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Dilated Cardiomyopathy in the Cardiology Department of Dalal Jamm National Hospital, Dakar, Senegal: Epidemiological, Clinical, Paraclinical, Therapeutic and Outcome Aspects

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Abstract

Introduction: Dilated cardiomyopathy (DCM) is a myocardial disease characterised by left ventricular or biventricular dilatation associated with impaired systolic function, in the absence of a sufficient haemodynamic or coronary cause. It is an important cause of heart failure, arrhythmias, sudden cardiac death and heart transplantation. In sub-Saharan Africa, DCM remains underestimated because of delayed diagnosis and limited access to specialised investigations. The objectives of this study were to analyse the epidemiological, clinical, paraclinical, therapeutic and outcome aspects of DCM in the Cardiology Department of Dalal Jamm National Hospital, Dakar. **Methods:** This was a retrospective, descriptive and analytical study conducted from 1 January 2021 to 31 December 2024 in the Cardiology Department of Dalal Jamm National Hospital. All patients aged at least 15 years who were hospitalised for DCM during the study period were included. The diagnosis was based on left ventricular dilatation associated with left ventricular systolic dysfunction, after exclusion of significant valvular heart disease, severe hypertension or sufficient coronary artery disease. Sociodemographic, clinical, paraclinical, therapeutic and outcome data were collected from medical records. Statistical analysis was performed using SPSS version 26.0, with statistical significance set at $p < 0.05$. **Results:** Among 2575 cardiology admissions, 500 records were

screened as possible DCM; 112 were excluded and 388 met the inclusion criteria, corresponding to a hospital frequency of 15.1%. Mean age was 57.46 years, with a range from 15 to 92 years. Women accounted for 52% of the study population, with a male-to-female sex ratio of 0.91. The main cardiovascular risk factors were physical inactivity (63%), hypertension (54.2%), diabetes (23.8%) and smoking (20.6%). Dyspnoea was the main symptom (90.5%), followed by lower limb oedema (56.4%) and cough (49%). Physical signs were dominated by spontaneous jugular venous distension (70.9%), lower limb oedema (61.9%), hepatomegaly (60.3%) and crackles (55.2%). Regarding paraclinical findings, 47.2% of patients had anaemia, 63.9% had impaired glomerular filtration rate and 84.5% had a left ventricular ejection fraction below 40%. Aetiologies were unexplained in 75.3% of cases, thyroid-related in 9.3%, peripartum-related in 9% and toxic in 2.8%. Treatment was mainly based on spironolactone (88%), angiotensin-converting enzyme inhibitors (85.6%), furosemide (85%) and beta-blockers (74.1%). Clinical outcome was favourable in 81.44% of patients, with an overall mortality of 15.5%. **Conclusion:** DCM was a frequent cause of cardiology hospitalisation at Dalal Jamm National Hospital. Its profile was characterised by frequent congestive presentation, severe impairment of systolic function and high in-hospital mortality. These findings highlight the need for early diagnosis, improved aetiological investigation and therapeutic optimisation.

Keywords

Dilated Cardiomyopathy, Heart Failure, Echocardiography, In-Hospital Mortality, Senegal

1. Introduction

Dilated cardiomyopathy (DCM) is a myocardial disease characterised by dilatation of the left ventricle, or both ventricles, associated with impaired systolic function, in the absence of severe hypertension, significant valvular heart disease or coronary artery disease sufficient to explain the ventricular dysfunction [1] [2]. It represents a heterogeneous group of diseases with genetic, inflammatory, toxic, metabolic, endocrine, autoimmune or infectious causes [3]-[6]. This aetiological diversity explains the complexity of diagnosis and the need for an integrated approach combining clinical assessment, electrocardiography, echocardiography, advanced imaging, biomarkers, coronary angiography and, in some cases, genetic testing [7]-[10].

DCM is one of the leading causes of heart failure with reduced ejection fraction, ventricular arrhythmias, sudden cardiac death and heart transplantation worldwide [11]-[14]. In sub-Saharan Africa, its burden is probably underestimated because of delayed diagnosis, limited access to advanced imaging, insufficient aetiological investigations and poor availability of innovative treatments [15]-[17]. African data report variable frequencies depending on the country, study popula-

tion and diagnostic criteria used [18]-[21].

The management of DCM is based on identification of the aetiology, optimal treatment of heart failure, prevention of arrhythmic and thromboembolic complications, and cardiac rehabilitation [22]-[26]. Recent guidelines emphasise quadruple therapy for heart failure with reduced ejection fraction, including renin-angiotensin system inhibitors or ARNIs, beta-blockers, mineralocorticoid receptor antagonists and SGLT2 inhibitors [27]-[30].

In Senegal, hospital-based data on DCM remain limited. The objectives of this study were to analyse the epidemiological, clinical, paraclinical, therapeutic and outcome aspects of DCM in the Cardiology Department of Dalal Jamm National Hospital, Dakar.

2. Methods

This was a retrospective, descriptive and analytical study conducted over a four-year period, from 1 January 2021 to 31 December 2024, in the Cardiology Department of Dalal Jamm National Hospital, Dakar. Dalal Jamm National Hospital is a level III public health facility located in the Dakar suburbs. The Cardiology Department includes an inpatient unit, a cardiac intensive care unit, an echocardiography room, a cardiac rehabilitation unit and an interventional cardiology unit.

All patients aged at least 15 years who were hospitalised for dilated cardiomyopathy during the study period were included. The diagnosis of DCM was based on left ventricular dilatation associated with left ventricular systolic dysfunction, after exclusion of significant valvular heart disease, severe hypertension or coronary artery disease sufficient to explain the global impairment of systolic function [1] [7]. Patients with incomplete medical records or another obvious cause of ventricular dysfunction were not included. Left ventricular dilatation was defined as a left ventricular end-diastolic diameter or volume > 112% of the predicted normal value corrected for age and body surface area, and systolic dysfunction as LVEF < 45%. LVEF was measured using the biplane Simpson method from apical views.

Data were collected from medical records using a standardised data collection form. The variables studied included sociodemographic data, cardiovascular risk factors, medical history, comorbidities, mode of admission, functional symptoms, clinical parameters, physical signs and severity features at admission. The paraclinical investigations analysed included electrocardiography, chest radiography, Doppler echocardiography, chest computed tomography, cardiac magnetic resonance imaging and coronary angiography. Aetiological classification was based on the clinical history and investigations documented in the medical record. Ischaemic cardiomyopathy was excluded. Thyroid-related DCM required documented thyroid dysfunction considered clinically relevant; toxic DCM required documented exposure to a potentially cardiotoxic agent, principally chemotherapy; peripartum-related DCM was based on a documented temporal relationship with pregnancy or the postpartum period; myocarditis-related DCM required documented clinical and/or imaging evidence of myocarditis; and DCM was clas-

sified as unexplained when no specific cause could be established from the available work-up. Because cardiac MRI, endomyocardial biopsy and genetic testing were not systematically available, aetiological classification reflects the investigations available in this retrospective setting.

Therapeutic data included lifestyle and dietary measures, heart failure treatments, anticoagulants, antiarrhythmic drugs, statins, aetiology-specific treatments, interventional treatments and cardiac rehabilitation. Outcomes were assessed according to length of hospital stay, clinical improvement, complications, deaths, transfers and rehospitalisations. Data were entered using Excel and analysed with SPSS version 26.0. Qualitative variables were expressed as numbers and percentages. Associations were assessed using the chi-square test, the Kruskal-Wallis test and odds ratios, with statistical significance set at $p < 0.05$. For the present manuscript, analyses were conducted using available-case data; missing observations were excluded from analyses requiring the corresponding variable, and denominators are reported where measurements were incomplete. Mortality analyses examined age, sex, haemoglobin, eGFR, LDL cholesterol, fasting glucose, number of cardiovascular risk factors, LVEF, aetiology, beta-blocker therapy, length of hospital stay, complications, rehospitalisation, and clinical improvement. "Favourable outcome" denoted a clinical course documented as favourable during the index hospitalisation; transfer, post-discharge death and rehospitalisation were recorded separately and were not treated as mutually exclusive index-hospital disposition categories.

Ethics: The study was approved by the Ethics Committee of Cheikh Anta Diop University, Dakar; no approval reference number was available. As this was a retrospective review of existing medical records, no additional study-specific patient contact was undertaken and no additional study-specific consent was collected. Data were extracted without direct identifiers, analysed in de-identified form, and handled confidentially with access restricted to the study team.

3. Results

During the study period, 2575 patients were hospitalised in the Cardiology Department. Among these admissions, 500 records were identified and screened as possible DCM; 112 were excluded because of incomplete records or an alternative explanation for ventricular dysfunction (significant valvular heart disease, severe hypertension or coronary artery disease sufficient to explain the dysfunction), and 388 were retained for analysis, corresponding to a hospital frequency of 15.1%. Reason-specific counts for the 112 exclusions were not available in the retrospective source database. Women accounted for 52% of the study population and men for 48%, with a male-to-female sex ratio of 0.91. Mean age was 57.46 years, with a range from 15 to 92 years and a median of 60 years. The 60 - 69-year age group was the most represented. Among patients with available data, 48.7% worked in the informal sector, 11.9% in the formal sector and 39.4% were unemployed, including retired patients. Socioeconomic status was low in 55.6%, middle in 32.5% and high in 11.9%. Most patients were admitted after referral from other healthcare

facilities (Table 1).

Table 1. Main epidemiological and sociodemographic characteristics.

Potential DCM records screened	500	Records identified as possible DCM
Records excluded	112	Incomplete record or an alternative cause of ventricular dysfunction; reason-specific counts unavailable
Variable	**Result**	**Details**
Cardiology inpatients	2575	Source population, 2021-2024
Patients included for DCM	388	Hospital frequency: 15.1%
Mean age	57.46 years	Range: 15 - 92 years; median: 60 years
Female sex	203/388 (52.3%)	Male-to-female ratio: 0.91
Male sex	185/388 (47.7%)	
Informal sector	48.7%	Available data: n = 310
Unemployed	39.4%	Including 16.5% retired patients
Low socioeconomic status	55.6%	Available data: n = 345
Self-funded care	308/332 (92.8%)	Health insurance: 3.6%; state budget allocation: 3.6%
Admission by referral	252/332 (76.0%)	Self-presented: 14%; transfer: 10%

Cardiovascular risk-factor information was available for 349 patients. Cardiovascular risk factors were dominated by physical inactivity (63%), hypertension (54.2%), diabetes (23.8%), smoking (20.6%) and alcohol use (4.6%). Dyslipidaemia was rarely reported. A history of heart disease was found in 32.2% of patients. Documented comorbidities were dominated by cancer, asthma, chronic kidney disease, systemic diseases and thyroid disorders (Table 2).

Table 2. Cardiovascular risk factors and clinical presentation.

Parameter	Result	Comment
Physical inactivity	220/349 (63.0%)	Most frequent cardiovascular risk factor; risk-factor data available: n = 349
Hypertension	189/349 (54.2%)	
Diabetes	83/349 (23.8%)	
Smoking	72/349 (20.6%)	Active, passive or stopped < 3 years
Dyspnoea	90.5%	Main presenting symptom
Lower limb oedema	219/388 (56.4%)	
Cough	49.0%	
Jugular venous distension	70.9%	Sign of right-sided heart failure
Hepatomegaly	60.3%	
Pulmonary crackles	55.2%	Sign of left-sided heart failure

Clinically, dyspnoea was the main symptom, present in 90.5% of patients, fol-

lowed by lower limb oedema (56.4%), cough (49%), chest pain (19.6%), palpitations (7.7%) and syncope (1%). Mean heart rate was 106.7 beats per minute. Physical signs were dominated by spontaneous jugular venous distension (70.9%), lower limb oedema (61.9%), hepatomegaly (60.3%), crackles (55.2%) and hepatojugular reflux (45.6%) **(Figure 1).**

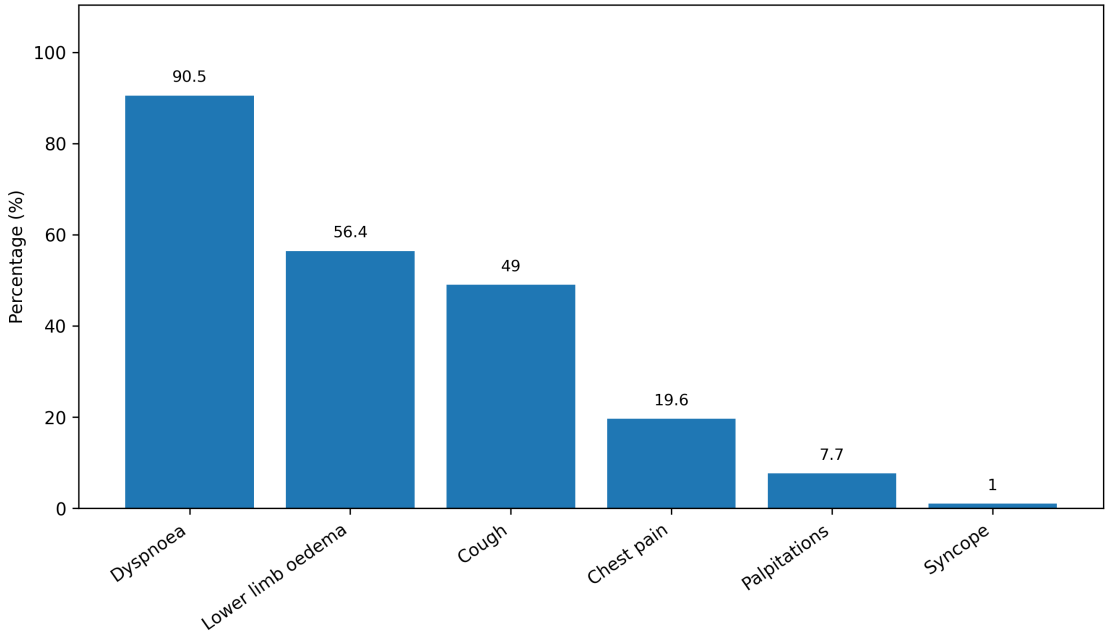

Figure 1. Main presenting symptoms among patients hospitalised for DCM (n = 388).

Regarding paraclinical findings, anaemia was found in 183/388 patients (47.2%). CRP was positive in 267/312 patients tested (85.6%; 76/388 not tested), corresponding to 68.8% of the full cohort. Serum creatinine was elevated in 140/373 patients tested (37.5%; 15/388 unavailable), and low eGFR was documented in 248/373 patients with available measurements (66.5%), corresponding to 63.9% of the full cohort. Electrocardiography showed sinus rhythm in 72.94% of cases, atrial arrhythmias in 24%, atrial fibrillation in 14.2%, left bundle branch block in 16.2%, repolarisation abnormalities in 44.1% and left ventricular hypertrophy in 33.2%. Negative T waves were present in 124/388 patients (32.0%); these were classified as repolarisation abnormalities and were not interpreted as evidence of ischaemic cardiomyopathy. Echocardiography, performed in 386 patients, showed a mean left ventricular ejection fraction of 30%, with LVEF < 40% in 84.5%. The aetiology was unexplained in 75.3% of cases, thyroid-related in 9.3%, peripartum-related in 9% and toxic in 2.8%.

Treatment was mainly medical: angiotensin-converting enzyme inhibitors (85.6%), spironolactone (88%), furosemide (85%), beta-blockers (74.1%), anticoagulation with acenocoumarol (37.3%), statins (34.7%) and SGLT2 inhibitors (6.7%) (Figure 2). Coronary angioplasty with stent implantation was performed in 11 patients, pacemaker implantation in 7, implantable cardioverter-defibrillator place-

ment in 3 and cardiac rehabilitation in 20. A favourable clinical course during the index hospitalisation was documented in 316/388 patients (81.44%). Sixty deaths were recorded overall, including 58 during the index hospitalisation and 2 after discharge. Twelve patients were transferred to other services. During post-hospital follow-up (mean 16.67 weeks), 57 patients were rehospitalised. These outcome categories refer to different phases of care and are not mutually exclusive. The main recorded causes of death were refractory shock, arrhythmias and electrolyte disorders (Table 3).

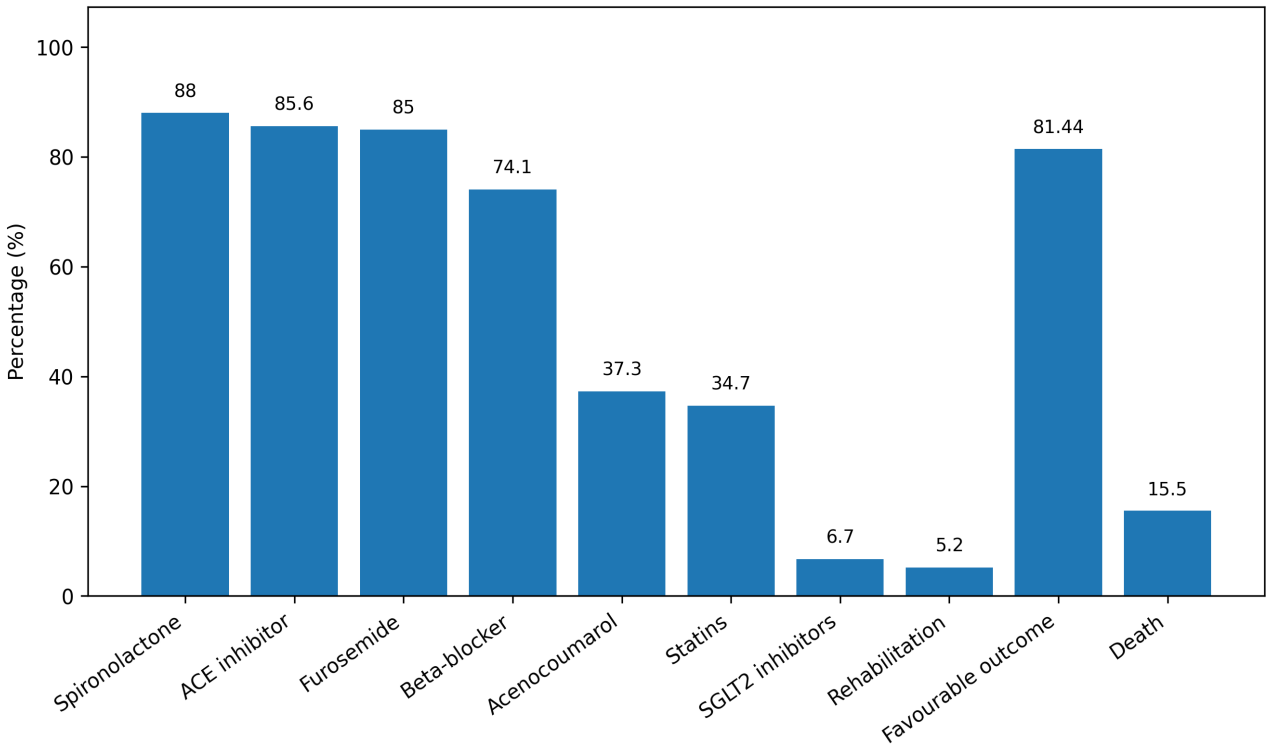

Figure 2. Main treatments used and in-hospital outcomes.

Table 3. Paraclinical, therapeutic and outcome profile.

Parameter	Result	Details
Anaemia	183/388 (47.2%)	Full blood count performed in all patients
Positive CRP	267/312 tested (85.6%)	76/388 not performed; 68.8% of full cohort
Low eGFR	248/373 measured (66.5%)	15/388 unavailable; 63.9% of full cohort
Sinus rhythm on ECG	283/388 (72.94%)	Atrial rhythm disorders: 24%
Mean LVEF	30%	LVEF < 40%: 326/386 (84.5%); LVEF measured by biplane Simpson method
ACE inhibitor therapy	332/388 (85.6%)	Beta-blocker: 286/388 (74.1%)
Spironolactone/furosemide	88.0% / 85.0%	SGLT2 inhibitors: 6.7%
Favourable outcome	316/388 (81.44%)	Clinical course documented as favourable during index hospitalisation

Continued

Death	60/388 (15.5%)	58 in-hospital deaths; 2 post-discharge deaths
Negative T waves on ECG	124/388 (32.0%)	Repolarisation abnormality; not classified as ischaemic cardiomyopathy
Beta-blocker-mortality association	40/96 deaths without vs 16/275 with beta-blocker	OR 11.6 (95% CI 6.0 - 22.1); p = 0.0002; available n = 371
Transfer to another service	12/388 (3.1%)	Index hospitalisation event
Rehospitalisation during follow-up	57/388 (14.7%)	Mean post-hospital follow-up: 16.67 weeks

Mortality analysis: Variables examined were age, sex, haemoglobin, eGFR, LDL cholesterol, fasting glucose, number of cardiovascular risk factors, LVEF, aetiology, beta-blocker therapy, length of hospital stay, complications, rehospitalisation and clinical improvement. Among patients with complete beta-blocker and mortality data (n = 371), death occurred in 40/96 patients (41.7%) who did not receive beta-blockers compared with 16/275 (5.8%) who received beta-blockers (OR 11.6, 95% CI 6.0 - 22.1; p = 0.0002). This association should be interpreted cautiously because treatment allocation was not random and may have been influenced by clinical severity or contraindications.

4. Discussion

This study shows that DCM represents an important cause of cardiology hospitalisation at Dalal Jamm National Hospital, with a hospital frequency of 15.1%. This frequency is higher than that reported in some African series, but remains consistent with the variability observed in sub-Saharan Africa, where frequencies depend on the type of recruitment, the level of specialisation of the centres, the diagnostic criteria used and the availability of echocardiography [18]-[21]. It also highlights the growing burden of heart failure with reduced ejection fraction in a context of epidemiological transition.

The mean age of 57.5 years reflects relatively early disease onset compared with some European series, but is close to several African data [20] [21]. The slight female predominance may be explained by the contribution of peripartum cardiomyopathy, thyroid disorders and certain comorbidities, although other series have reported a male predominance [19]-[21]. Low socioeconomic status and the high proportion of patients paying out of pocket are important factors, as they may delay diagnosis, limit access to investigations and reduce adherence to disease-modifying therapies.

The clinical presentation was dominated by signs of congestive heart failure, particularly dyspnoea, oedema, jugular venous distension, hepatomegaly and crackles. This presentation probably reflects late presentation to care, at an advanced stage of decompensation. Paraclinical findings reinforce this impression, with a severely reduced mean LVEF, and high frequencies of anaemia, biological inflammation, renal impairment and rhythm disorders. Renal impairment, anaemia and metabolic disorders are known prognostic factors in heart failure [31]-[34].

Regarding aetiology, the high proportion of unexplained DCM reflects the limitations of investigation in our setting, particularly the low use of cardiac magnetic resonance imaging, specialised biomarkers, endomyocardial biopsy and genetic testing. This finding supports the need for better access to coronary angiography or coronary imaging in patients with unexplained systolic dysfunction, particularly those with cardiovascular risk factors [8] [10] [35]. In addition, the aetiological categories were assigned retrospectively from the investigations documented in the records rather than from a uniform prospective diagnostic algorithm; therefore, the proportion classified as unexplained should be interpreted in the context of incomplete access to advanced testing.

Treatment relied largely on angiotensin-converting enzyme inhibitors, diuretics, spironolactone and beta-blockers, in accordance with the principles of management of heart failure with reduced ejection fraction [27]-[30]. However, the still limited use of ARNIs and SGLT2 inhibitors probably reflects financial accessibility constraints. In the available-case analysis, absence of beta-blocker therapy was associated with higher mortality (OR 11.6, 95% CI 6.0 - 22.1; $p = 0.0002$). Because this was a retrospective non-randomised study, this association may be influenced by confounding by indication, haemodynamic instability, contraindications or other markers of disease severity and should not be interpreted as causal. Overall mortality was 15.5%, including 58 in-hospital deaths (14.9%) and 2 post-discharge deaths. Complications and absence of clinical improvement were associated with mortality, whereas rehospitalisation was recorded as a separate post-hospital follow-up event. These findings underline the need for earlier diagnosis, structured follow-up and rapid therapeutic optimisation.

5. Conclusions

Dilated cardiomyopathy represented a frequent cause of hospitalisation in the Cardiology Department of Dalal Jamm National Hospital, with a hospital frequency of 15.1% between 2021 and 2024. Patients were relatively old, with a slight female predominance and an often unfavourable socioeconomic profile. The clinical presentation was dominated by congestive heart failure, particularly dyspnoea, lower limb oedema, jugular venous distension and hepatomegaly.

Paraclinical investigations showed severe impairment of left ventricular systolic function, with high frequencies of anaemia, renal impairment, rhythm disorders and repolarisation abnormalities. Aetiologies remained unexplained in a substantial proportion of cases, thyroid-related, peripartum-related and toxic causes were the main identified causes.

Treatment was mainly medical, but the use of modern therapies remained limited. In-hospital mortality was high, justifying the strengthening of early screening, aetiological investigation, access to recommended therapies and multidisciplinary follow-up.

Author Contributions

Conceptualisation: AAN; Formal analysis: MAN; Writing - original draft: NDG

and AAN; Supervision: AAN and AK; Writing - review and editing: all authors.

Conflicts of Interest

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

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