Mobile phone applications for clinical diagnostic, therapeutic and public health use by front-line health workers in developing countries.

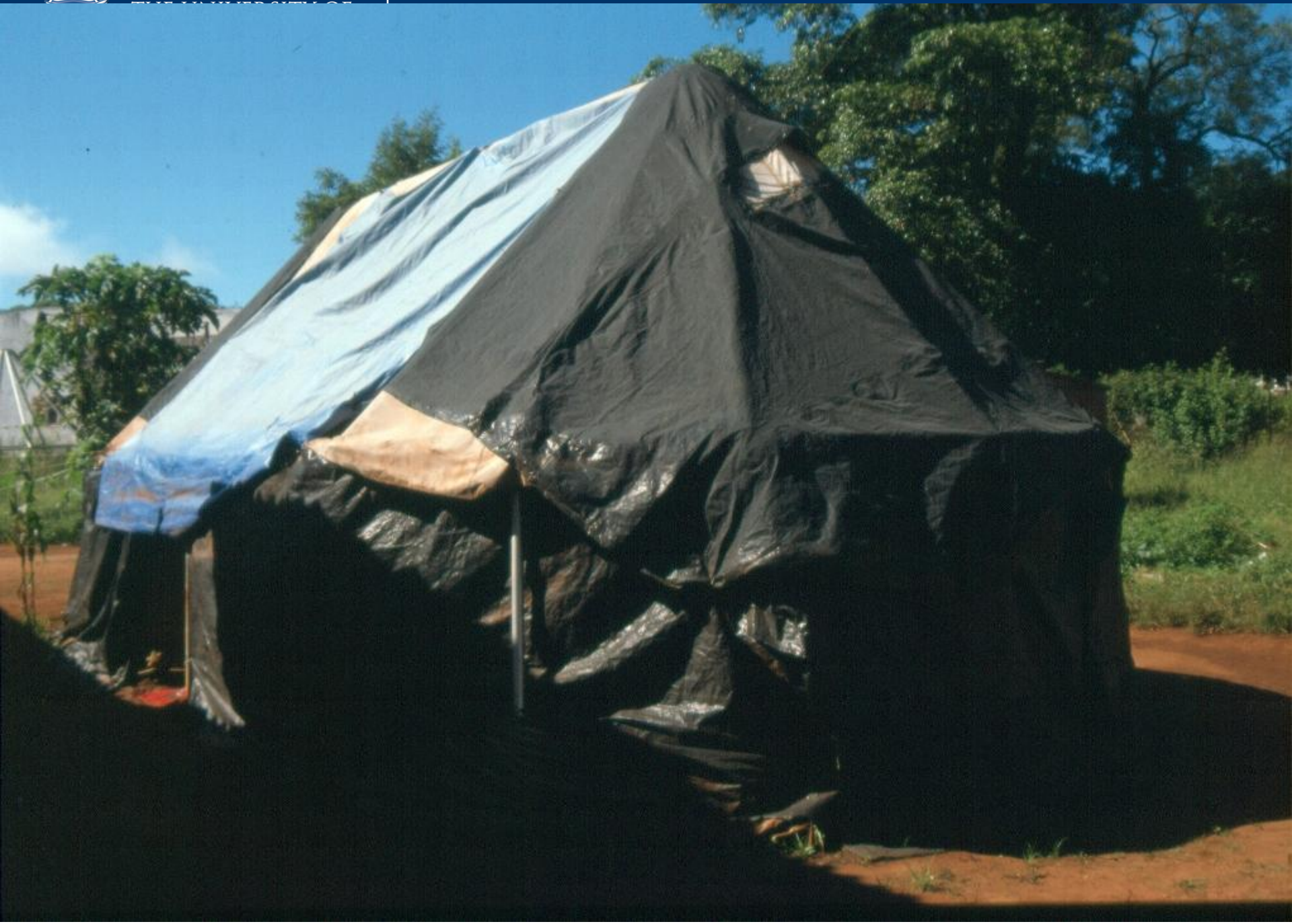
Dr Rens Scheepers
Department of Information Systems

The motivation

"Here in Manica Province … we have an estimated population of 858,000, of whom 153,000 are children under 5 years. The **total government budget** available to the province for health services is about 1 billion Meticais (£59,350 at current exchange rates). That is **about £0.07 per person per year**. This figure covers recurrent costs of the health service, and includes salaries but not vaccines or drugs, which are accounted for at national level. The total spent on recurrent costs for our 76 health units in ten districts, plus the capital city, is unlikely to be more than about **£2.16 per person per year**."

Black JF, de Giacomi G, Barreto I. Priorities in Mostar and Manica. *Lancet* 1996 Mar 30; 347(9005): 906

The motivation



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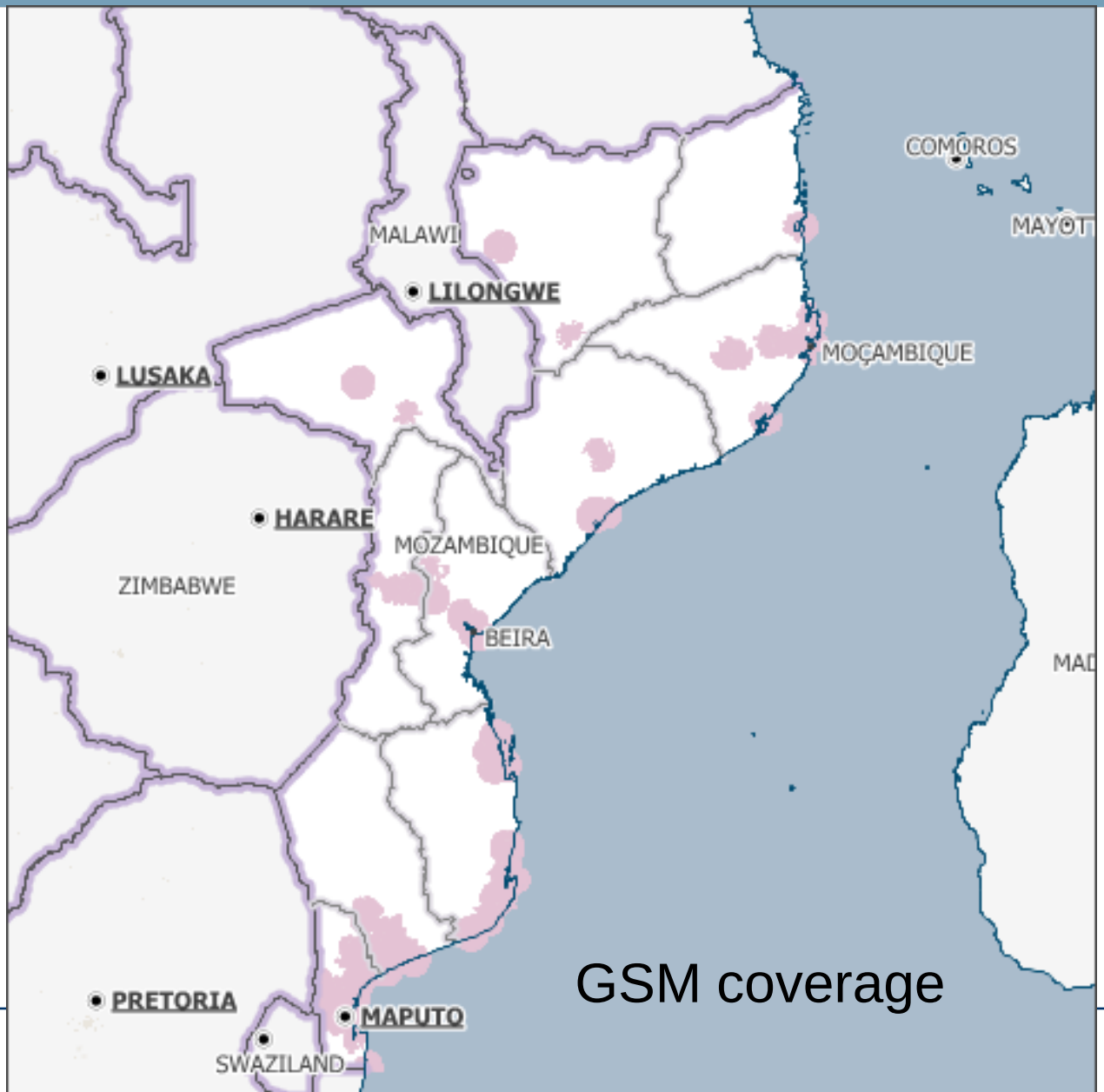
“With their first pay packet they buy a bicycle. With their second they buy a mobile phone.”

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Therefore…

- Why not make mobile phones more useful for health workers?
  - They are quite powerful small computers.
  - Some have cameras built in.
  - All have microphones.
  - Many have operating systems, some quite sophisticated.

Besides, Microsoft was offering money...

Three basic principles:

1. As far as possible create no new capital costs and no new recurrent costs. No use of the telephone network. No calls. No SMS. No data transfer.
2. Don't rely on distant experts. Create applications that provide useful answers directly to the health worker in the clinic. No delays.
3. Avoid the need for training wherever possible. i.e. make the applications behave exactly the way a mobile phone application usually behaves.

The team: Academics

University of Melbourne:

Jim Black (Nossal Institute for Global Health)

Rens Scheepers (Department of Information Systems)

Liz Sonenberg (Department of Information Systems)

Ahsan Khandoker (Department of Electrical and Electronic Engineering)

Marimuthu Palaniswami (Department of Electrical and Electronic Engineering)

Roger Rassool (School of Physics)

Universidade Eduardo Mondlane, Maputo, Mozambique:

Baltazar Chilundo (Departmento de Saúde da Comunidade)

Western Hospital, Footscray, Australia:

Forbes McGain (Anaesthetic Department)

The team:

Electrical and Electronic Engineer:

Edgar Charry

C#/.NET Developer:

Nay Lin Soe

Network/phone expert:

Fernando Koch

Postgraduate Students:

Bryn Sobott

Chetan Singhal

Undergraduate Students:

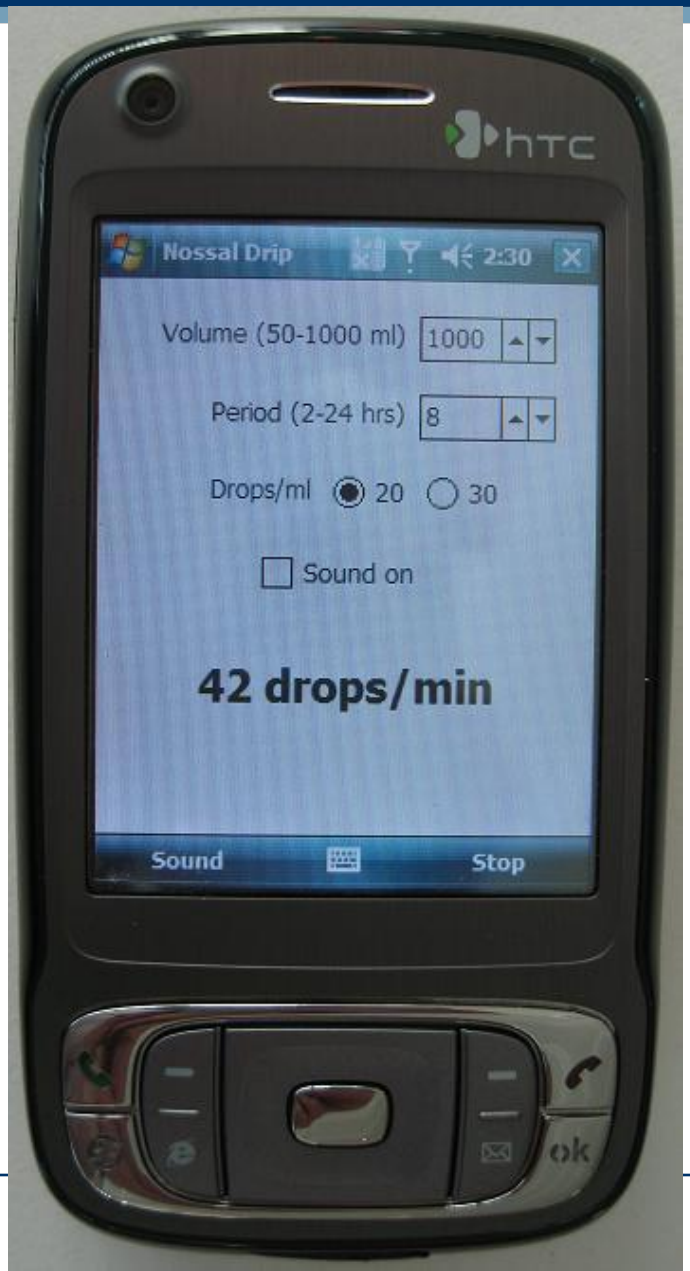
Wei “Will” Dong

Happy Xia

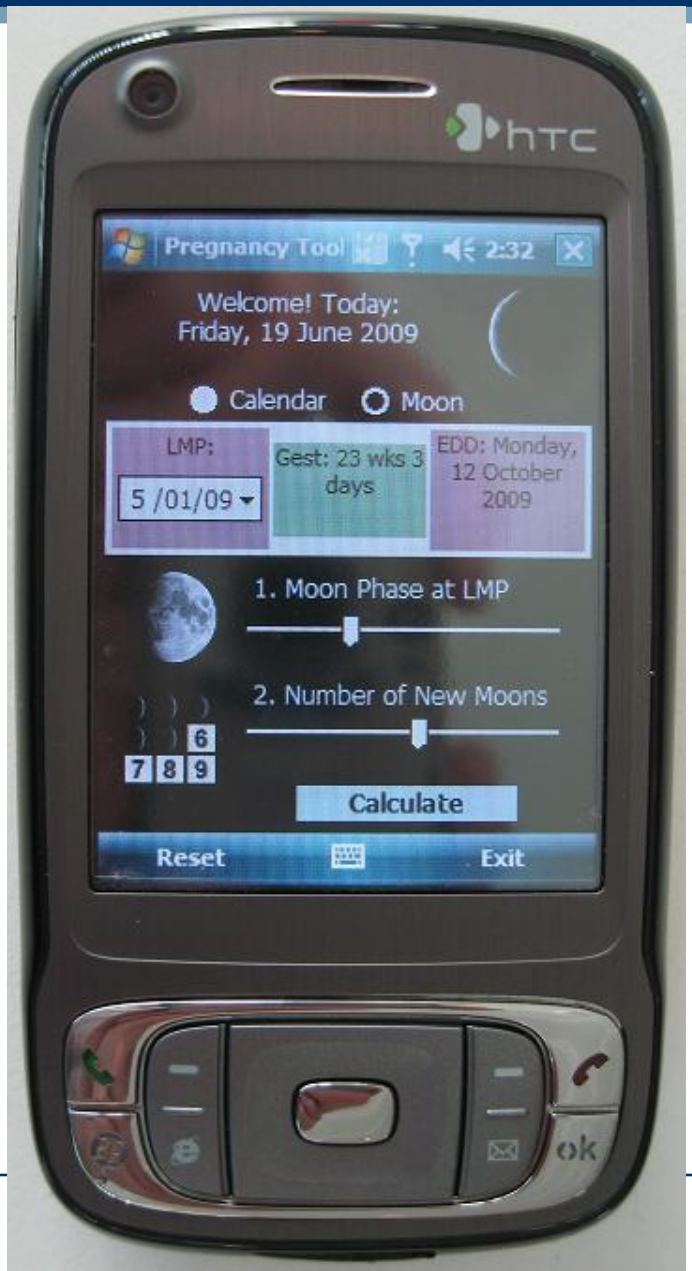
Brian Walker

Siti Nabihah Ahmad Suhud

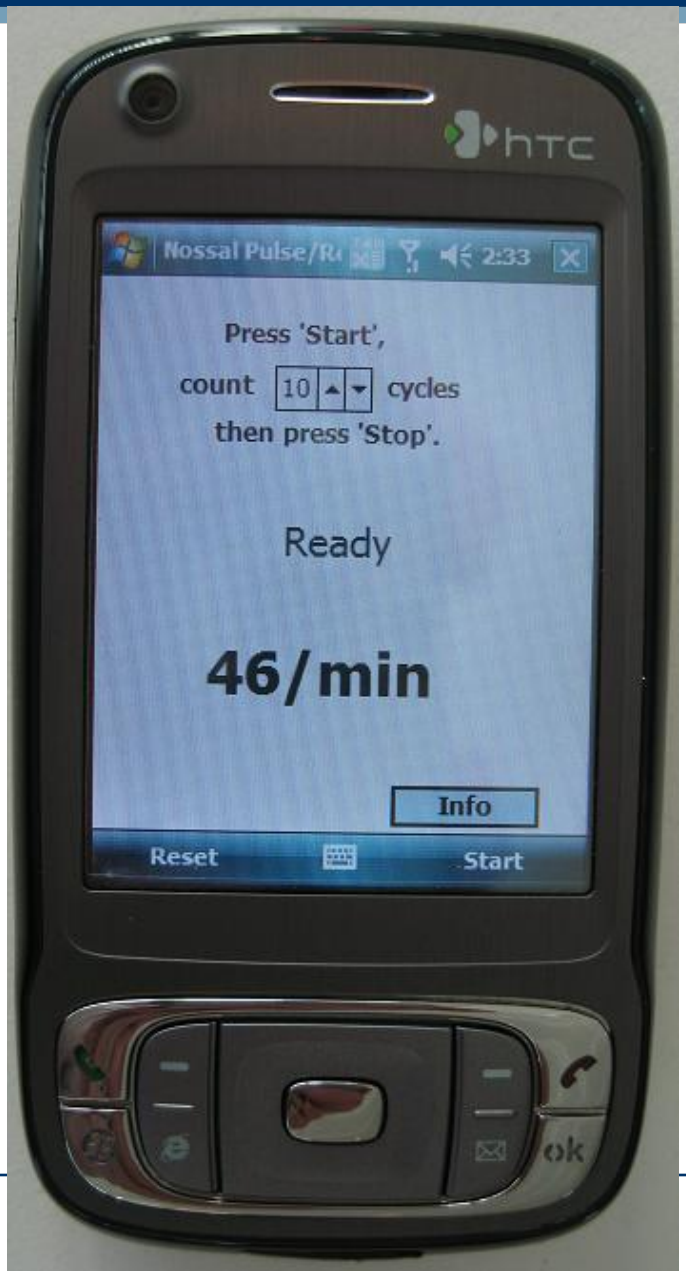
Mobile phone applications: Drip rate calculator



Pregnancy calculator



Respiratory rate calculator



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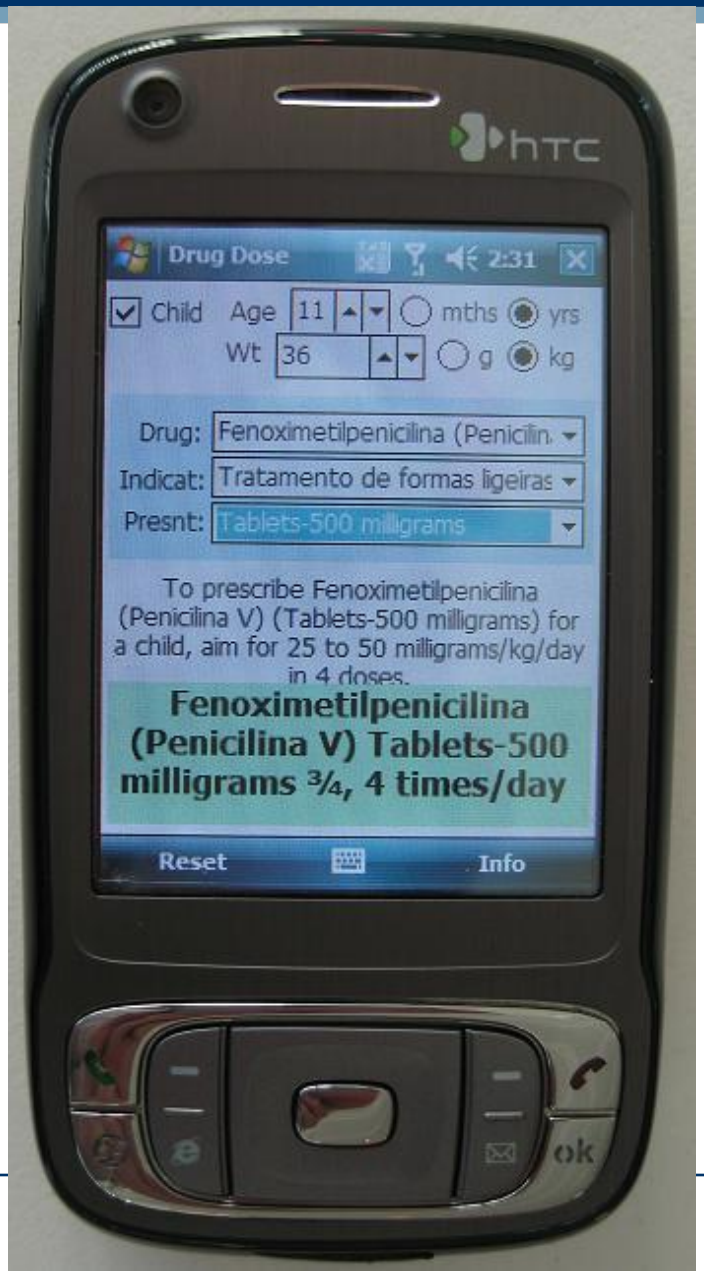
Formulary/Dose calculator



Medication reminder

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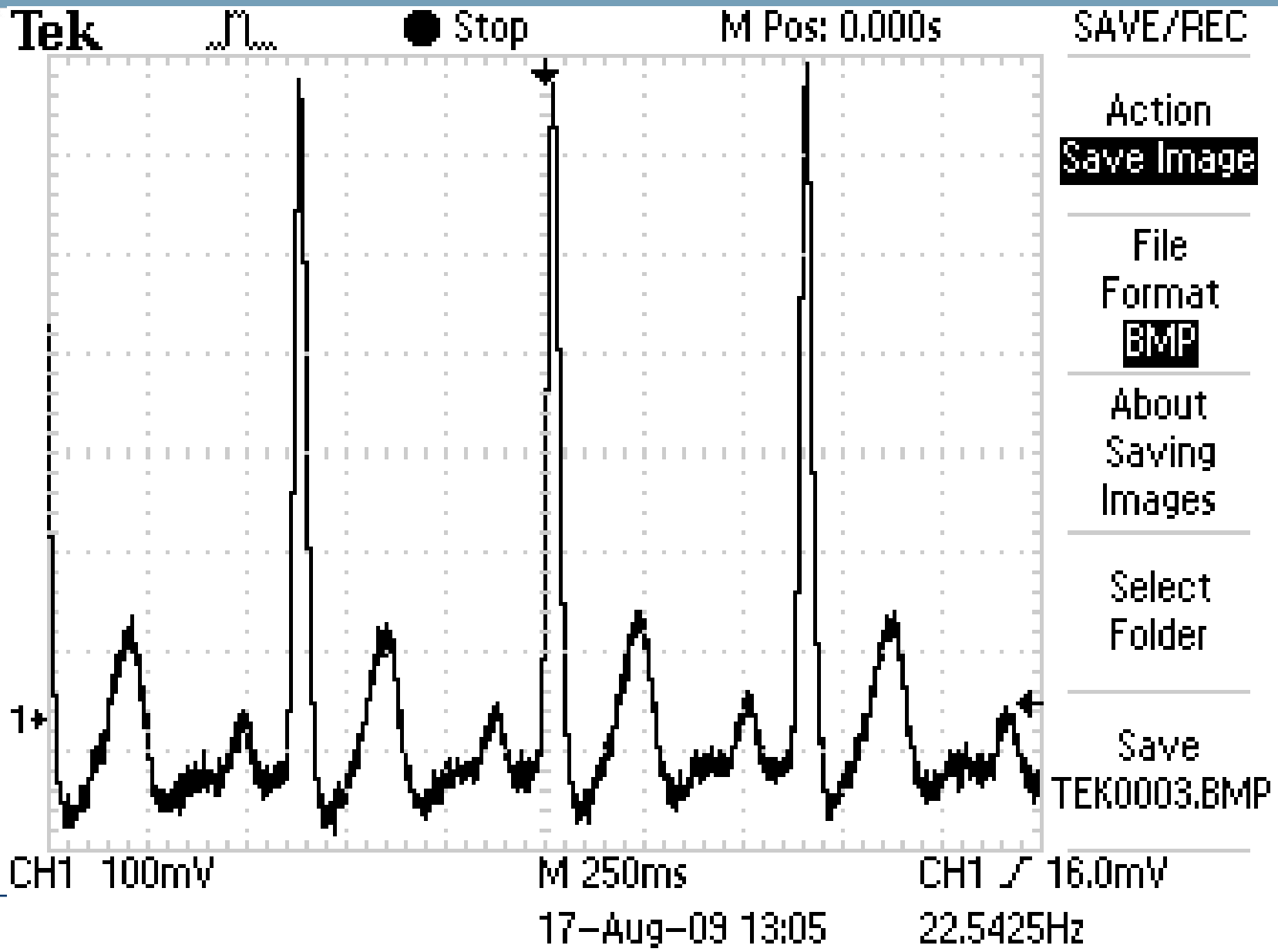
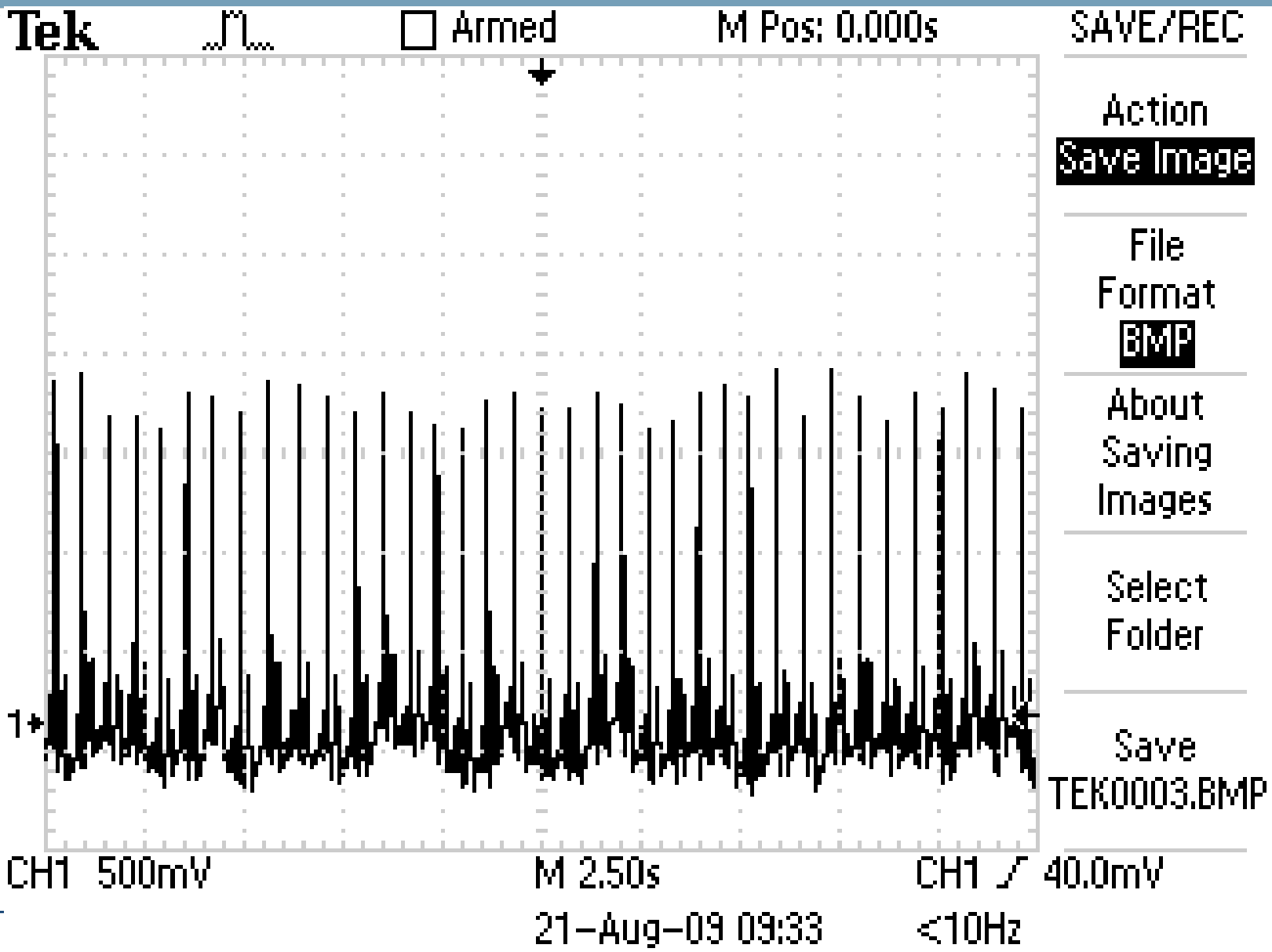
Diagnostic devices: Pulse oximeter

Electrocardiogram



Electrocardiogram



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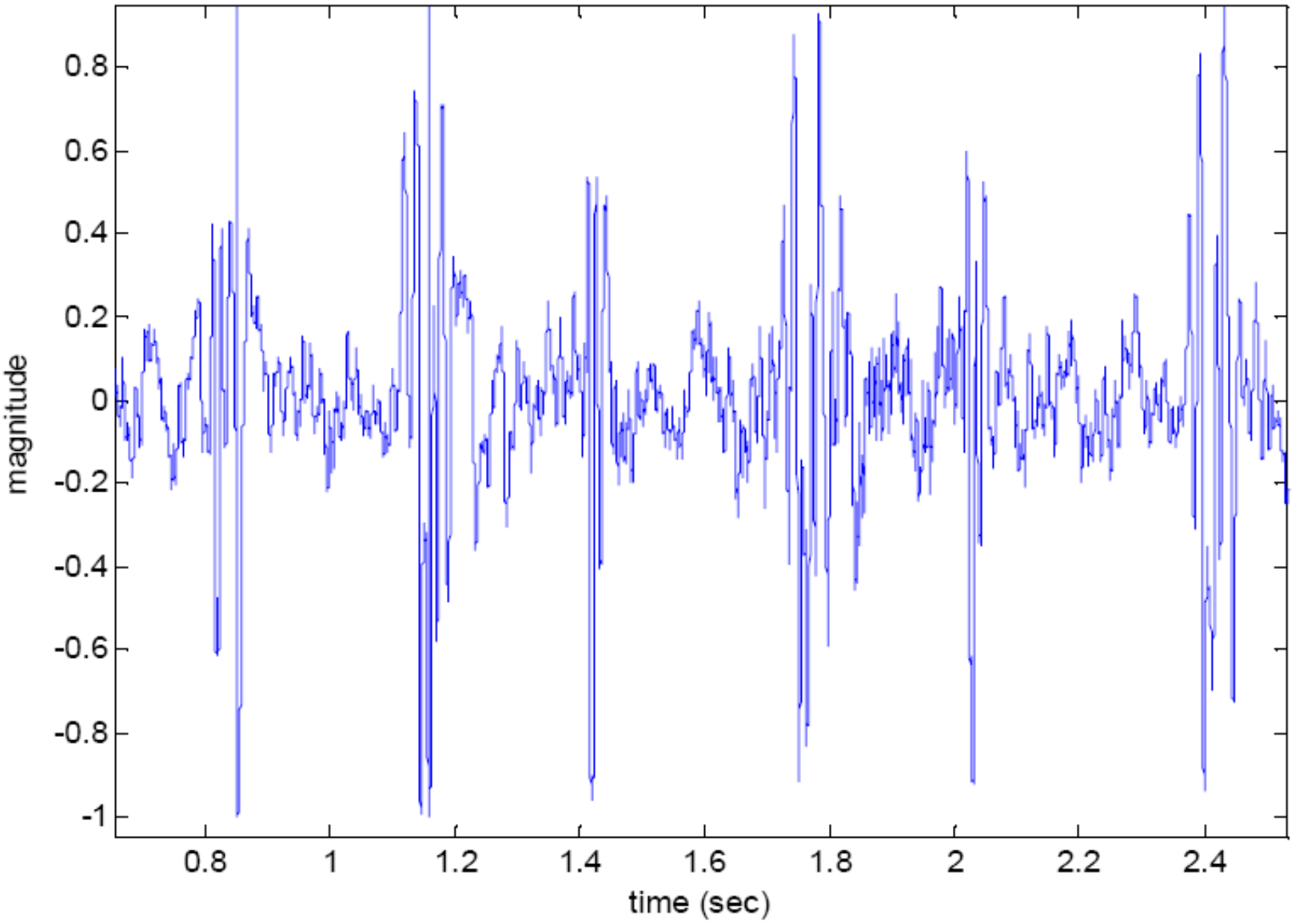
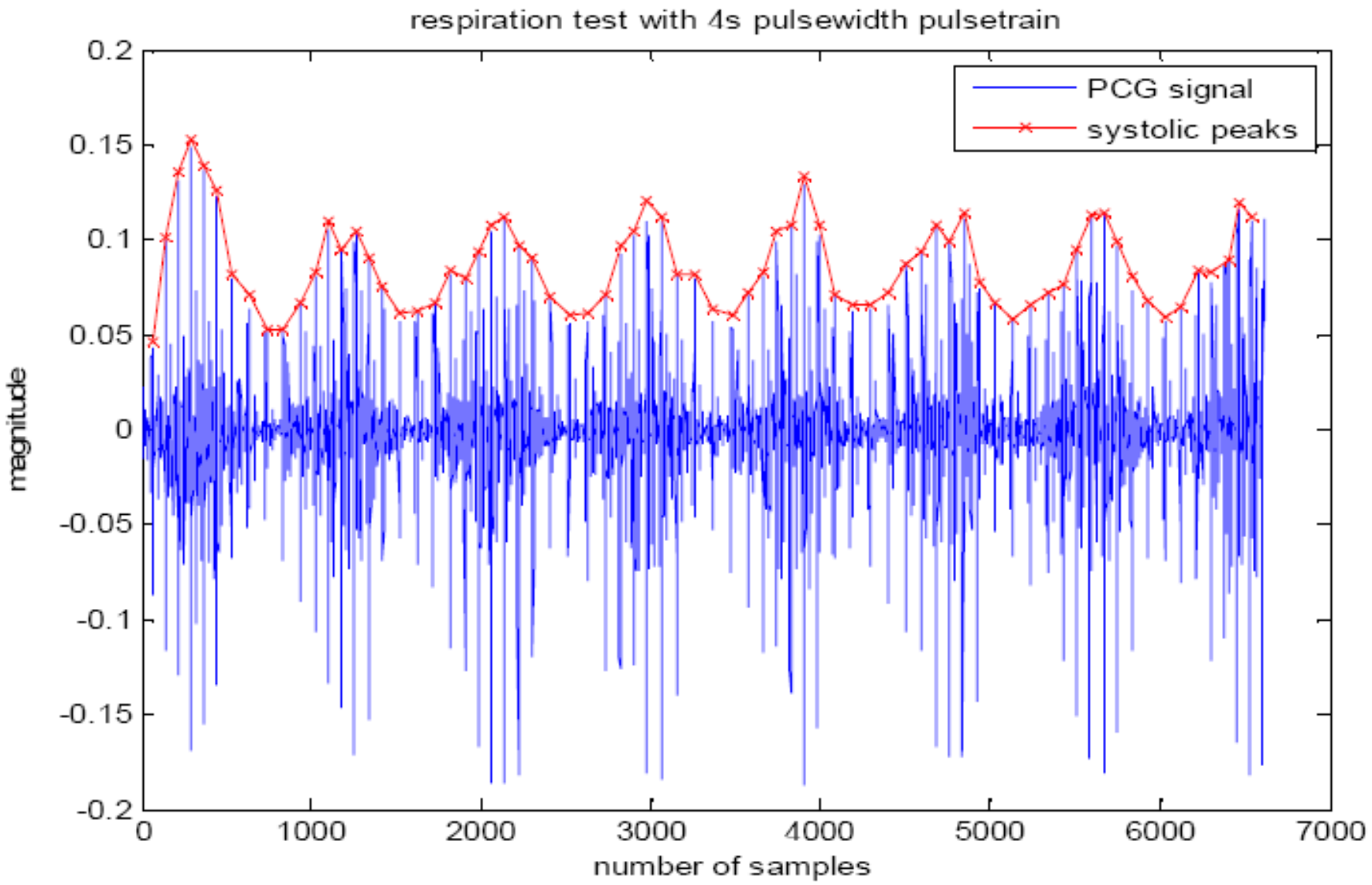
Phonocardiogram

Phonocardiogram



Phonocardiogram

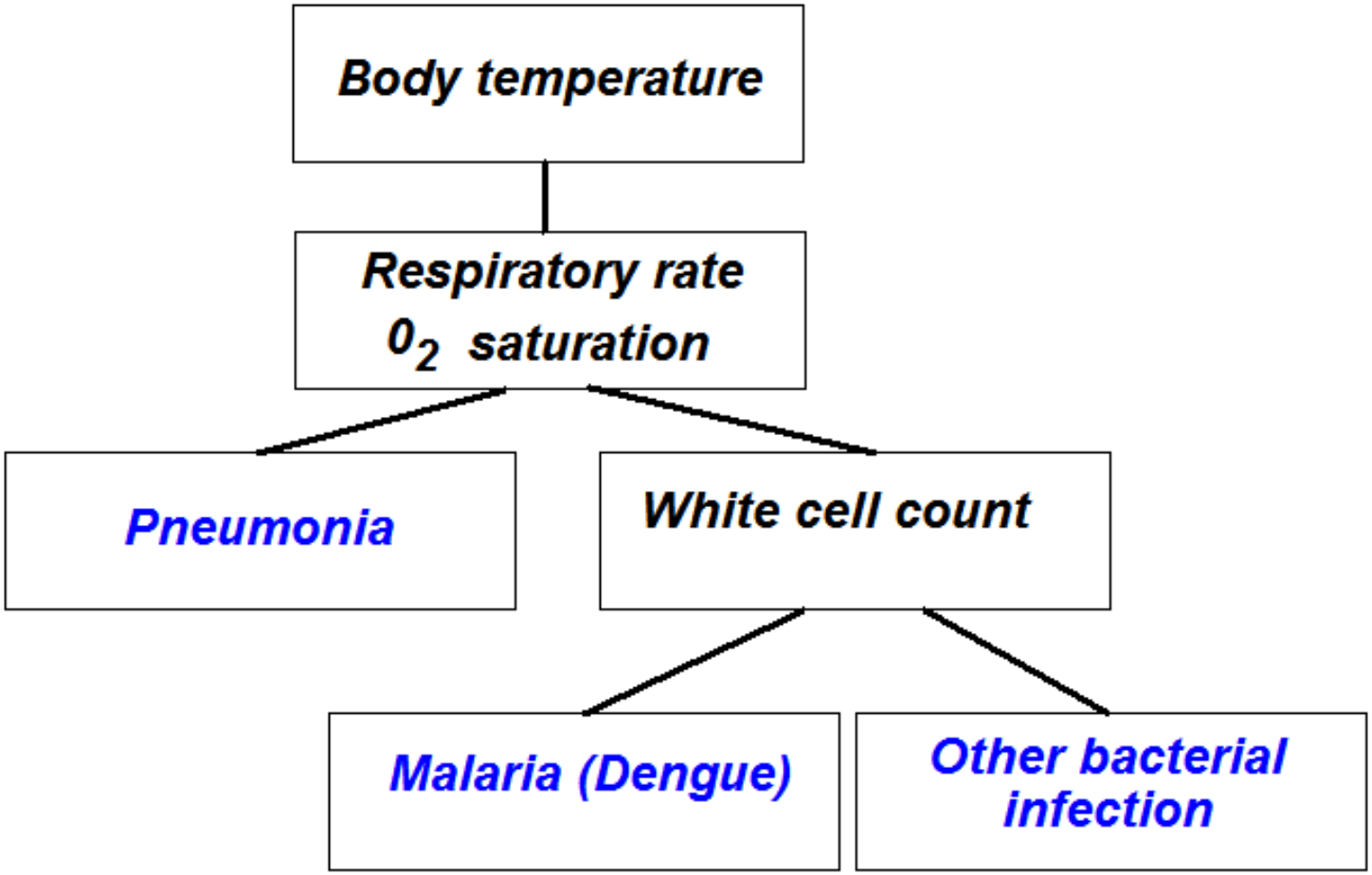


Collaborations in Mozambique

- Malaria Consortium:
  - Respiratory rate counting by community health workers
  - Comparison with the UNICEF one-minute counter
- Vanderbilt Institute for Global Health:
  - Field-testing the drug dose calculator and pregnancy calculator
- UNICEF Mozambique:
  - Field-testing the Nossal Oximeter
- Universidade Eduardo Mondlane:
  - Dr Baltazar Chilundo and colleagues

Where to next? (To boldly go…)

The 21st century tricorder (or 'McCoy Device')



The febrile patient algorithm

The 21st century tricorder (or 'McCoy Device')

- The pale/tired patient algorithm
- The jaundiced patient algorithm
- The dehydrated child algorithm
- The thin child algorithm

Links to the formulary and drug dose calculation…

The California mastitis test