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Original Research Article

Epidemiological, Clinical and Outcome Profile of Severe Malaria in the Intensive Care Units of the Conakry University Hospitals (Guinea)

Diallo T.S[1]*, Donamou J[1], Touré A[2], Yansané MA[1], Camara M.L[1]

[1]Department of Anaesthesia and Intensive Care, Donka National Hospital, Guinea
[2]Anesthesia and Intensive Care Unit, Ignace Deen National Hospital, Conakry, Guinea

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Abstract: ***Introduction***: Severe malaria is a life-threatening emergency and a leading cause of intensive care admission in sub-Saharan Africa, yet data from Guinean intensive care units are scarce. The aim of this study was to describe the epidemiological, clinical and outcome profile of patients admitted for severe malaria in the intensive care units of the Conakry University Hospitals. ***Patients and Methods***: This was a retrospective, descriptive cross-sectional study conducted over 24 months, from 1 January 2024 to 31 December 2025, in the Departments of Anaesthesia and Intensive Care of Donka National Hospital and Ignace Deen University Hospital. All patients with a positive rapid diagnostic test or thick blood smear and at least one WHO severity criterion were included. ***Results****:* Forty-eight patients were included, corresponding to a hospital frequency of 13.2%. The mean age was 24.21 ± 11.25 years (range: 4–64 years), with a male-to-female ratio of 1.52. Most patients were students (54.2%), had no health insurance (91.7%) and lived outside Conakry (87%). Altered consciousness (87.5%) and seizures (62.5%) were the main presenting signs. Thrombocytopenia (83.3%) and raised creatinine (47.9%) were the most frequent laboratory abnormalities. All patients received intravenous artesunate. The main complications were acute kidney injury (41.7%) and persistent seizures (37.5%). The mean hospital stay was 7.18 ± 4.66 days. Mortality was 27.1% (13 deaths), due to septic shock in 61.5% and hypoxaemic cardiac arrest in 38.5% of casesb. ***Conclusion***: Severe malaria in the intensive care units of Conakry mainly affects young, uninsured patients referred from outside the capital with severe neurological involvement, and carries a high mortality. Earlier referral, strict adherence to artesunate protocols and better monitoring are needed to reduce morbidity and mortality.

Keywords: Severe Malaria, Intensive Care, Donka National Hospital, Guinea.

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INTRODUCTION

Malaria is a febrile, haemolytic erythrocytopathy caused by the multiplication of a Plasmodium parasite in the liver and in red blood cells, and transmitted by the bite of the female Anopheles mosquito (Baglo *et al*., 2023). Of the five species infecting humans, Plasmodium falciparum is the most pathogenic and the main cause of severe forms, although severe disease has also been described with P. vivax and P. knowlesi (Baglo *et al*., 2023). Severe malaria is defined by the presence of asexual forms of P. falciparum in the blood together with at least one clinical or laboratory criterion of severity set out by the World Health Organization (WHO, 2015). It is a life-threatening medical emergency requiring immediate management in an intensive care unit (ICU). The global burden remains considerable. The WHO estimated 229 million cases and 409,000 deaths in 2019, 249 million cases and about 608,000 deaths in 2022, and 263 million cases and about 597,000 deaths in 2023, the African region accounting for roughly 94% of cases and 95% of deaths (WHO, 2025). Children under five years bear most of the deaths from severe malaria in sub-Saharan Africa (Nau *et al*., 2011). Intravenous artesunate is recommended as first-line treatment of severe malaria in adults and children (SEAQUAMAT group, 2005; WHO, 2015).

African ICU series show a heavy but variable toll. Severe malaria was reported to account for 35–45% of all ICU admissions in Gabon (Dzeing-Ella *et al*., 2005) and to have a hospital frequency of 20.22% in Côte d'Ivoire (Ango Priva *et al*., 2021). In Mali, a series of 30 ICU cases reported a hospital prevalence of 3.9%, a mean stay of 6.8 ± 5.9 days and a case-fatality rate of

***Corresponding Author:** Diallo T. S
Department of Anaesthesia and Intensive Care, Donka National Hospital, Guinea

30% (Sidibé *et al*., 2020). In Guinea, the national malaria control programme reported more than 3.6 million confirmed cases and 8,000 deaths in 2022 (PNLP, 2023).

Despite this burden, precise epidemiological data on severe malaria cases admitted to intensive care in Guinea are lacking. This study therefore aimed to contribute to improving the management of severe malaria in the ICUs of the Conakry University Hospitals. Its specific objectives were to determine the frequency of severe malaria, to describe the epidemiological characteristics of the patients, to describe the most frequent signs of severity, and to determine the associated mortality.

PATIENTS AND METHODS

This was a retrospective, descriptive cross-sectional study conducted over 24 months, from 1 January 2024 to 31 December 2025, in the Departments of Anaesthesia and Intensive Care of Donka National Hospital and Ignace Deen University Hospital (Conakry), two referral units for critically ill patients with care, training and research missions. The Donka unit has a 10-bed ward and two single-bed cubicles, 12 monitors and four ventilators. The Ignace Deen unit has a six-bed ward, a four-bed recovery room and a two-bed cubicle, with two ventilators and four portable ventilators.

The study population comprised all patients, irrespective of age, admitted to the ICU for severe malaria or who developed severe malaria during hospitalisation. Patients were included if they had a positive rapid diagnostic test (RDT) or thick blood smear at admission together with one or more WHO severity criteria (WHO, 2015). Records that could not be used because of missing essential information were excluded. Recruitment was exhaustive.

Data were collected from medical records and admission registers using a standardised survey form. The variables comprised sociodemographic data (age, sex, residence, occupation, health insurance), epidemiological data (history, department of origin, self-medication before admission), clinical and laboratory data (Glasgow Coma Scale, haemodynamic and respiratory parameters, presenting signs, parasite density, haemoglobin, platelets, creatinine, urea, blood glucose, electrolytes), therapeutic data and outcome data (length of stay, complications, outcome). Age was grouped according to the Statistics Canada categories (<15, 15–24, 25–64 and >64 years). The frequency of severe malaria was the ratio of severe malaria cases to all patients admitted during the study period.

Intravenous artesunate was given at 3 mg/kg per dose below 20 kg and 2.4 mg/kg from 20 kg upwards, at H0, H12 and H24 and then every 24 hours. Data analysis and ethics Data were entered on a smartphone with KoboCollect and analysed with R software, version 4.4.1; Microsoft Office 2019 was used for data entry, tables and figures. Quantitative variables are expressed as means ± standard deviation and ranges, and qualitative variables as frequencies and percentages.

RESULTS

During the study period, 48 patients were included, corresponding to a hospital frequency of severe malaria of 13.2%. The mean age was 24.21 ± 11.25 years (range: 4–64 years); the 15–24 age group predominated (56.2%). There were 29 men (60.4%) and 19 women (39.6%), a male-to-female ratio of 1.52. Students were the largest occupational group (54.2%), 91.7% of patients had no health insurance and 87% lived outside Conakry (Table I).

Table I: Sociodemographic characteristics and history of the patients (N = 48)

Characteristic	n	%
Age group (years)		
< 15	8	16.7
15–24	27	56.2
25–64	12	25.0
> 64	1	2.1
Sex		
Male	29	60.4
Female	19	39.6
Occupation		
Pupils / students	26	54.2
Self-employed	19	39.6
Civil servants	3	6.3
Health insurance		
Uninsured	44	91.7
Insured	4	8.3
Department of origin		
Emergency department	43	89.6
Haematology	2	4.2
Paediatrics	2	4.2
Maternity	1	2.1
History		
Previous malaria	24	50.0
No known history	19	39.6
Other history*	5	10.4
Self-medication before admission		
Paracetamol	19	39.6
Herbal medicine	1	2.1

The main presenting signs were altered consciousness (87.5%) and seizures (62.5%), followed by vomiting (41.7%), pallor (31.3%), jaundice (22.9%) and respiratory distress (10.4%). Fever was almost constant (97.9%; mean temperature 38.79 °C), and one patient was hypothermic. On the Glasgow Coma Scale, 29 patients (60.4%) scored 9–12 and 19 (39.6%) were deeply comatose (score ≤ 8). The mean heart rate was 118.06 beats/min, with tachycardia (> 100/min) in 35.4%; systolic blood pressure was ≥ 90 mmHg in all patients (mean 124.4 mmHg). The mean respiratory rate was 28.12 cycles/min and the mean pulse oximetry saturation 89.0%.

Parasite density was available for 28 patients and exceeded 10,000 parasites/µL in 19 of them (67.9%). Thrombocytopenia was present in 40 patients (83.3%). Among the 44 patients with a haemoglobin result, 3 (6.8%) had severe anaemia (< 7 g/dL). Creatinine and urea were raised in 47.9% and 50.0% of patients, respectively. Hyperglycaemia affected 19 patients (39.6%) and hypoglycaemia only one. Electrolyte disturbances were infrequent, with hyponatraemia in 6 patients (12.5%), and hypo- and hyperkalaemia in 3 patients each (Tables II and III).

Table II: Vital signs and laboratory values at admission

Parameter	Mean	Range
Temperature (°C)	38.79	34.70–40.50
Systolic blood pressure (mmHg)	124.4	94–180
Diastolic blood pressure (mmHg)	78.04	57–126
Heart rate (beats/min)	118.06	60–186
Respiratory rate (cycles/min)	28.12	18–44
Pulse oximetry saturation (%)	89.00	70–93
Parasite density (/µL), n = 28	28,756	1,017–98,718
Platelets ($\times 10^9$/L)	129.2	22–904
Haemoglobin (g/dL), n = 44	9.55	4.60–16.00
Creatinine (µmol/L)	209.5	37–602
Urea (mmol/L)	12.54	2.60–32.94
Serum sodium (mmol/L)	137.22	116.97–144
Serum potassium (mmol/L)	4.21	3.33–6.40
Blood glucose (g/L)	1.28	0.58–2.29

Severity criteria were dominated by impaired consciousness, seizures, jaundice and respiratory distress, whereas severe anaemia, raised creatinine and hypoglycaemia were the main laboratory criteria.

All patients received injectable artesunate as aetiological treatment. The mean dose per administration was 162.3 ± 26.41 mg (range: 48–180 mg), and 180 mg was given to 56.3% of patients. The mean duration of artesunate treatment was 4.35 ± 2.43 days (range: 1–13 days), and 56.3% of patients were treated for less than four days. Symptomatic treatment consisted mainly of antipyretics (97.9%) and anticonvulsants (58.3%); 18 patients (37.5%) received blood products, 13 (27.1%) standard oxygen therapy, 4 (8.3%) analgesia-sedation with mechanical ventilation and 2 (4.2%) dialysis.

The main complications were acute kidney injury (41.7%), persistent seizures (37.5%) and thrombocytopenia (29.2%). The mean length of stay was 7.18 ± 4.66 days, and 62.2% of the 45 patients with a recorded length of stay were hospitalised for less than eight days. Thirteen patients died, a mortality of 27.1%. Septic shock (61.5%) and hypoxaemic cardiac arrest (38.5%) were the causes of death (Table III).

Table III: Complications and outcome

Variable	n	%
Complications (N = 48)		
Acute kidney injury	20	41.7
Persistent seizures	18	37.5
Thrombocytopenia	14	29.2
Acute respiratory distress syndrome	7	14.6
Severe anaemia	5	10.4
Septic shock	3	6.3
Hepatic failure	3	6.3
Acute pulmonary oedema	2	4.2
Length of stay (n = 45)		
< 8 days	28	62.2
8–14 days	13	28.9
> 14 days	4	8.9
Outcome (N = 48)		
Survivors	35	72.9
Deaths	13	27.1
Causes of death (n = 13)		
Septic shock	8	61.5
Hypoxaemic cardiac arrest	5	38.5

DISCUSSION

This study describes the profile of 48 patients admitted for severe malaria in the ICUs of two Conakry university hospitals over two years. Severe malaria accounted for 13.2% of admissions, lower than the 16% reported in an adult ICU in Mali (Beye *et al*., 2024); differences in recruitment and admission policies probably explain part of this variability.

Our patients were young (mean age 24.21 years), with the 15–24 age group the most represented (56.2%), followed by the 25–64 group (25.0%); children under 15 accounted for 16.7%. In Côte d'Ivoire, Koffi *et al*., (2025) reported older ICU patients (21–89 years, mean 36.5 years, with the 25–44 age group predominating). The predominance of young subjects in our series could reflect a greater exposure in this age group combined with late recourse to specialised care. Male predominance (60.4%, ratio 1.52) was similar to that of Thiongane *et al*., (2023) in Dakar (60.26%, ratio 1.51).

More than half of our patients were pupils or students (54.2%) and 91.7% had no health insurance, which may be a factor of delayed care. Eighty-seven percent came from outside Conakry, a pattern different from that described in Ziguinchor by Sène (2024), where 52% of patients came from suburban and 32% from rural areas. Most patients were referred from the emergency department (89.6%); in Dakar, Nemaleu (2018) reported that 60.3% of patients were referred.

Altered consciousness (87.5%) and seizures (62.5%) dominated the clinical picture, as in the study of Sène (2024), in which neurological signs were also predominant (44% and 18%). Fever was the main reason for consultation in the series of Ntahimpereye (2019) (94%) and Rojomampihavana (2022) (55.74%), which are therefore only partially comparable to ours. Almost all our patients were febrile (97.9%). The severity criteria were comparable to those of Ly *et al*., (2019), who reported coma (55.6%), anaemia (53.89%), jaundice (31.13%) and respiratory distress (17.37%). Thrombocytopenia was very frequent (83.3%), and renal impairment affected nearly half of the patients. Hyperglycaemia (39.6%) contrasted with the 3.85% hypoglycaemia rate reported by Thiongane *et al.,* (2023).

All patients received injectable artesunate, in line with international recommendations (SEAQUAMAT group, 2005; WHO, 2015). However, 56.3% were treated for less than four days (mean 4.35 days) and 43.8% received less than 180 mg per administration. Doses below 180 mg may simply reflect weight-based dosing in children and lighter adults, and the relay with an oral artemisinin-based combination therapy after at least 24 hours of parenteral treatment was not documented; these figures should therefore be interpreted with caution, but they underline the need for strict adherence to the protocol and for systematic use of artesunate in every severe case (WHO, 2020).

Acute kidney injury (41.7%), persistent seizures (37.5%) and thrombocytopenia (29.2%) were the main complications. In Madagascar, Randrianarisoa *et al*., (2021) reported functional acute kidney injury in 27.2% and thrombocytopenia in 83% of cases. The mean length of stay (7.18 days) was close to the 7.3 days reported in Dakar by Ndongo *et al*., (2022). Mortality (27.1%) was close to the 30% reported in Mali (Sidibé *et al*., 2020) and above the 15–25% range reported in Madagascar (Randrianarisoa *et al*., 2021). Septic shock (61.5%) and hypoxaemic cardiac arrest (38.5%) were the causes of death, which probably reflects both the severity of the patients admitted and delays in care.

This study has limitations. Its retrospective design led to missing data for some variables (parasite density in 28 patients, haemoglobin in 44, length of stay in 45), its sample was small and limited to two hospital units, and its descriptive nature did not allow prognostic factors to be identified by comparing survivors and non-survivors.

CONCLUSION

Severe malaria in the ICUs of the Conakry University Hospitals mainly affects young, predominantly male, uninsured patients coming from outside the capital. It presents mostly with altered consciousness and seizures, frequent thrombocytopenia and renal impairment, and is associated with a mortality of 27.1%, mainly from septic shock and hypoxaemic cardiac arrest. These findings call for strengthening prevention and early diagnosis, including systematic use of rapid diagnostic tests; improving referral and counter-referral systems and access to care through health insurance coverage; guaranteeing the permanent availability of injectable artesunate, blood products and ICU equipment; ensuring rigorous clinical and biological monitoring and strict application of treatment protocols; and continuing training of healthcare staff. Families should be encouraged to consult early and to avoid self-medication. Prospective multicentre studies with an analytical component are needed to identify prognostic factors.

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