PATIENTS HOSPITALISED WITH ACUTE HEART FAILURE

Characteristics and outcomes of patients hospitalised with acute heart failure at a tertiary hospital in South Africa

A Mazaza, H Weich and AF Doubell

Department of Medicine, Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa

Address for correspondence:
Dr Arlene Mazaza
Division of Cardiology
Tygerberg Hospital
Parow
7505
Cape Town
South Africa

Email:
amazaza@sun.ac.za

A Mazaza https://orcid.org/0000-0002-9173-3503
H Weich https://orcid.org/0000-0002-4283-0198
AF Doubell https://orcid.org/0009-0005-7699-8684
DOI: https://doi.org/10.24170/23-2-7652

ABSTRACT

Aims: Acute heart failure (AHF) remains a major public health challenge in sub-Saharan Africa, yet contemporary data on its clinical characteristics and management outcomes are limited. This study aims to characterise the epidemiology, treatment patterns, and clinical outcomes of AHF patients in a South African tertiary care setting in the era of modern heart failure (HF) therapy.

Methods: We conducted a retrospective study of 339 AHF admissions at Tygerberg Hospital (TBH), Cape Town, during 2022. Comprehensive data, including demographics, clinical characteristics, investigations (echocardiography, coronary angiography), treatment regimens, and outcomes, were analysed. Patients were identified using the International Classification of Diseases, Tenth Revision (ICD-10) codes for HF and cardiomyopathy.

Results: The cohort (mean age 53 ± 15.4 years, 51.9% male) demonstrated a high burden of non-ischaemic cardiomyopathy with HF with reduced ejection fraction (HFrEF) predominance (91%). Comorbidities were highly prevalent (74% hypertension, 43.4% diabetes). While conventional guideline-directed medical therapy (GDMT) utilisation was robust (88.7% beta blocker [BB], 87.5% angiotensin-converting enzyme inhibitor [ACEi]/ angiotensin receptor blocker [ARB]), novel therapies were markedly underutilised (3.9% sodium-glucose cotransporter 2 inhibitor [SGLT2i], 1.3% angiotensin receptor-neprilysin inhibitor [ARNi]). Only 42.9% of eligible patients for cardiac resynchronisation therapy (CRT) received implants. Clinical outcomes included rates of 3.9% in-hospital mortality, 27.7% 2-year case fatality, and 44.3% 30-day re-admission.

Conclusions: This study reveals a distinct AHF phenotype in South Africa, characterised by younger patients with a predominant non-ischaemic aetiology and high comorbidity burden. Despite adequate conventional GDMT implementation, significant therapeutic gaps persist in advanced therapies. The substantial re-admission burden highlights critical health system challenges, emphasising the urgent need for healthcare policy reforms and optimised care pathways in resource-limited settings.

Keywords: acute heart failure, sub-Saharan Africa, dilated cardiomyopathy, guideline-directed medical therapy, cardiac resynchronisation therapy.

SA Heart® 2026;23:73-80

INTRODUCTION

The incidence of HF has nearly doubled over the past few decades, rising from 33.5 million cases in 1990 to 64.3 million in 2017, with projections indicating continued growth.(1) AHF requires hospitalisation, often on an emergent basis, which is a major driver of healthcare costs.(2,11) Each episode of AHF hospitalisation is associated with an increased mortality risk and a decline in quality of life, making the prevention of recurrent hospital admissions a key priority in HF management.(3)

Despite the growing burden of HF, a paucity of data remains regarding the characteristics and management of patients admitted with AHF in sub-Saharan Africa. Although several HF registries exist, they primarily represent populations from high-income countries, whose ethnic, racial, and socio-economic characteristics differ significantly from those in Africa.(4-6) AHF populations in high-income countries are older, predominantly male, and have a higher prevalence of ischaemic heart disease.(7,8) Limited evidence suggests that the aetiology of AHF in sub-Saharan Africa is distinct, with a higher prevalence of peripartum cardiomyopathy, idiopathic dilated cardiomyopathy (DCM), and HF associated with human immunodeficiency virus (HIV) infection.(9)

Rheumatic heart disease is also an important cause of HF, with an annual incidence of 24.7 per 100 000 South Africans.[10] Additionally, sub-Saharan Africa is undergoing an epidemiological transition, with an increasing burden of noncommunicable diseases (NCD), particularly cardiovascular disease, which now accounts for 37% of NCD-related deaths in the region.[5] It is not well described whether there has been an increase in the contribution of ischaemic heart disease as a cause for HF on the African continent.

This study focused on a population of AHF patients managed with GDMT and device therapy. Given the limited data on the epidemiology, clinical course, and management of AHF in South Africa, there is an urgent need to better characterise these patients to improve care and outcomes. This study aimed to evaluate the aetiology and outcomes of patients admitted with AHF. It sought to characterise the initial emergency department assessment and subsequent inpatient management, and to identify key patient characteristics associated with adverse outcomes. Additionally, the study assessed treatment strategies at discharge, with a particular focus on GDMT and device therapy use in patients with chronic HF. By addressing these knowledge gaps, the study is intended to provide valuable insights to inform future healthcare policies and optimise HF management strategies in South Africa.

METHODS

TBH is a 1 384-bed tertiary academic hospital serving a population of over 2.6 million people in Cape Town, South Africa.[12] The study was a single-centre, retrospective, hospital-based study of patients admitted with acute decompensated HF to TBH over 1 year (1 January to 31 December 2022). All patient records were obtained from TBH's comprehensive electronic database, including clinical patient records, ICD-10-coded discharge diagnoses, and death registrations. For each patient meeting the inclusion criteria, clinical notes, laboratory results, echocardiographic images, and procedure reports were systematically reviewed. A follow-up review of patient records was conducted 2 years post-discharge to determine the case fatality rate of the study population.

Patients were included in this audit based on admissions with discharge diagnoses of AHF, as determined by ICD-10 coding. Patients with a diagnosis of DCM (I42.0), unspecified HF (I50.9), unspecified left ventricular failure (I50.1), systolic (congestive) HF (I50.2), unspecified cardiomyopathy (I42.9), and acute systolic (congestive) HF (I50.21) were included. AHF was defined as either new-onset HF or decompensation of chronic, established HF with symptoms sufficient to warrant hospitalisation.[13] Patients aged ≥ 18 years were included. Patients with HF as a complication of acute coronary syndrome, valvular heart disease, pericardial disease, congenital heart disease, primary pulmonary hypertension, and cor pulmonale were excluded from the study. The broad exclusion criteria were intended to identify a representative population of patients with AHF who are primarily managed medically, to assess current treatment practices in a South African setting.

The cause of HF was identified based on the information obtained from history, clinical examination, and echocardiography. Echocardiographic records were obtained from an internal database of all transthoracic echocardiograms performed at the Division of Cardiology at TBH. All echocardiograms were performed by qualified healthcare professionals in accordance with contemporary guidelines.[14] The characteristics of our AHF population were compared with previous AHF studies conducted in Africa, as well as high-income countries.

Ethical considerations

This study was approved by the Health Research Ethics Committee of Stellenbosch University (reference: S22/11/259) and conducted in accordance with the 2013 Declaration of Helsinki. A waiver of individual consent was obtained from the ethics committee to include data from patient records in this retrospective study.

Statistical analysis

Statistical analysis was performed with IBM SPSS Statistics version 29 for Windows. Descriptive statistics, including means, medians, proportions, and standard deviations, were used. Categorical data were analysed using the chi-squared test with *p*-values. A p-value < 0.05 was considered statistically significant. All continuous variables were tested for normal distribution using a histogram for visualisation. Normally distributed data were reported as mean and standard deviation. All statistical analyses were performed in consultation with a statistician.

RESULTS

A total of 339 patients were admitted with AHF between 1 January and 31 December 2022 (Figure 1). The baseline characteristics of the cohort are summarised in Table I. The study population was evenly distributed between males (51.9%, n = 176) and females (48.1%, n = 163). Most AHF admissions (91%, n = 311) had HFrEF, and the analysis mostly described this HF phenotype. The mean age of patients with HFrEF was 53 ± 15.4 years, with 74.3% (n = 252) of this population aged < 65. The mean age of patients with HF with mildly reduced or preserved ejection fraction (HFmrEF or HFpEF) was 60.9 ± 16.7 years. The mean systolic blood pressure on admission was 137 ± 37.1 mmHg in the entire HF population, with a higher mean systolic blood pressure of 185.9 ± 35.1 mmHg in the HFmrEF/HFpEF groups.

Half of the patients (49.6%, n = 168) had ≥ 2 comorbidities. A large proportion of the HFrEF population (74%, n = 251) had comorbid hypertension. Just under half of the patients (43.4%, n = 147) had diabetes mellitus, with a mean HbA1C of 8.8 ± 2.7%. Regarding recreational substance use, 36.6% of the population (n = 124) were regular cigarette smokers, and 6.5% (n = 22) self-reported methamphetamine use. Of the patients, 89 (26.3%) had chronic kidney disease, with a mean estimated

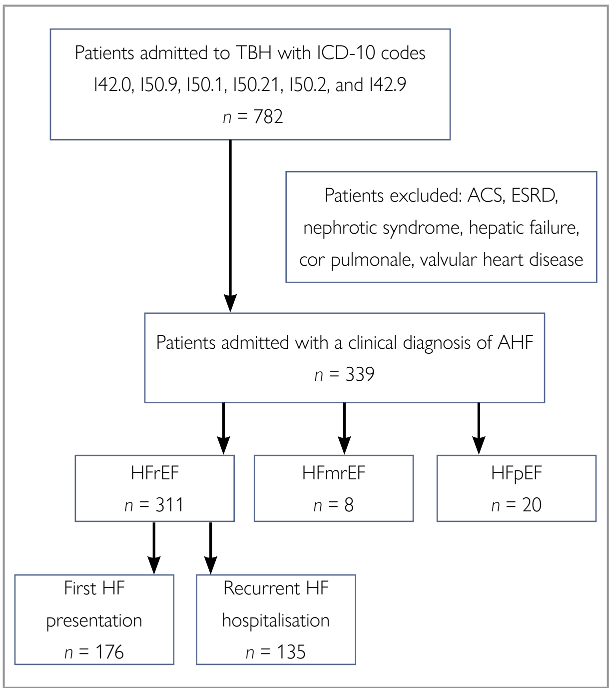

FIGURE 1: Recruitment of study participants.

ACS: acute coronary syndrome, AHF: acute heart failure, ESRD: end-stage renal disease, HF: heart failure, HFmrEF: heart failure with mildly reduced ejection fraction (left ventricular ejection fraction [LVEF] 40–49%)[14], HFpEF: heart failure with preserved ejection fraction (LVEF ≥ 50%)[15], HFrEF: heart failure with reduced ejection fraction (LVEF < 40%)[14], ICD-10: International Classification of Diseases, Tenth Revision, TBH: Tygerberg Hospital.

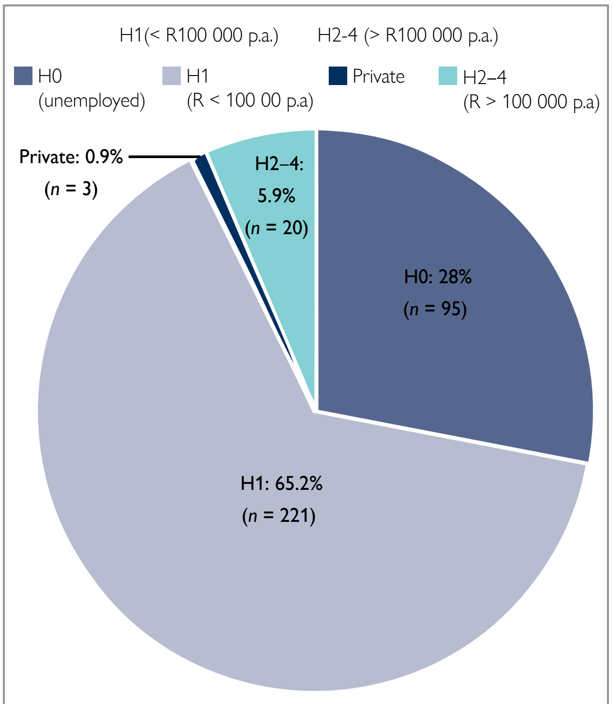

FIGURE 2: Income status of the population with heart failure with reduced ejection fraction.
p.a.: per annum.

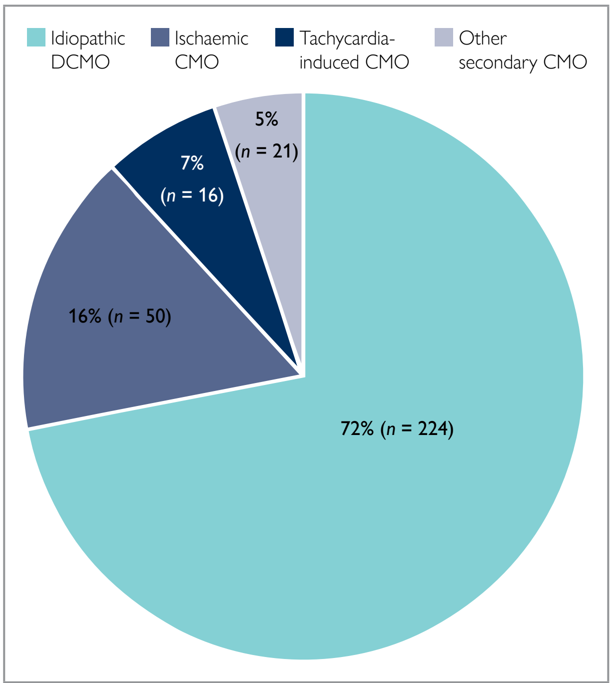

FIGURE 3: Aetiology of heart failure with reduced ejection fraction based on clinical assessment and echocardiography.
CM: cardiomyopathy, DCM: dilated cardiomyopathy.

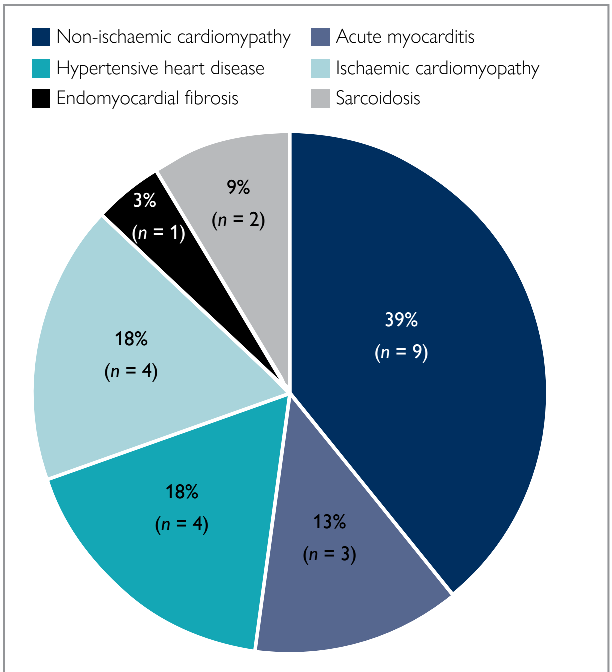

FIGURE 4: Diagnoses of patients who underwent cardiac magnetic resonance imaging.

glomerular filtration rate of 34.01 ± 13.08. At the time of the study, 8% of the cohort (*n* = 27) were living with HIV, with a mean CD4 count of 353 ± 294.7. Among them, 3.5% (*n* = 12) had a CD4 count < 200, consistent with advanced HIV.

TABLE I: Baseline characteristics of acute heart failure admissions.

***n* = 339**		**HFrEF**	**HFmrEF**	**HFpEF**
n (%)		311 (91.7)	8 (2.35)	20 (5.9)
Male, *n* (%)	176 (51.9)	168 (54.1)	3 (37.5)	6 (30)
Age, mean (SD)	53 (15.4)	53.4 (15.1)	54.25 (21.2)	63.5 (14.3)
< 40, ***n*** (%)	65 (19.2)	62 (19.9)	2 (25)	1 (5)
≥ 40–64, *n* (%)	187 (55.2)	172 (55.3)	4 (50)	11 (55)
≥ 65, n (%)	87 (25.6)	77 (24.8)	2 (25)	8 (40)
Systolic BP, mean (SD)	137 (37.1)	133 (34.1)	168 (32.2)	193 (3.1)
Diastolic BP, mean (SD)	84 (23.0)	84 (22.7)	85 (26.2)	93 (25.4)
HR, mean (SD)	96.2 (24.1)	96.3 (24.1)	92.3 (18.4)	81.3 (13.9)
Hypertension, *n* (%)	251 (74.0)	224 (72.0)	7 (87.5)	20 (100)
Diabetes mellitus, *n* (%)	147 (43.4)	128 (41.2)	3 (37.5)	16 (80)
HbA1C, mean (SD)	8.9 (2.6)	8.8 (2.7)	12.8 (2.8)	8.9 (1.6)
HbA1C < 10, ***n*** (%)	104 (70.7)	91 (71.1)	0 (0)	10 (62.5)
HbA1C >10, ***n*** (%)	41 (27.9)	36 (28.1)	2 (66.7)	6 (37.5)
Unknown HbA1C, ***n*** (%)	2 (1.4)	1 (0.8)	1 (33.3)	0 (0)
Renal insufficiency, *n* (%)	89 (26.3)	80 (25.7)	1 (12.5)	8 (40)
eGFR (CKD-EPI), mean (SD)	34.01 (13.8)	35.78 (14.8)	40 (0)	21.6 (9.7)
eFGR ≤ 30, ***n*** (%)	35 (39.3)	28 (35)	0 (0)	7 (87.5)
eGFR 31–60, ***n*** (%)	54 (60.7)	52 (65)	1 (100)	1 (12.5)
Haemoglobin, mean (SD)	12.6 (2.4)	12.4 (2.3)	12.1 (3.0)	10.3 (2.3)
PLHIV, *n* (%)	27 (8.0)	26 (8.4)	1 (12.5)	0 (0)
CD4 count, mean (SD)	353 (295)	356 (287)	N/A	N/A
Atrial fibrillation, *n* (%)	57 (16.8)	56 (18.0)	0 (0.0)	1 (5.0)

BP: blood pressure, CKD-EPI: Chronic Kidney Disease Epidemiology Collaboration, eGFR: estimated glomerular filtration rate, HFmrEF: heart failure with mildly reduced ejection fraction, HFpEF: heart failure with preserved ejection fraction, HFrEF: heart failure with reduced ejection fraction, HR: heart rate, N/A: not applicable, PLHIV: people living with human immunodeficiency virus, SD: standard deviation.

In the HFrEF population, electrocardiogram-documented atrial fibrillation (AF) was identified in 18% (*n* = 56) and atrial flutter in 4.5% (*n* = 14). Nine of these patients underwent catheter ablation (5 for AF and 4 for typical atrial flutter). Of the patients with atrial arrhythmias (*n* = 70), 40% (*n* = 28) had at least 1 electrical cardioversion, 5.7% (*n* = 4) were on digoxin, and 4.3% (*n* = 3) were on amiodarone at discharge.

The income distribution of the study population is depicted in Figure 2. Among patients with HFrEF, 5.9% (*n* = 20) had an annual household income > R100 000 (United States $5 430 at the time of submission), while 0.9% (*n* = 3) had private medical insurance. However, 93.2% (*n* = 316) were either unemployed or had an annual household income < R100 000.

The most common cause of HF in HFrEF patients was idiopathic DCM, diagnosed in 72% (*n* = 224) (Figure 3). In the HFrEF cohort, 16% (*n* = 50) had ischaemic cardiomyopathy, 7% (*n* = 16) had a tachycardia-induced cardiomyopathy, and 5% (*n* = 21) had other secondary causes for cardiomyopathy, including 9 patients with peripartum cardiomyopathy, 1 with cardiac sarcoidosis, 5 with a history of previous exposure to cardiotoxic chemotherapy agents, 1 with confirmed endomyocardial fibrosis, and 1 with Takotsubo cardiomyopathy.

Twenty-three patients with HFrEF underwent cardiac magnetic resonance imaging after being assessed as having atypical cardiomyopathy (Figure 4). Magnetic resonance imaging diagnosis of non-ischaemic cardiomyopathy or acute myocarditis was done in over half of these patients. There were 4 patients with hypertensive heart disease and 4 patients with ischaemic cardiomyopathy.

Iron studies were performed in 33.6% (114/339) of the AHF population. There was evidence of either absolute or relative iron deficiency in 80.7% of those with iron studies (92/114).[22,23] There were 154 patients (45.4%) with evidence of anaemia on laboratory investigations: 54.5% females (*n* = 84) and 45.5% males (*n* = 70). Iron studies were performed in 52.6% (81/154) of the anaemic patients. Of these, 32.1% (26/81) had evidence of iron deficiency. Eleven patients were on oral iron replacement, and only 2 were receiving intravenous iron replacement.

Echocardiographic reports were available for 97% (*n* = 303) of the patients with HFrEF (Table II). Eight patients did not have echocardiographic data available, and 6 demised before echocardiography was performed. In patients with HFrEF, 79.2% (*n* = 240) had a left ventricular ejection fraction (LVEF) < 30%. The mean left ventricular end-diastolic dimension (LVEDD) was

TABLE II: Baseline echocardiography in heart failure with reduced ejection fraction, acute heart failure admissions.

Echocardiography available, *n* (%)	303/311 (97.4)
LVEF, mean (SD)	23.8 (8.2)
LVEF ≤ 20%, *n* (%)	126 (41.6)
LVEF 21–30%, *n* (%)	114 (37.6)
LVEF 31–40%, *n* (%)	63 (20.8)
LVEDD (mm), mean (SD)	60.54 (9.0)
LVEDD < 55 mm, *n* (%)	124 (40.9)
LVEDD 56–64 mm, *n* (%)	101 (33.4)
LVEDD ≥ 65 mm, *n* (%)	78 (25.7)
Severe secondary MR, *n* (%)	8 (2.6)
LA diameter, mm (SD)	42.9 (7.1)
IVSD (mm), mean (SD)	8.0 (2.0)
IVSD < 8 mm, *n* (%)	123 (40.6)
IVSD 8–9 mm, *n* (%)	106 (34.9)
IVSD ≥ 10 mm, *n* (%)	74 (24.4)

IVSD: interventricular septal thickness in diastole, LA: left atrium, LVEDD: left ventricular end-diastolic diameter, LVEF: left ventricular ejection fraction, MR: mitral regurgitation, SD: standard deviation.

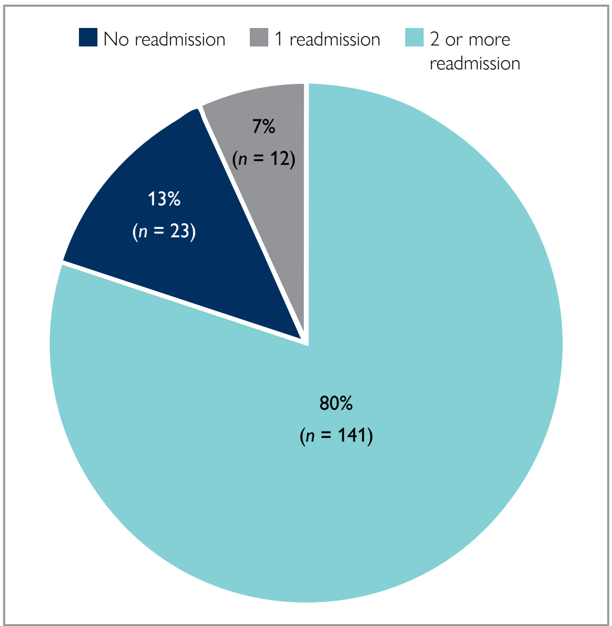

FIGURE 5: Hospital re-admissions after first heart failure diagnosis.

also elevated at 60.54 ± 9 mm. The mean left ventricular wall thickness was 8.2 ± 2 mm, and 24.4% (*n* = 74) measured ≥ 10 mm. Eight patients (2.6%) had severe secondary mitral regurgitation.

A total of 39.9% (*n* = 124) HFrEF patients underwent coronary angiography. Significant left main coronary or multivessel coronary artery disease was identified in 7% (*n* = 22), with 3 patients having undergone previous coronary artery bypass grafting. Of these patients, 16 received percutaneous revascularisation, and the remaining 3 were managed medically.

At the time of discharge, 87.5% (*n* = 272) of the HFrEF cohort were on an ACEi or ARB, 88.7% (*n* = 276) on a BB, and 56.3% (*n* = 175) on a mineralocorticoid receptor antagonist. Only 3.9% (*n* = 12) were on an SGLT2i, and 1.3% (*n* = 4) on an ARNi. SGLT2is and ARNis were purchased out of pocket by all patients.

A total of 11.6% of patients (*n* = 36) with HFrEF met the eligibility criteria for CRT based on electrocardiographic and echocardiographic findings. Among them, 77.8% (28/36) had idiopathic DCM, and 22.2% (8/36) had ischaemic cardiomyopathy. The mean QRS duration was 154 ± 20.3 ms; 25% (*n* = 7) had 130–149 ms, and 75% (*n* = 21) had ≥ 150 ms. Of the patients with idiopathic DCM, 75% (21/28) had a Class I indication for CRT per current guidelines.[16] Of those with a Class I indication, 42.9% (9/21) went on to receive a CRT implant.

The in-hospital mortality of the HFrEF patients was 3.9%. The mean age of the 12 patients with in-hospital mortality was 62 ± 15.3 years. There was better survival in patients who had HFmrEF/HFpEF, as all patients in this group were discharged. According to provincial electronic clinical records, the case fatality rate of the entire HF population was 27.7% (*n* = 92/339) at 2 years. The mean hospital stay was 6 ± 5 days in patients with HFrEF, and 28.6% (*n* = 89) had hospitalisations lasting ≥ 7 days. The HFpEF patients had a mean hospital stay of 5 ± 2 days.

Of the HFrEF patients, 51 (16.4%) required either non-invasive ventilatory support or intravenous inotropes, which were administered in the emergency department upon admission or in a high-care unit. No patients with AHF were admitted to the medical intensive care unit for invasive ventilatory support. TBH's medical intensive care unit policy dictates that patients with a LVEF < 40% do not qualify for admission, due to the limited availability of beds for invasive ventilatory support.

In the HFrEF population, 56.6% (*n* = 176) had a new HF diagnosis during their admission in 2022. Of these patients, 19.9% (35/176) had ≥ 1 all-cause re-admission in 2022 (Figure 5). The time to first re-admission was < 1 month in 44.3% (78/176).

Table III compares the Tygerberg cohort with previous HF registries and retrospective studies. Like other African AHF cohorts, this population was younger than those in high-income countries. Additionally, patients in this cohort had more advanced disease at the time of admission, as reflected by a lower LVEF and higher LVEDD compared with prior studies. However, the discharge prescription rate for GDMT was higher than in previous AHF studies.

DISCUSSION

This study highlights the distinct characteristics of patients with AHF in sub-Saharan Africa, with notable patterns that differ from those observed in previous local and international studies.

TABLE III: Comparison of patients in published acute heart failure studies and the Tygerberg Hospital cohort.

	Current study (*n* = 339)	Szymanski, et al.,[9] South Africa (*n* = 119)	THESUS-HF, Africa[4] (*n* = 1 006)	ADHERE, United States[7] (*n* = 105 388)	EHFS II, Europe[8] (*n* = 3 580)
Age, mean (SD)	**53.0 (15.4)**	49.9 (16.3)	52.3 (18.3)	72.4 (14)	69.9 (12.5)
Females (%)	**48.1**	58.0	50.6	52.0	38.7
LVEF (%), mean (SD)	**26.2 (11.3)**	34.1 (16.9)	39.5 (16.5)	34.4 (16.1)	38.0 (15.0)
LVEDD (mm), mean (SD)	**60.5 (9.0)**	N/A	57.7 (11.6)	N/A	58.0 (7.0)
Hypertension (%)	**74.0**	48.7	55.5	73.0	62.5
Systolic BP (mmHg), mean (SD)	**137.0 (37.1)**	134.6 (33.2)	130.4 (33.5)	144 (13.2)	135.0 (25.0)
Diabetes mellitus (%)	**43.4**	21.8	11.4	44.0	32.8
Renal insufficiency (%)	**26.0**	N/A	7.7	30.0	16.8
Atrial fibrillation/flutter (%)	**21.2**	5.0	18.3	31.0	38.7
In-hospital mortality (%)	**3.9**	8.4	4.2	4.0	6.7
Length of stay (days)	**6.0**	9.0	9.2	4.3	9.0
ACEi/ARB at discharge (%)	**87.1**	73.0	80.0	66.1	80.2
BB at discharge (%)	**88.7**	42.7	30.0	N/A	61.0
MRA at discharge (%)	**56.6**	26.1	75.0	N/A	47.5

ACEi: angiotensin-converting enzyme inhibitor, ADHERE: Acute Decompensated Heart Failure National Registry, ARB: angiotensin receptor blocker, BB: beta blocker, BP: blood pressure, EHFS II: EuroHeart Failure Survey II, LVEDD: left ventricular end-diastolic diameter, LVEF: left ventricular ejection fraction, MRA: mineralocorticoid receptor antagonist, N/A: not applicable, SD: standard deviation, THESUS-HF: The Sub-Saharan Africa Survey of Heart Failure.

This cohort is significantly younger than European and American AHF cohorts.[7,8] A population with mortality peaking at productive age profoundly impacts a group of patients for whom persistent HF symptoms and recurrent HF hospitalisations may result in significant income loss.

Idiopathic DCM is the most common cause of HFrEF in this study, as in the THESUS-HF (The Sub-Saharan Africa Survey of Heart Failure) registry.[4] Although this study did not assess the genetic contribution to DCM, previous local data suggest an equal distribution of familial, idiopathic, and secondary DCM in African populations.[17] Further genetic studies are warranted to explore the hereditary aspects of DCM and identify potential therapeutic targets.

While ischaemic heart disease remains the predominant cause of HF in high-income countries, its contribution to HF in Africa remains relatively low, with 9.7% of our cohort diagnosed with ischemic cardiomyopathy. This aligns with previous African studies, which reported ischaemic cardiomyopathy rates ranging from 0.4% to 9%.[9,21]

HF re-admission rates within 30 days were strikingly high (44.3%) compared with the United States (24.8%).[7] This study illustrates a vulnerable group of patients with lower LVEFs on admission compared with prior studies. Despite lower LVEF on admission, this study population had a shorter length of stay than in high-income countries. Due to constant limitations of hospital beds in South African public hospitals, patients with AHF are often discharged prematurely with inadequate post-discharge treatment plans.

The study found an even distribution of males and females in the HFrEF group, in contrast to predominantly male European HF cohorts.[8] Despite shared risk factors, previous studies suggest that males are more prone to developing HFrEF, whereas females tend to develop HFpEF.[17] This finding suggests that the interplay between sex-specific risk factors and HF pathophysiology may differ in African populations. Further research is needed to explore the sex-based disparities in Africa's HF phenotypes.

This AHF cohort primarily comprised patients with HFrEF due to idiopathic DCM, with hypertension as a frequent comorbidity. The high prevalence of hypertension in this study reflects local epidemiological data, which indicate that 44.1% of individuals < 50 in South Africa have hypertension.[18,19,20] Similarly, European HF registries report hypertension in 70–91% of HF patients.[8]

The interplay between AHF and renal impairment is complex and associated with adverse outcomes in AHF patients.[1] Our cohort showed a higher prevalence of renal insufficiency (26%) than historically reported in African populations (7.7%).[4] This finding aligns more closely with data from AHF populations in high-income countries, likely reflecting the increasing global prevalence of hypertension, diabetes, and chronic kidney disease.[5,7,8] Cardiorenal syndrome also represents an important contributor to renal impairment in advanced HF.

This study showed that 8.7% of the HF population were people living with HIV, a prevalence similar to The Heart of Soweto Study (9.7%).[21] Additionally, HIV was found to be the direct cause of HF in 2.6% of cases, consistent with the THESUS-HF study.[4] The interplay between HIV and HF remains complex, with HIV-associated cardiomyopathy being a recognised contributor to the HF burden in sub-Saharan Africa.

Anaemia was highly prevalent in the AHF cohort (45.4%) compared with European HF registries (14%).[8] Furthermore, routine screening for iron deficiency was not performed in more than half of the HFrEF population. Given that iron deficiency is an independent predictor of poor HF outcomes, routine screening and treatment with intravenous iron therapy could offer a potential therapeutic target to improve functional capacity and reduce HF hospitalisations.[22,23,24]

The study found a higher incidence of AF (16.8%) than previously reported rates in African hospital-based studies (4.6–10.6%).[25,26] This aligns with the global trend of increasing AF incidence.[27] The presence of AF in HF patients is associated with worse outcomes due to increased thromboembolic risk, rapid ventricular rates, and worsened cardiac function.

Obstructive sleep apnoea is highly prevalent among patients with HF, with a reported incidence of 22.8% in South Africa.[30,31] However, access to continuous positive airway pressure therapy remains limited due to its prohibitive cost. In this study, there were limited data on the true prevalence of obstructive sleep apnoea and how it may be linked to our AHF population.

Compared with prior studies, our study showed that the overall prescription of GDMT at hospital discharge for HF improv -ed.[4,7-9] There was an improvement in the prescription of BBs at discharge (42.7% in a previous local HF registry vs. 88.7% in this study).[9] ARNis and SGLT2is remain widely inaccessible in the South African public sector due to financial constraints, prompting hospital policies that limit access despite their proven mortality benefits. Many patients in Africa cannot afford these life-saving therapies[28]. The income distribution of our HF cohort likely reflects the general South African population, in which a substantial proportion lives below the poverty line. To bridge this gap, urgent policy changes are needed to improve the accessibility and affordability of these medications within public healthcare systems. Hydralazine and nitrates were not utilised in our AHF population, despite their ongoing presence in contemporary HF guidelines.

An 11.6% eligibility for CRT was identified in the HFrEF population, aligned with a previous study indicating that 10–15% of AHF patients were eligible for CRT.[29] However, there was a lower uptake of CRT implantation in eligible patients compared with HF registries in the First World (42.9% vs. 58–66%).[29] The lower CRT implantation uptake may have multiple explanations in this AHF population. First, patients hospitalised with AHF may not yet be optimised on HF therapy, and hence not referred for CRT consideration at the first hospitalisation. This is reflected by the fact that over half of our AHF cohort had de novo AHF. Second, there may have been a proportion of patients who were eligible for CRT based on electrocardiographic and echocardiographic criteria but had significant comorbidities or advanced HF, for whom palliative care may have been more appropriate as treatment in a resource-limited setting.

Limitations

This is a retrospective observational study; therefore, its main limitation is selection bias. The study participants were enrolled based on ICD-10 diagnostic coding, medical history, and management documentation, all of which may be imprecise or incomplete. A further limitation, due to possible selection bias, was the exclusion of approximately 50% of the study population at enrolment. Patients were recruited from a tertiary hospital in sub-Saharan Africa and were likely the sickest HF patients, and the findings from this registry cannot be extrapolated to the general HF population. In addition, this study population was small, limiting the reproducibility of the findings to represent a large population.

CONCLUSION

This study illustrates a distinct epidemiological and clinical profile of AHF in South Africa, characterised by premature disease onset, predominant non-ischaemic cardiomyopathies, and a high comorbidity burden. Despite satisfactory implementation of conventional GDMT, systemic barriers persist in accessing advanced pharmacological therapies, reflecting critical healthcare disparities in South Africa. The high rates of re-admission and intermediate-term mortality underscore fundamental deficiencies in post-discharge pathways. These findings provide compelling evidence for urgent health policy reforms to expand access to all evidence-based GDMT, with the hope of mitigating the growing HF burden in resource-constrained African settings.

Acknowledgements:

The authors acknowledge Dr Makhosandile Ndabaza for his valuable participation in data collection.

Conflict of interest: none declared.

REFERENCES

1. Bragazzi NL, Zhong W, Shu J, et al. Burden of heart failure and underlying causes in 195 countries and territories from 1990 to 2017. Eur J Prev Cardiol 2021;28(15):1682-1690. https://doi.org/10.1093/eurjpc/zwaa147.
2. Damasceno A, Cotter G, Dzudie A, Sliwa K, Mayosi BM. Heart failure in sub-Saharan Africa: Time for action. J Am Coll Cardiol 2007;50(17):1688-1693. https://doi.org/10.1016/j.jacc.2007.07.030.
3. Setoguchi S, Stevenson LW, Schneeweiss S. Repeated hospitalizations predict mortality in the community population with heart failure. Am Heart J 2007;154(2):260-266. https://doi.org/10.1016/j.ahj.2007.01.041.
4. Damasceno A, Mayosi BM, Sani M, et al. The causes, treatment, and outcome of acute heart failure in 1006 Africans from 9 countries: Results of The Sub-Saharan Africa Survey of Heart Failure. Arch Intern Med 2012;172(18):1386-1394. https://doi.org/10.1001/archinternmed.2012.3310.
5. Yuyun MF, Sliwa K, Kengne AP, Mocumbi AO, Bukhman G. Cardiovascular diseases in sub-Saharan Africa compared to high-income countries: An epidemiological perspective. Glob Heart 2020;15(1):15. https://doi.

org/10.5334/gh.403.
6. Dokainish H, Teo K, Zhu J, et al. Heart failure in Africa, Asia, the Middle East and South America: The INTER-CHF study. Int J Cardiol 2016;204:133-141. https://doi.org/10.1016/j.ijcard.2015.11.183.
7. Adams Jr KF, Fonarow GC, Emerman CL, et al. 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). Am Heart J 2005;149(2):209-216. https://doi.org/10.1016/j.ahj.2004.08.005.
8. Nieminen MS, Brutsaert D, Dickstein K, et al. EuroHeart Failure Survey II (EHFS II): A survey on hospitalized acute heart failure patients: Description of population. Eur Heart J 2006;27(22):2725-2736. https://doi.org/10.1093/eurheartj/ehl193.
9. Szymanski PZ, Badri M, Mayosi BM. Clinical characteristics and causes of heart failure, adherence to treatment guidelines, and mortality of patients with acute heart failure: Experience at Groote Schuur Hospital, Cape Town, South Africa. S Afr Med J 2018;108(2):94-98. https://doi.org/10.7196/SAMJ.2017.v108i2.12519.
10. Zühlke LJ, Engel ME, Watkins D, Mayosi BM. Incidence, prevalence and outcome of rheumatic heart disease in South Africa: A systematic review of contemporary studies. Int J Cardiol 2015;199:375-383. https://doi.org/10.1016/j.ijcard.2015.06.145.
11. Urbich M, Globe G, Pantiri K, et al. A systematic review of medical costs associated with heart failure in the USA (2014-2020). Pharmacoeconomics 2020;38(11):1219-1236. https://doi.org/10.1007/s40273-020-00952-0.
12. SUN Orthopaedics. Tygerberg Academic Hospital [online]. Available at: https://www.sunorthopaedics.com/tygerberg-hospital.html. Accessed 22 March 2026.
13. Greene SJ, Bauersachs J, Brugts JJ, et al. Worsening heart failure: Nomenclature, epidemiology, and future directions: JACC review topic of the week. J Am Coll Cardiol 2023;81(4):413-424. https://doi.org/10.1016/j.jacc.2022.11.023.
14. Robinson S, Rana B, Oxborough D, et al. A practical guideline for performing a comprehensive transthoracic echocardiogram in adults: The British Society of Echocardiography minimum dataset. Echo Res Pract 2020;7(4):G59-G93. https://doi.org/10.1530/ERP-20-0026.
15. Kraus SM, Cirota J, Pandie S, et al. Etiology and phenotypes of cardiomyopathy in Southern Africa: The IMHOTEP Multicenter Pilot Study. JACC Adv 2024;3(12):100952. https://doi.org/10.1016/j.jacadv.2024.100952.
16. Glikson M, Nielsen JC, Kronborg MB, et al. 2021 ESC guidelines on cardiac pacing and cardiac resynchronization therapy: Developed by the task force on cardiac pacing and cardiac resynchronization therapy of the European Society of Cardiology (ESC) with the special contribution of the European Heart Rhythm Association (EHRA). Eur Heart J 2021;42(35):3427-3520. https://doi.org/10.1093/eurheartj/ehab364.
17. Lam CSP, Arnott C, Beale AL, et al. Sex differences in heart failure. Eur Heart J 2019;40(47):3859-3868c. https://doi.org/10.1093/eurheartj/ehz835.
18. Ntuli ST, Maimela E, Alberts M, Choma S, Dikotope S. Prevalence and associated risk factors of hypertension amongst adults in a rural community of Limpopo Province, South Africa. Afr J Prim Health Care Fam Med 2015;7(1):847. https://doi.org/10.4102/phcfm.v7i1.847.
19. Slivnick J, Lampert BC. Hypertension and heart failure. Heart Fail Clin 2019;15(4):531-541. https://doi.org/10.1016/j.hfc.2019.06.007.
20. Gafane-Matemane LF, Craig A, Kruger R, et al. Hypertension in sub-Saharan Africa: The current profile, recent advances, gaps, and priorities. J Hum Hypertens 2025;39(2):95-110. https://doi.org/10.1038/s41371-024-00913-6.
21. Sliwa K, Wilkinson D, Hansen C, et al. Spectrum of heart disease and risk factors in a black urban population in South Africa (The Heart of Soweto Study): A cohort study. Lancet 2008;371(9616):915-922. https://doi.org/10.1016/S0140-6736(08)60417-1.
22. Pasricha S-R, Rogers L, Branca F, Garcia-Casal M-N. Measuring haemoglobin concentration to define anaemia: WHO guidelines. Lancet 2024;403(10440):1963-1966. https://doi.org/10.1016/S0140-6736(24)00502-6.
23. Martens P, Tang WHW. Defining iron deficiency in heart failure: Importance of transferrin saturation. Circ Heart Fail 2024;17(4):e011440. https://doi.org/10.1161/CIRCHEARTFAILURE.123.011440.
24. Klip IT, Comin-Colet J, Voors AA, et al. Iron deficiency in chronic heart failure: An international pooled analysis. Am Heart J 2013;165(4):575-582.e3. https://doi.org/10.1016/j.ahj.2013.01.017.
25. Mandi DG, Bamouni J, Naïbé DT, et al. Epidemiology and long-term prognosis of atrial fibrillation in rural African patients. Egypt Heart J 2019;71(1):6. https://doi.org/10.1186/s43044-019-0005-3.
26. Mboweni N, Maseko M, Tsabedze N. Heart failure with reduced ejection fraction and atrial fibrillation: A sub-Saharan African perspective. ESC Heart Fail 2023;10(3):1580-1596. https://doi.org/10.1002/ehf2.14332.
27. Lippi G, Sanchis-Gomar F, Cervellin G. Global epidemiology of atrial fibrillation: An increasing epidemic and public health challenge. Int J Stroke 2020;16(2):217-221. https://doi.org/10.1177/1747493019897870.
28. Luyckx VA, Anandh U. Transporting sodium-glucose cotransporter-2 inhibitors to the African continent: Challenges and solutions. Kidney Int Rep 2023;9(3):516-519. https://doi.org/10.1016/j.ekir.2023.11.029.
29. Osmanska J, Hawkins MN, Toma M, Ignaszewski A, Virani SA. Eligibility for cardiac resynchronization therapy in patients hospitalized with heart failure. ESC Heart Fail 2018;5(4):668-674. https://doi.org/10.1002/ehf2.12297.
30. Alharbi A, Bansal N, Alsughayer A, et al. Impact of obstructive sleep apnea in patients with acute heart failure: a nationwide cohort study. Heart 2024;5(4):547-556. https://doi.org/10.3390/hearts5040040.
31. Benjafield AV, Ayas NT, Eastwood PR, et al. Estimation of the global prevalence and burden of obstructive sleep apnoea: a literature-based analysis. Lancet Respir Med 2019;7(8):687-698. https://doi.org/10.1016/S2213-2600(19)30198-5.