Malaria Overview • Case Definition Kills Quickly

Malaria Risk
High • Low • How to Assess • Classification

IMCI Guidelines
Adaptation

Diagnostic Microscopy

Treatment
Choice of Anti-Malarial • Updating Policy

IM Quinine • Why not IM Cloroquine?

Severe malaria in Young Infants
Overview

- *P. falciparum* malaria widespread in Africa, Asia
- Leading cause of mortality in children under age 5 in many African countries
- Variable epidemiology based on different ecological settings
Malaria Overview

- Important to identify countries/areas as high risk, low risk or no risk
  - In **high risk** areas, all children with febrile diseases assumed to have malaria
  - In **low risk** areas, only children with no other diagnoses should be considered to have malaria
  - In **no risk** areas, anti-malarials should not be used

- **Anti-malarial resistance on the increase**
Case definition

- No specific clinical case definition
- No adequate gold standard in non-severe disease
- > 5000 parasites/μl also occurs in healthy children in areas with high parasitaemia
- In endemic areas, repeated attacks of malaria and nutritional deficiencies have led to severe anaemia.
Cerebral Malaria

Kills quickly

- Very severe febrile disease may signal cerebral malaria
- Rapid treatment after onset of fever essential
- Give Quinine, urgent referral if very severe febrile disease
- Don't take chances if high-risk area or season, or non-immune
Malaria Risk

High

- May describe areas for full year (endemic) or seasons (rainy seasons) or history of travel to high-risk area
- Classifying all children with fever as “malaria” is considered an acceptable strategy
- Diagnostic criteria with maximal sensitivity
  - fever by history, touch or measurement in the clinic
  - anaemia and splenomegaly also highly predictive
- Microscopy of little value, even if available
Malaria

Malaria Risk

Low

- No simple method for detecting malaria in low-risk area
- Protocol suffers from lack of good clinical definition
- More restrictive criteria applied, but still over-diagnosis occurs
- Current guidelines still have very low specificity in low malaria risk areas
- Research showed overtreatment in 9 of 10 cases
How to Assess

- Systematically sample children with fever or history of fever whether or not severe or referred

- Use well-defined, unbiased sample
  - ≥ 50/month allowed for high risk areas
  - >100/month allowed for low risk areas

- Microscopist and a clinician must be available
Malaria Risk

How to Assess

- Quality of laboratory diagnosis should be assured before study starts
  - Slide positive rate $\leq 5\%$ equals low risk

- Rationale for dividing areas into high, low, or no malaria risk comes from studies in Africa and in Asia
  - The Gambia experience
  - Pre-test in Gondar
  - Field test in Arusha
Malaria

Low Malaria Risk

Classification

• Fever or history of fever
  AND
  - NO runny nose
  - NO measles
  - NO other causes of fever
**IMCI Guidelines**

**Adaptation**

- Generic chart, modules show high and low risk
- Ethiopia adaptation has high, low and no risk
- Tanzania, Uganda - whole country considered high risk
  - All children with fever treated with anti-malarial
- Some countries in Asia and South America
  - No malaria risk only OR
  - Only non *P. falciparum* OR
  - Both *P. falciparum* and *P. vivax* are problems
  - Adaptations can be complex
Diagnostic Microscopy

- Useful if:
  - good technique is used
  - high sensitivity is available
  - results are available during clinic visit
Malaria

Diagnostic Microscopy

- Can be used:
  - To determine cause of treatment failure or identify resistant malaria
  - To exclude severe malaria, if no prior anti-malarials are used
  - To identify the few patients with malaria in low-risk settings
  - Where *P. vivax* and *P. falciparum* occur and treatment is different
  - To reduce non-specific treatment of febrile children where borreliosis is common
  - In high-risk areas where only moderate number of febrile children have positive smears
Malaria

Choice of Anti-malarial

- Drug resistant *P. falciparum* malaria becoming more common
- Drug policies must include at least two lines of treatment for uncomplicated malaria
  - First-line drug chosen by National Drug Program for uncomplicated malaria
  - Second-line drug for children not cured by first-line treatment or where contraindications occur
Malaria

Choice of Anti-malarial

- First- and second-line drugs must be available at same facility
- Only one therapy specified for the treatment of severe malaria (intramuscular Quinine)
Malaria

Treatment

Updating Policy

- Detect ineffective first-line treatment
  - Determine precise number of treatment failures
  - Can clinical failures be reduced by improving compliance?
  - What is the unacceptable proportion of clinical failures?
  - How can you assess that the critical proportion has been reached?
Malaria

Treatment

Updating Policy

• Determine the safe and affordable alternatives based on:
  – resistance rate and clinical efficacy
  – compliance rate, cost, availability, and side effects
  – areas that should be covered by the policy
Malaria

Treatment

Intramuscular Quinine

- Controversial, but proven effective
- Complications that can be avoided with good technique
  - Subcutaneous injection which causes skin narcosis
  - Rapid infusion IV therapy associated with cardiac arrhythmias and hypoglycemia, and subsequent mortality
  - Muscle necrosis, sterile abscess related to formulations in urethane, other irritants
  - Pain caused by concentrated solutions but well-tolerated when diluted
Intramuscular Quinine

• WHO guidelines recommend:
  – A loading dose of 20 mg salt per kg in 2 doses of 10 mg/kg
  – Maintenance dose of 10 mg/kg given at intervals of 8 to 12 hours after the last administration
    • 12-hour dosing if referral is not possible
    • Reduce maintenance to 5-7 mg per kg if more than 48 hours of therapy is required
  – As soon as the child can swallow, full oral treatment should be initiated

Note: Do not give Quinine to young infants under 2 months old or to any child age less than 4 months in a low malaria risk area
Why Not IM Chloroquine?

- Chloroquine-resistant malaria is spreading
- Very rapid IM absorption is dangerous
  - Time to peak: 20 minutes (sometimes 5 minutes)
  - Transiently high, potentially toxic (500-3500 μl/l) hypotension and vasodilatation, maybe sudden death
Severe malaria in Young Infants

Risk

- Generally low because maternal antibodies protect
- Quinine not recommended for young infants under 2 months old in high or low malaria settings or to any child age less than 4 months in a low malaria risk area
- In high-risk areas, young infants with severe bacterial infection may be treated with IM Quinine
- Base decision to treat on prevalence severe malaria among infants in this age group