Introduction

Febrile illnesses are the leading cause of morbidity and mortality in children under 5 in sub-Saharan Africa. However, invasive bacterial infections (IBI) are poorly documented in this region.

Objectives

- Study design: Prospective observational study
- Study site: Referral Health Centre, Koutiala, Mali
- Eligibility criteria:
  - Age 2 months to 5 years
  - Danger signs of infections: fever, or history of fever in the last 48h (>37.5 °C), or hypothermia (<35 °C), or neurological signs, or symptoms of shock, or respiratory distress, or petechial/purpuric at admission
  - Consent to participate in the study
- Selection of participants:
  - To have a balance of malaria and non-malaria cases, we included all eligible patients with a negative malaria rapid diagnostic test (mRDT) and every third eligible patient with a positive mRDT.
  - Admission and treatment of all children in this health centre were free of charge.
- Laboratory procedures based on routine practices
  - Blood sample collected on admission for blood culture and malaria confirmation with blood smear
  - Cerebrospinal fluid collected for culture if suspicion of meningitis
  - Further blood cultures if clinical deterioration >48 hours post admission (suspicion of hospital-acquired bacteraemia)
  - Disk diffusion antibiotic susceptibility testing following EUCAST 2016-2017

Methods

Results

- 1784 children were included from August 2016 to August 2017 (980 with negative mRDT, 804 with positive mRDT). 2/3 of children were below 2 years-old.
- An estimation of 6.1% of patients with confirmed malaria had community-acquired IBI compared with 14.8% in malaria-negative patients.
- After weighting, the overall mortality was 12.6% (CI95% 11.0-14.4). Case fatality rate in patients with co-infection IBI-malaria (34.4%) was higher than with severe malaria only (p<0.001 (Table 1).

Table 1: Prevalence and mortality of community and hospital acquired invasive bacterial infections

<table>
<thead>
<tr>
<th>Infections</th>
<th>Prevalence weighted % (CI95%)</th>
<th>Case fatality rate weighted % (CI95%)</th>
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</thead>
<tbody>
<tr>
<td>Community-acquired IBI</td>
<td>10.6 (9.1-12.2)</td>
<td>27.2 (20.9-34.5)</td>
</tr>
<tr>
<td>Co-infection IBI-malaria</td>
<td>2.9 (2.1-4.1)</td>
<td>34.7 (19.7-52.9)</td>
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<tr>
<td>IBI without malaria</td>
<td>7.8 (6.5-9.3)</td>
<td>26.2 (19.2-34.5)</td>
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<tr>
<td>Confirmed severe malaria</td>
<td>40.4 (37.8-43.1)</td>
<td>10.1 (7.7-13.2)</td>
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<tr>
<td>Hospital-acquired bacteraemia</td>
<td>2.5 (1.8-3.5)</td>
<td>32.4 (18.3-50.6)</td>
</tr>
</tbody>
</table>

Figure 1: Aetiology of community and hospital acquired invasive bacterial infections. NTS=Non-Typhi Salmonella; Non fem GN=Non fermentative Gram-negative rods

Figure 2: Proportion of antibiotic resistance among Enterobacteria isolated from community and hospital acquired invasive bacterial infections.

Conclusion

- Non-Typhi Salmonella was the main cause of community-acquired IBI as previously shown in multiple studies in sub-Saharan Africa.
- The mortality of children with community or hospital-acquired IBI was high. Mortality of children with co-infection IBI-severe malaria was much higher than severe malaria only.
- The high proportion of multidrug-resistant bacteria, specifically in hospital-acquired IBI, led to improved individual patient management with appropriate antibiotics, reinforcement of antibiotic stewardship and infection prevention measures in the paediatric hospital.