SmartCDS: Malaria Diagnosis, Treatment, and Surveillance using Smartphones

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Mobile technology to improve health in developing countries

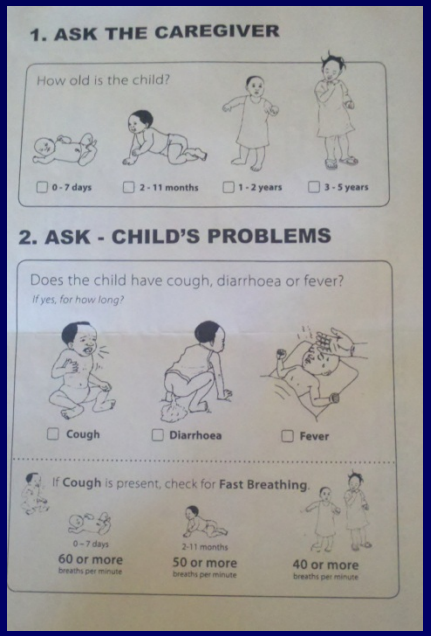
- Health system weaknesses
  - Health worker shortage
    - Physicians per 1,000 population
      - U.S.: 2.45
      - sub-Saharan Africa: <0.5
  - Inadequate/non-existent disease surveillance

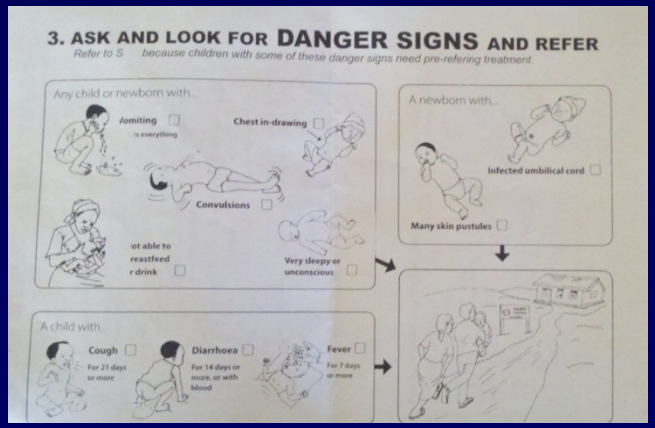
Background: Malaria

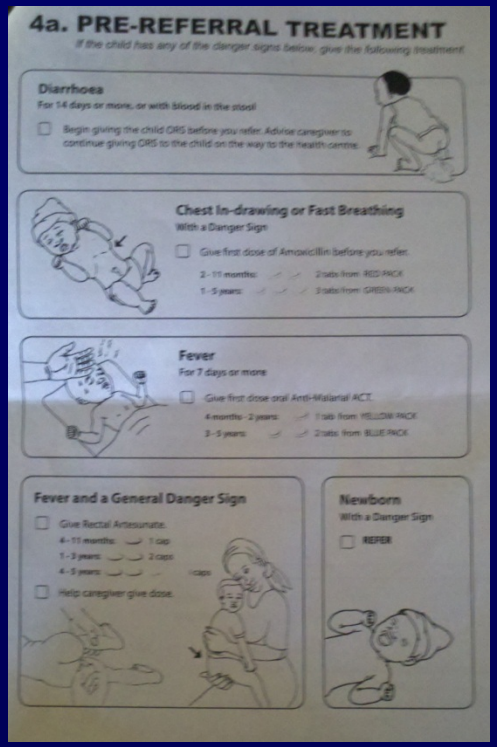
- 200 million malaria cases (WHO, 2014)
  - 600,000 deaths
- Uganda 1.5 million cases in 2013
- Current surveillance systems detect only 10% of the estimated global cases
- Early case detection and treatment within 24 hours most effective
  - Community-based services

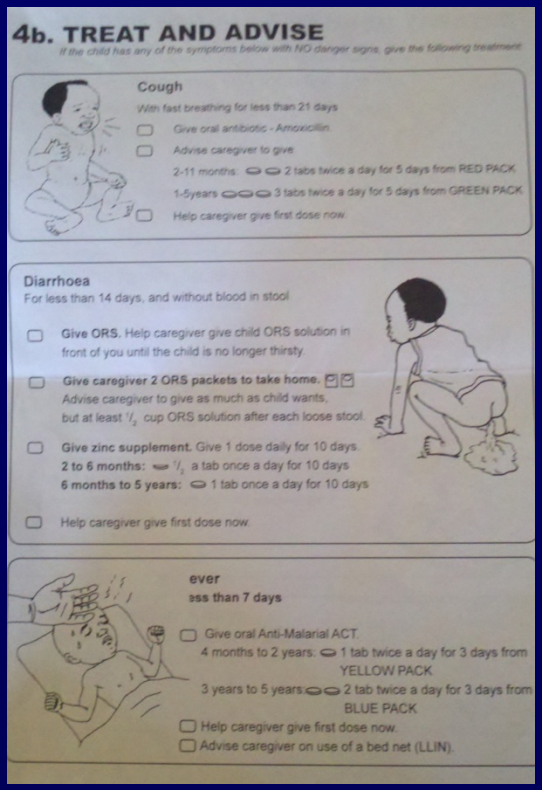
Integrated community case management of childhood illness (iCCM)

- Community health workers (CHWs)
- Targeting: malaria, pneumonia, and diarrhea in children under 5
- Symptom assessment and treatment recommendations

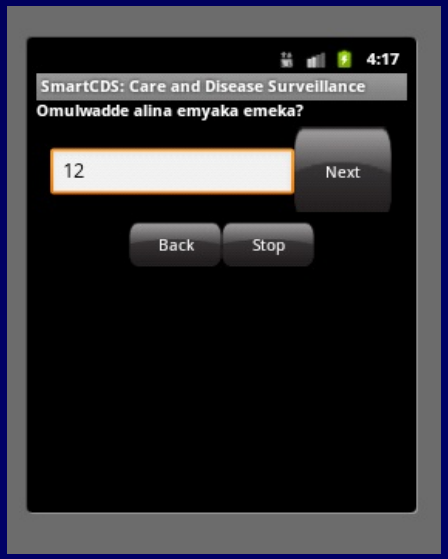

1. ASK THE CAREGIVER
How old is the child?
0 - 7 days
2 - 11 months
1 - 2 years
3 - 5 years
2. ASK - CHILD'S PROBLEMS
Does the child have cough, diarrhoea or fever?
If yes, for how long?
Cough
Diarrhoea
Fever
If Cough is present, check for Fast Breathing
0 – 7 days
60 or more
breaths per minute
2-11 months
50 or more
breaths per minute
40 or more
breaths per minute

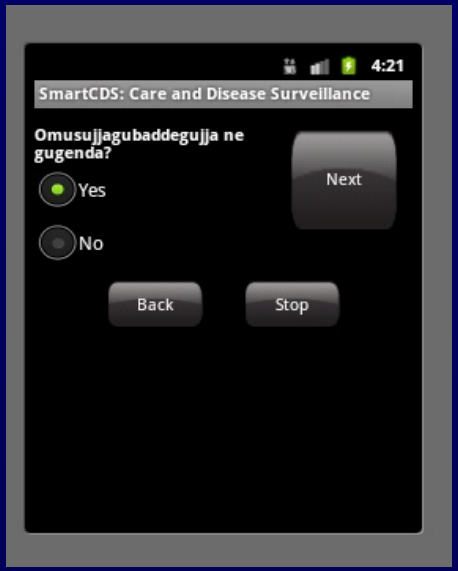

3. ASK AND LOOK FOR DANGER SIGNS AND REFER
Refer to S because children with some of these danger signs need pre-refering treatment
Any child or newborn with...
/omiting
s everything
Chest in-drawing
Convulsions
ot able to reastfeed r drink
Very sleepy or unconscious
A newborn with...
Infected umbilical cord
Many skin pustules
A child with...
Cough
For 21 days or more
Diarrhoea
For 14 days or more, or with blood
Fever
For 7 days or more

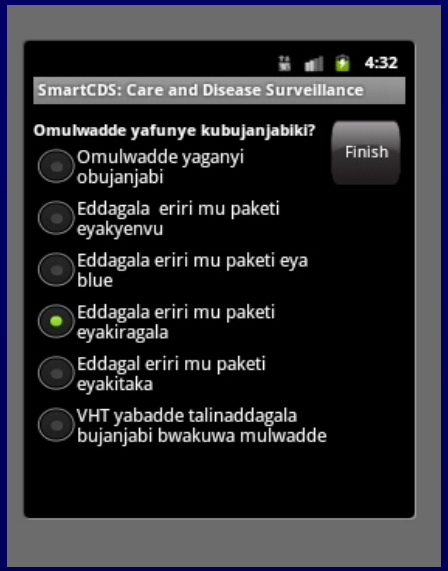

4a. PRE-REFERRAL TREATMENT
If the child has any of the danger signs below, give the following treatment
Diarrhoea
For 14 days or more, or with blood in the stool
Begin giving the child ORS before you refer. Advise caregiver to continue giving ORS to the child on the way to the health centre
Chest In-drawing or Fast Breathing
With a Danger Sign
Give first dose of Amoxicillin before you refer
2 - 11 months: 2 tabs from RED PACK
1 - 5 years: 3 tabs from GREEN PACK
Fever
For 7 days or more
Give first dose oral Anti-Malarial ACT
4 months - 2 years: 1 tab from YELLOW PACK
3 - 5 years: 2 tabs from BLUE PACK
Fever and a General Danger Sign
Give Rectal Artesunate
4 - 11 months: 1 cap
1 - 3 years: 2 caps
4 - 5 years: 3 caps
Help caregiver give dose
Newborn
With a Danger Sign
REFER

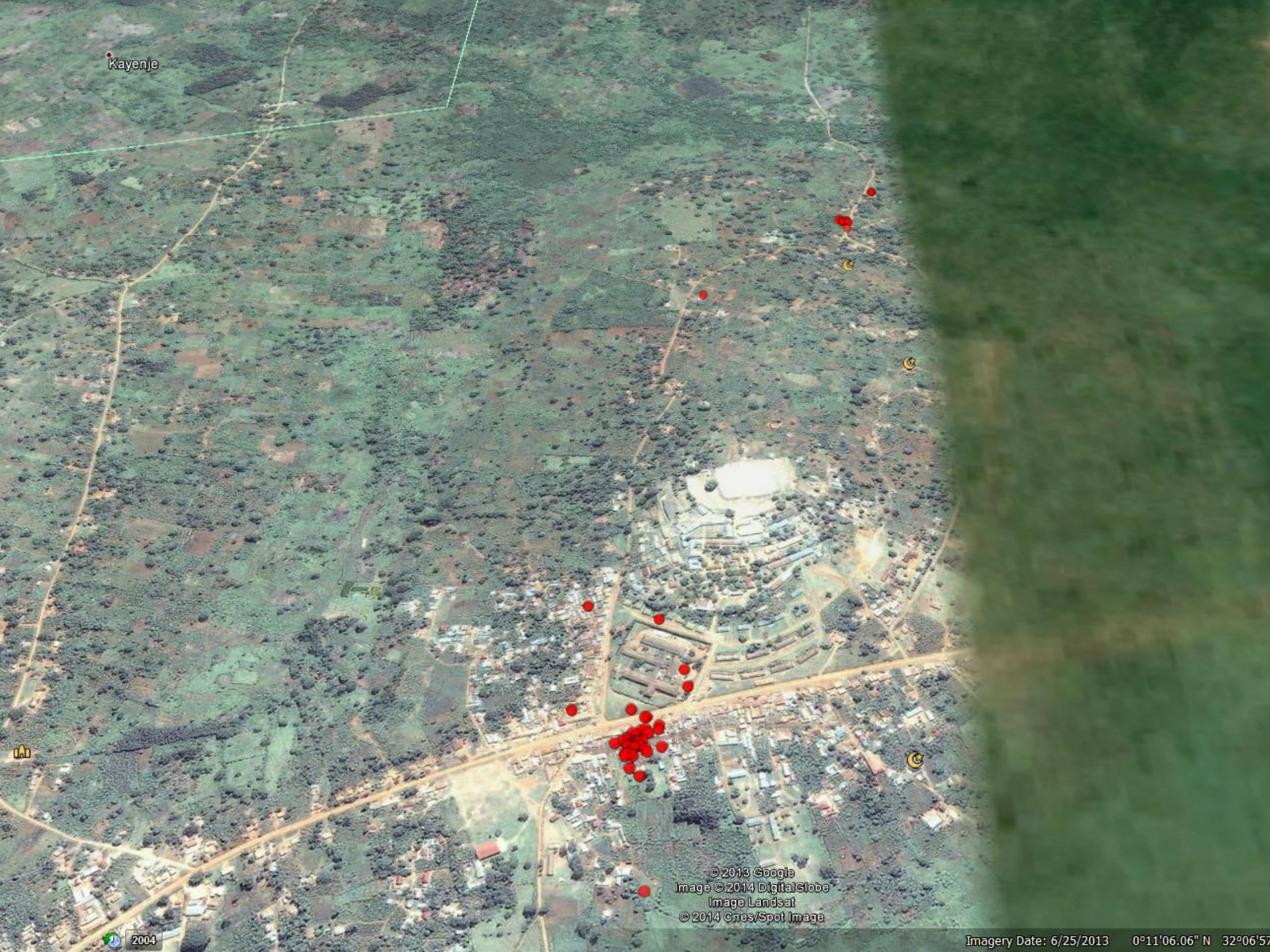

4b. TREAT AND ADVISE
If the child has any of the symptoms below with NO danger signs, give the following treatment
Cough
With fast breathing for less than 21 days
Give oral antibiotic - Amoxicillin
Advise caregiver to give
2-11 months: 2 tabs twice a day for 5 days from RED PACK
1-5years 3 tabs twice a day for 5 days from GREEN PACK
Help caregiver give first dose now
Diarrhoea
For less than 14 days, and without blood in stool
Give ORS. Help caregiver give child ORS solution in front of you until the child is no longer thirsty
Give caregiver 2 ORS packets to take home.
Advise caregiver to give as much as child wants, but at least ½ cup ORS solution after each loose stool.
Give zinc supplement. Give 1 dose daily for 10 days.
2 to 6 months: ½ a tab once a day for 10 days
6 months to 5 years: 1 tab once a day for 10 days
Help caregiver give first dose now
ever
ss than 7 days
Give oral Anti-Malarial ACT.
4 months to 2 years: 1 tab twice a day for 3 days from YELLOW PACK
3 years to 5 years 2 tab twice a day for 3 days from BLUE PACK
Help caregiver give first dose now.
Advise caregiver on use of a bed net (LLIN).

iCCM via SmartCDS





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Lessons learned

- < 1 hour training required
- Patients' increased confidence in CHW's skills

Challenges

- Phone GPS functionality
- Phone charging
- Scalability