HFrEF, and anemia. Whether these characteristics are associated with readmissions needs to be determined in further studies.

5. Conclusion

There was a high rate of re-hospitalization for HF in the cardiology unit of the Yaoundé General Hospital during our study period. Re-hospitalized patients had mostly old age, class IV NYHA disease, HFrEF, and anemia. Further studies are needed to assess the determiners of re-hospitalization in these patients.

Authors' Contributions

Amalia Owona, Ning Lom Bryan-Bill, Ahmadou Musa Jingiand Alain Patrick Menanga designed the study. Ning Lom Bryan-Bill collected the data. Ning Lom Bryan-Bill and Dieudonne Danwe performed the statistical analysis. Amalia Owona and Dieudonne Danwe drafted the manuscript. Alain Patrick Menanga did the overall supervision.

Conflicts of Interest

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

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