Malaria detection in relation to fever among malnourished children in Ethiopia

Have we got it right?

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Ethiopia

- Endemic for Malaria
- High childhood burden of Malaria & Malnutrition
- Malnourished children with malaria parasitaemia:
  - may or may not present with fever.
  - need treatment ⇒ risk of severe malaria and death
Ethiopia - MSF (2008)

- Supported 48 nutritional centers with Artemisinin-based malaria treatment (ACT)
- All children with and without fever were routinely tested for malaria using paracheck (RDT).
Paracheck results & Artemisinin treatment

- Paracheck (+) with or without Fever
  - Artemisinin

- Paracheck (-) with fever
  - search for conditions other than malaria
Ethiopia – National Guidelines

- Restrict paracheck testing to children with fever

- Children with parasitemia but without fever are likely to be missed

⇒ No malaria treatment!
Operational Research Question

What proportion of malnourished children with and without fever have *plasmodium falciparum* malaria?
Objectives

To determine:

- the frequency of temperature recording under routine conditions
- the proportion of malnourished children with and without fever who had falciparum malaria
- the association between malaria and grades of malnutrition
Method

- **Study design:** Retrospective analysis of program data sourced from patients’ cards.

- **Study period:** June - November 2008

- **Study setting:** 48 MSF nutritional centers southern Ethiopia.

- **Study population:** All malnourished children aged <15 years

- **Ethics:** MOH-Ethiopia, MSF and The Union
Package of care
Admission criteria

- Mid upper arm circumference (MUAC)

- Weight for height
Grading of malnutrition

Malnutrition was graded into:

- Mild
- Moderate
- Severe
Measuring of temperature

- Temperature was measured using standard mercury thermometer.
Antibiotic
Vitamin A
Measles vaccination
De-worming
Folic acid
Malaria screening
Paracheck (RDT)
### Results 1

**Patient Characteristics**

- Admitted to nutrition programme: 19,200
- Paracheck not recorded: 2484 (13%)
- Included in study: 16,716
  - Males: 7412 (44%)
  - Mean age (years): 4.4
## Results 2

### Grades of malnutrition

<table>
<thead>
<tr>
<th>Grade of Malnutrition</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>3767 (27)</td>
</tr>
<tr>
<td>Moderate</td>
<td>5986 (35)</td>
</tr>
<tr>
<td>Severe</td>
<td>6399 (38)</td>
</tr>
</tbody>
</table>
### Results 3

**Recorded temperature and malaria**

<table>
<thead>
<tr>
<th>Fever Temperature &gt;37°C</th>
<th>Malaria Paracheck (+)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>57 (28%)</td>
<td>206</td>
</tr>
<tr>
<td>No</td>
<td>122 (10%)</td>
<td>1262</td>
</tr>
<tr>
<td>Unrecorded</td>
<td>1174 (8%)</td>
<td>15,248 (91%)</td>
</tr>
<tr>
<td>Total</td>
<td>1353 (9%)</td>
<td>16,716</td>
</tr>
</tbody>
</table>
Malnutrition grade & malaria prevalence

<table>
<thead>
<tr>
<th>Malnutrition</th>
<th>Total</th>
<th>Malaria Paracheck (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>3767</td>
<td>184 (5%)</td>
</tr>
<tr>
<td>Moderate</td>
<td>3986</td>
<td>480 (8%)</td>
</tr>
<tr>
<td>Severe</td>
<td>6399</td>
<td>632 (10%)</td>
</tr>
</tbody>
</table>

χ² linear trend 78

\( P < 0.001 \)
Seven in ten children with fever did not have malaria.

Universal RDTs
- Promoted rational use of artimesinin
- Prevented waste through empirical administration of ACT to all those with fever
10% children without fever had malaria and without RDT ⇒ No malaria treatment!

- Ethiopia guidelines: 2000 children without fever but with malaria would have missed malaria treatment and progressed to severe malaria and probably die!

- This study influenced WHO revision of Ethiopian malnutrition guidelines.
DISCUSSION (3)

- 91% lacked temperature recording! Why?
  - Perception - with RDT, temperature recording is redundant?
    ➞ awareness raising /education/ training
  
- Workload related to “manual” mercury thermometers?
  ➞ digital (user-friendly) thermometers

Fever with negative RDT ➞ Further investigation for fever
Short coming in clinical practice
(Operational research +)
LIMITATIONS

- Unrecorded Temperature

- Use of Paracheck
CONCLUSION

In malaria-endemic Ethiopia:

- This study confirms the value of universal RDT malaria screening among malnourished children irrespective of fever
ACKNOWLEDGMENTS

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- Ethiopian Health & Nutrition Research Institute.

- Data encoder in MSF mission in Ethiopia