

Management and outcomes of severe malaria in a pediatric intensive care unit, Koutiala, Mali

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INTRODUCTION

- There have been few breakthroughs in the treatment of severe malaria since the AQUAMAT trial, which established the superiority of injectable artesunate as first-line treatment
 - The case fatality rate among children who received artesunate in that trial was still 8.5%
- Severe malaria remains a major morbidity in many MSF field settings in sub-Saharan Africa.
- Questions remain about the best strategies for fluid management and the presumptive use of antibiotics to treat possible bacterial co-infections in children with severe malaria

OBJECTIVES

- Describe the presentation of children with severe malaria
- Describe the treatment of children with severe malaria
- Explore possible risk factors for poor outcomes



METHODS

Setting

- Reference Health Center of Koutiala, Mali
- More appropriately called a hospital, supported by MSF since 2009, with general paediatrics wards, neonatology unit, inpatient nutritional rehabilitation unit
- Hosts a suite of 3 intensive care units: a resuscitation room, a nutritional rehabilitation ICU and a paediatrics ICU
- >11 500 admissions to hospital among children <5yr in 2015

Data collection

- **Severe malaria:** categorized by treating physician following standard practice and based on RDT; of note, all children in current study had symptoms warranting ICU-level care
- Prospective data collection on all patients admitted to one of the three ICUs between July 2015 and June 2016
- Data extracted from patient charts during first 24 hours of ICU stay, at time of discharge from ICU, and at hospital discharge
 - Vital signs and clinical symptoms over time
 - Anthropometrics and physical exam findings
 - Admission and discharge diagnoses
 - Laboratory data (cultures, CBC, point-of-care haemoglobin and malaria tests, analysis of CSF)
 - Treatments received in first 24 hours

Data analysis

- All data anonymized and described using Stata
- Log-binomial regression used to calculate risk ratios associated with severe malaria

RESULTS

- Severe malaria caused 2491 admissions (70% of all ICU admissions). All children were treated with injectable artesunate.

Figure 1: Weekly ICU admissions, Koutiala Mali, July 2015-June 2016

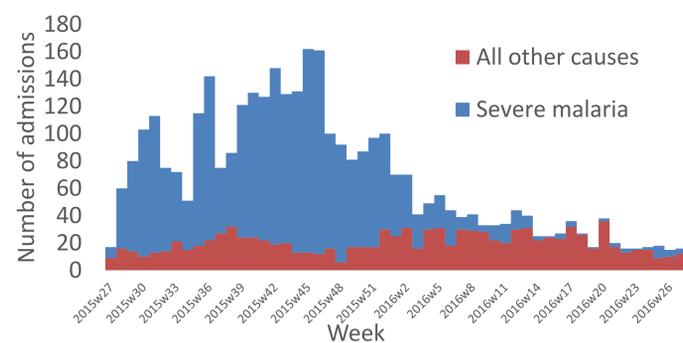


Table 1: Characteristics of patients admitted with severe malaria (N=2491)

Female sex, n(%)	1210 (49)
Age in months, n(%)	
2-11	139 (6)
12-23	357 (14)
24-35	669 (27)
36-47	767 (31)
48-59	559 (22)
Time since symptom onset, n(%) (N=2435)	
Same or next day	384 (16)
2-3 days	1016 (42)
4-6 days	620 (25)
≥7 days	415 (17)
Laboratory values	
Serum glucose <60 mg/dl, n(%)	552 (22)
Serum hemoglobin (g/dl), median (IQR)	6.0 (4.3-8.3)
Received ≥1 transfusion, n(%)	1216 (49)
Received ≥1 antibiotic, n(%)	2113 (85)
Received ceftriaxone, n(%)	2065 (83)

- 227 children had blood culture performed, 26 (12%) grew pathogenic bacteria
 - Non-typhi *Salmonella* was the most common (16 cases)
- 284 children died in-hospital (**CFR 11.4%**)
- After controlling for age, sex, hemoglobin on admission, and bacteremia, the following factors were associated with a higher or lower in-hospital mortality (Table 2):

Table 2: Factors significantly associated with increased or decreased in-hospital mortality

Factor	Risk Ratio	95%CI	p
Seeking care ≥4 days after symptom onset	1.9	1.6-2.2	0.001
Glucose <60 mg/dl	3.4	2.9-4.0	<0.001
Receiving a transfusion	0.6	0.5-0.7	0.01

DISCUSSION AND CONCLUSION

- Severe malaria is a major morbidity in this context
- Despite reasonable access to care and treatment according to current international standards, case fatality due to severe malaria remains elevated
- Improved access to care may help reduce delays in presentation
- Innovation in the management of severe malaria is urgently needed