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Research Article

Factors Associated with Poor Prognosis in Heart Failure Among Adults in Goma, North Kivu, DRC

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Abstract

Introduction: Heart failure is a major global health challenge with high morbidity and mortality. In sub-Saharan Africa, prognostic data remain limited. **Methodology:** A prospective study of 150 Heart failure patients hospitalized at HEAL Africa and Charité Maternelle (Jan 2024–Sep 2025) was conducted. Sociodemographic, clinical, biological, and echocardiographic variables were analyzed using ESC "I NEED HELP" criteria and logistic regression. **Results:** HF frequency was 3.98%. Poor prognosis affected 50.66% of patients, with 17.33% mortality. Determinants included advanced age (≥71 years), diabetes, renal dysfunction, sepsis, palpitations, tachycardia, edema, reduced ejection fraction (<40%), pulmonary hypertension, left ventricular hypertrophy, atrial dilatation, elevated ProBNP, and poor therapeutic adherence. **Conclusion:** Heart failure in Goma is marked by high morbidity and mortality. Prognosis is driven by age, comorbidities, severity markers, and adherence. Optimized multidisciplinary care and patient education are essential to improve outcomes

Keywords: Heart failure, Bad, Prognosis, Heal Africa, Charité Maternelle

Introduction

Noncommunicable diseases are becoming increasingly prevalent in tropical Africa, particularly cardiovascular diseases, which often progress to heart failure (HF) [1, 2]. Heart failure results from damage to the heart muscle associated with coronary artery disease, myocardial infarction, hypertension, valvular heart disease, or cardiomyopathy, with aggravating factors such as diabetes, obesity, smoking, and alcohol use [1]. Despite advances in treatment, access to care remains limited, and HF remains a major cause of morbidity, mortality, and readmissions [3, 4].

Mortality can reach 50% at five years [5], influenced by disease severity, treatment adherence, and comorbidities [6]. Factors associated with a poor prognosis include severe dyspnea, hypotension, severe renal failure, anemia, elevated NT-proBNP, and an impaired left ventricular ejection fraction [3, 6].

In Africa, admissions for HF account for 3–7% of hospitalizations, with an estimated mortality rate of 20% [7]. Studies conducted in Cameroon, Guinea, Lubumbashi, and Goma have identified high prevalence, advanced age, hypertension, cardiomyopathies, poor adherence, and lack of access to echocardiography and biomarkers as the main challenges [8–12]. Obesity and elevated ProBNP are also independent predictors of poor prognosis [13, 14].

In the city of Goma, where diagnostic tools remain limited, no study has yet documented the determinants of HF prognosis. This research therefore aims to identify these determinants among patients hospitalized at HEAL Africa Hospital and HGR/Charité Maternelle.

Methodology

Study Site and Period

The study was conducted from January 1, 2024, to September 30, 2025, in the Department of Internal Medicine at HEAL Africa Tertiary Hospital and HGR/Charité Maternelle, two referral hospitals located in Goma, North Kivu (DRC).

Study Design

This is a prospective, multicenter, analytical study aimed at identifying the determinants of poor prognosis in adult heart failure.

Population and Sample

Of the 3,670 patients admitted to the hospital, 150 adult patients being treated for heart failure were included. The sample was a non-probability convenience sample.

Inclusion Criteria

Age ≥18 years

Confirmed diagnosis of heart failure (clinical, echocardiographic, radiological, or laboratory-based)

Consent to participate

Underwent at least one echocardiogram, ProBNP test, chest X-ray, or ECG.

Exclusion Criteria

Patients with acute respiratory distress syndrome (injury-related ARDS) were excluded.

Operational definitions

Heart failure was defined according to the recommendations of the European Society of Cardiology (ESC), including the presence of symptoms and signs of heart failure, structural and/or functional abnormalities detected on imaging, or elevated cardiac enzymes (elevated cardiothoracic index and ProBNP >300 pg/mL). Three categories were identified: heart failure with reduced ejection fraction (≤40%), heart failure with preserved ejection fraction (≥50%), and heart failure with moderately reduced ejection fraction (41–49%).

A poor prognosis was defined by the presence of at least three ESC "I NEED HELP" criteria (I=inotropes, N=NYHA Class III–IV and/or persistent elevation of natriuretic peptides, E=worsening renal and hepatic insufficiency, E=LVEF < 40%, ≥2 hospitalizations/year or recurrence, E=PAH, SBP <90–100 mmHg, P=inability to titrate or need to reduce medication for HF).

Variables studied:

Non-modifiable factors: age, sex.

Modifiable factors: hypertension, diabetes, obesity, coronary artery disease, renal failure, anemia, sepsis, treatment adherence, eGFR, cardiothoracic index, left ventricular end-diastolic volume (LVEDV), ProBNP, duration and number of hospitalizations, marital status.

Data Collection and Analysis

Data were collected via questionnaire (Morisky score for medication adherence) and medical records. Analysis was performed using R and SPSS. Crude odds ratios (ORs) were calculated, and significant variables were then included in a logistic regression model to obtain adjusted ORs.

Ethical considerations

Informed consent was obtained from the patients. Anonymity and confidentiality were respected. The study was approved by the Ethics Committee of the University of Goma; Approval No.: UNIGOM/CEM/004/2025.

Results

The prevalence of heart failure (HF) in the Internal Medicine department at HEAL Africa and Charité Maternelle was 3.98% (150 patients out of 3,760 hospitalizations). Among them, 49.3% had a favorable prognosis, while 50.7% had an unfavorable prognosis, including 17.3% who died. The overall mortality rate was 18.9%, with 42% of deaths occurring within the first month (Table I.1).

Variable	Number	Proportion (%)
Prognosis		
Good prognosis (clinical stability)	74	49,33
Poor prognosis without death	50	33,33
Poor Prognosis with Death	26	17,33
ProBNP		
< 300 pg/dl	28	24,56
≥ 300 pg/dl	86	75,44
Use of Inotropes		
No	109	72,67
Yes	41	27,33
Recurrence		
No	49	32,67
Yes	101	67,33
LVEF **< 40%**		
Absent	69	64,49
Present	38	35,51
Blood Pressure		
100-139/ 80-89 mmHg	47	31,33
< 100/80 mmHg	55	36,66
Grade 1 : 140–159 / 90–99 mmHg	27	18,00
Grade 2 : 160–179 / 100–109 mmHg	17	11,33
Grade 3 : ≥ 180 / 110 mmHg	4	2,67
APE (acute pulmonary edema)		
Absent	37	24,67
Present	113	75,33

Table I.1: Distribution of patients according to the I NEED HELP criteria for heart failure (clinical prognosis)

From a sociodemographic perspective, advanced age was strongly associated with a poor prognosis: patients aged 71–80 years (OR = 3.24; p = 0.03) and, in particular, those aged ≥ 81 years (OR = 4.72; p = 0.008) were at significant risk. Gender and marital status were not associated with prognosis (Table I.2).

	Prognosis			
Variable / Categories	**Poor (n, %)**	**Good (n, %)**	**OR [IC95]**	**P**
Gender				
Female (Ref)	41 (53,95)	42 (56,76)	1	–
Male	35 (46,05)	32 (43,24)	1,12 [0,59 – 2,13]	0,73
Age				
≤ 50 years (Réf)	9 (11,84)	17 (22,97)	1	–
51–60 years	10 (13,16)	15 (20,27)	1,26 [0,40 – 3,93]	0,69
61–70 years	13 (17,11)	20 (27,03)	1,23 [0,42 – 3,57]	0,71

71–80 years *	24 (31,58)	14 (18,92)	3,24 [1,14 – 9,19]	0,03*
≥ 81 years *	20 (26,32)	8 (10,81)	4,72 [1,49 – 14,93]	0,008*
Marital status				
Divorced (Réf)	3 (3,95)	3 (4,11)	1	–
Married	45 (59,21)	54 (73,97)	0,83 [0,16 – 4,33]	0,83
Widowed	28 (36,84)	16 (21,92)	1,75 [0,32 – 9,72]	0,52

Table I.2: Distribution of patients according to sociodemographic parameters and prognosis in heart failure

Regarding comorbidities, diabetes (OR = 2.24; p = 0.04), impaired renal function (OR = 20.5; p < 0.001), and sepsis (OR = 66.3; p < 0.001) were major determinants of poor prognosis. Hypertension, anemia, and malaria were not significant. BMI was higher in patients with a poor prognosis (27.6 vs. 25.4; p = 0.041) (Figure1).

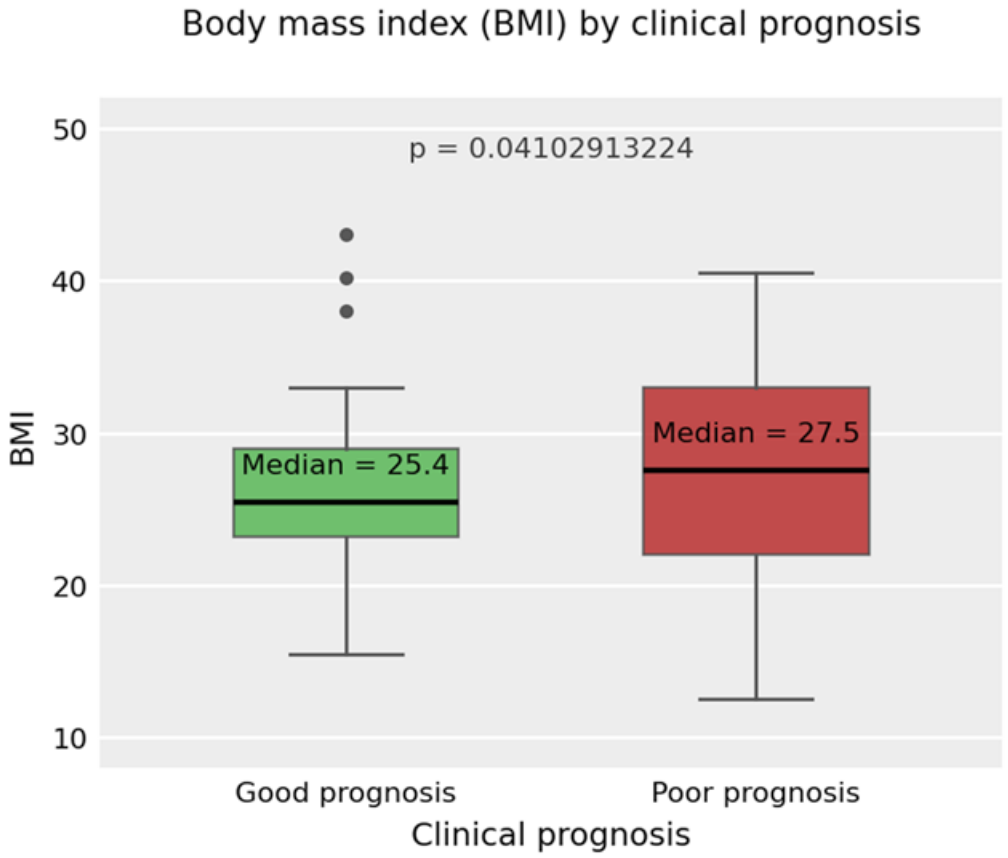

Figure 1: Distribution of patients by BMI and clinical prognosis

The echocardiographic abnormalities most strongly associated with a poor prognosis were LVEF < 40% (OR = 5.83; p < 0.001), PAH (OR = 10.6; p < 0.001), RVH (OR = 4.25; p < 0.001), and atrial dilation (OR = 2.74; p = 0.003). Pleural and pericardial effusions and septal hypokinesis were also significant.

On the ECG, myocardial infarction (OR = 2.50; p = 0.02), a Sokolow index > 35 mm (OR = 3.36; p = 0.001), and HVG (OR = 2.80; p = 0.003) were associated with a poor prognosis. Other abnormalities (bundle branch block, AF, T-wave changes) were not significant.

Biologically, a ProBNP level ≥ 300 pg/mL increased the risk of a poor prognosis (OR = 5.24; p = 0.001).

Finally, the multivariate analysis confirmed that palpitations (OR ≈ 181; p = 0.02) and recurrence (OR ≈ 19; p = 0.01) were significant independent predictors. LVEF < 40%, elevated ProBNP, renal impairment, and high-volume heart failure showed strong but nonsignificant trends (Table I.3).

Variable	**OR**	**IC 95%**	**P**
Intercept	0.005	0.00 – 0.13	0.001 *
Palpitations	181.17	2.26 – 14536.49	0.020 *
Precordial pain	0.09	0.00 – 2.68	0.160
Pleural effusion	2.33	0.14 – 38.23	0.550
LVEF < 40%	13.58	0.82 – 226.02	0.070
Pulmonary hypertension	1.42	0.08 – 26.25	0.810
LV hypertrophy	5.89	0.73 – 47.35	0.100
I. Sokolow > 35 mm	1.79	0.21 – 15.38	0.590
Recurrence	19.14	1.99 – 183.84	0.010 *
PRO-BNP ≥ 300 pg/dL	6.39	0.84 – 48.58	0.070
Impaired renal function	9.66	0.87 – 107.03	0.060

Table I.3: Multivariate Analysis of Clinical Prognosis in Patients with Heart Failure

Discussion

The observed prevalence of heart failure (3.98%) is close to global figures (1–2%, ≥10% after age 70). Half of the patients had a poor prognosis (50.66%), with a mortality rate of 17.33%, higher than that reported by Barry Ibrahima Sory in Guinea (9.6%) [15] and by Meriem Drissa in Tunisia (5%) [43]. The majority were in NYHA Class III (59.3%), indicating advanced severity, and nearly one-third were in cardiogenic shock (27.3%).

Advanced age was confirmed as a major risk factor: patients aged 71–80 years and ≥81 years had a significant risk of poor prognosis, which is consistent with the observations of Liliane Mfeukeu Kuate et al. in Yaoundé [16] and Noel Lorenzo Villalba in Spain [17]. Gender and marital status were not associated with outcomes, as shown by Ikama et al. [18].

The most significant comorbidities were diabetes, renal failure, and, above all, sepsis, confirming their role as aggravating factors, in line with the studies by Liliane Mfeukeu Kuate [16] and Allognon Mahutondji C. [19]. A high BMI was also linked to an unfavorable outcome, consistent with the observations of McDonagh, Kheyi, and Ouédraogo [20-22].

Clinically, palpitations, lower extremity edema, and moderate tachycardia were strongly associated with a poor prognosis, unlike dyspnea or classic signs of congestion.

These results differ from those of Sarrha Jouini in Tunisia [23] and Djedid Younes in Algeria [19]. Low blood pressure (<100/80 mmHg) was a major risk factor, confirming the findings of Elsa Ayo Bivigou in Libreville [24].

On echocardiography, reduced LVEF, PAH, LVH, and atrial dilation were unfavorable markers, whereas an intermediate LVEF appeared to be protective.

These results are similar to those reported by Ouédraogo [25] and Mboup in Senegal [26]. A high ICT confirmed its role as an indicator of severity, consistent with Front Matter [27]. On ECG, myocardial infarction, a high Sokolow index, and high left ventricular wall thickness were significant, consistent with the observations of Coulibaly in Abidjan [28] and Lorenzo Villalba [17].

Biochemically, a ProBNP level ≥300 pg/ml significantly increased the risk of poor outcome, confirming its prognostic role previously described by Allognon Mahutondji [29] and Nicolas R. Jones [30]. From a therapeutic standpoint, the use of bisoprolol halved the risk of a poor prognosis, but only a minority of patients received the full recommended treatment regimen, which is consistent with the findings of Boutaleb in Casablanca [31]. Therapeutic adherence was a decisive factor: moderate or low adherence increased the risk, as demonstrated by Nganou-Gnindjio [32] and Mfeukeu Kuate [16].

Finally, the length of hospital stay was longer among patients with a poor prognosis, and frequent relapses confirmed the chronic nature of the disease, consistent with the findings of Mirieu de Labarre in France [33]. Multivariate analysis confirmed that palpitations and recurrence were independent predictors, while reduced LVEF, elevated ProBNP, renal failure, and high VG showed strong trends.

Limitations

The lack of routine proBNP measurement at discharge, difficulty accessing previous creatinine data, and the inability to calculate certain prognostic scores (ELAN, MAGGIC).

Conclusion

Heart failure remains a serious condition in Goma, with a prevalence of 3.98% and a mortality rate of 17.33%. A poor prognosis is associated with advanced age, diabetes, renal failure, and the presence of sepsis.

Palpitations, lower extremity edema, moderate tachycardia, reduced LVEF, LVH, atrial dilation, PAH, and elevated proBNP

levels are markers of disease severity. Providing clinicians and patients with accurate information about the factors associated with a poor prognosis for heart failure will lead to a significant reduction in morbidity and mortality among patients with heart failure in Africa, particularly in Goma.

Authors' Contributions

All authors contributed to the drafting, data analysis, and revision of the final version of the manuscript.

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Conflict of Interest

The authors declare that this research was conducted in the absence of any commercial or financial relationships that could be construed as a conflict of interest.

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