Global Health Diagnostics: needs, challenges and promises

Rosanna W Peeling
Professor and Chair, Diagnostic Research
Director, International Diagnostics Centre
London School of Hygiene & Tropical Medicine

www.idx-dx.org
Diagnostics Landscape in the Developing World

- **Lack of access**
  Although high-quality diagnostics are available for many infectious diseases, they are neither affordable nor accessible to patients in the developing world.

- **Lack of investment**
  Little industry interest in developing quality diagnostics for diseases prevalent in the developing world, due to a perceived lack of return for investment, and lack of investment by MOHs.

- **Lack of regulatory oversight**
  Tests are often sold and used without evidence of effectiveness, discouraging companies with quality products from competing.

- **Lack of quality standards for test evaluations**
  Claimed accuracy on product inserts often misleading.
WHO recommends the use of syndromic management

- **Need:**
  - ~1 million children die of pneumonia each year
  - WHO guidelines for “Integrated management of childhood illness”

- **Challenges:**
  - In malaria endemic areas of Africa:
    - Fever only: test for malaria, treat
    - Fever + fast breathing: give antibiotic (often just 1 antibiotic available and may not be appropriate)
  - In Asia and Latin America:
    - self-medication is a deeply entrenched cultural practice
    - antibiotics are sold over the counter
    - the financial incentives for individuals to:
      - pay for a test, wait for results and then pay for treatment (if indicated)
      - vs just pay <50 cents for antibiotics over the counter?
Proportion of febrile patients receiving:

- **Antimalarials**
  - Before RDT implementation: 81%
  - After RDT implementation: 24%

- **Antibiotics**
  - Before RDT implementation: 49%
  - After RDT implementation: 73%

D’Acremont et al, 2010
ASSURED

A = Affordable
S = Sensitive
S = Specific
U = User-friendly
R = Rapid and robust
E = Equipment-free
D = Deliverable

☑️ Affordability
☑️ Accuracy
☑️ Access
Cepheid: A Multi-disease Random Access Real-time PCR Platform

Omni:
- 9 in. tall
- 1 kg
- AC or battery operated
- controlled via dedicated mobile device
- wireless, web enabled
- USD 2,895

MTB/RIF
MRSA
CT/Ng
HIV Viral Load

5 20 80

500-1000 Samples per shift
Connectivity Solutions for Rapid Point-of-care Tests

Smartphone dongles performed a point-of-care HIV and syphilis test in Rwanda from finger prick whole blood in 15 minutes, operated by health care workers trained on a software app.

—Image courtesy of Samiksha Nayak for Columbia Engineering
Funding for AMR Activities

POC Test or test systems are needed to:

• improve the specificity of syndromic management leading to more targeted use of antibiotics
• AMR for surveillance & guiding treatment
• lower the cost of drug trials

Incentivising Test Development:

• The UK Longitude Prize £ 10 million
• The EC Horizon 2020 Prize: 1 million euros
• The US NIH AMR Prize of up to $ 20 million

Global AMR Innovation Fund (target: $2 billion)
Innovation in health service delivery: Unmanned Aerial Vehicles

Cost: ~ $10,000
Payload: 5 lbs
Flight time: 30-60 min
Range: 20-60 miles

Operation: manual or pre-programmed for specific routes; need almost no room to land, and can even drop packages from a low hover; can deliver 100 HIV POC tests
The Way Forward

• In the developing world, many communities lack access to laboratories and diagnostics

• Simple affordable rapid POC tests are available to increase access to diagnosis of some infectious diseases but none can be used to reduce inappropriate prescribing

• Connectivity solutions can link data from POC testing, quality assurance stock management and automated surveillance systems

• New models of public-private product development partnerships are critical in leveraging diagnostic innovation in other priority areas for better, simpler diagnostics for combating AMR

• Economic models to incentise the use of tests before treatment are needed
Thank you