Antimicrobial Resistance: towards Viable Markets for Diagnostics and Antibiotics

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Agenda

Part 1
- AMR context
- Post-2016 progress
- Resistance unabated

Part 2
- The Longitude Prize
- Slow progress in developing Pull Mechanisms
- Need for AMR Investment Fund
The 2016 Review on Antimicrobial Resistance

DEATHS ATTRIBUTABLE TO AMR EVERY YEAR

TACKLING DRUG-RESISTANT INFECTIONS GLOBALY: FINAL REPORT AND RECOMMENDATIONS

TACKLING ANTIMICROBIAL RESISTANCE ON TEN FRONTS

- Public awareness
- Sanitation and hygiene
- Antibiotics in agriculture and the environment
- Vaccines and alternatives
- Surveillance
- Rapid diagnostics
- Human capital
- Drugs
- Global Innovation Fund
- International coalition for action
Post-2016 international investment in AMR

£150+ million invested
50 Supported Projects
14 projects new ABX classes, Accelerators

£300 million investment in TB includes support to new molecular tests, peds treatment development and compliance tools
Funding project to improve fever diagnosis in children including pneumonia

£500 million PPP project. Gonorrhoea & neonatal sepsis. Both clinical trials on new combinations and new drug development
5 by 25 - five new antibiotics by 2025

£265 million - Improving laboratory capacity for diagnosis and surveillance of AMR in LMICs.
Professional fellowships, regional grant programmes etc.
IACG
No Time to Wait…
One Health: FAO
OIE (World Org for Animal Health)
WHO

Fig. 2: One Health, IACG recommendations and the Sustainable Development Goals

ONE HEALTH RESPONSE TO ANTIMICROBIAL RESISTANCE

Antimicrobial resistance is a global crisis. There is no time to wait. A sustained One Health response with a shared vision and goals is essential to tackle antimicrobial resistance and achieve the Sustainable Development Goals.

Interagency Coordination Group on Antimicrobial Resistance Recommendations

ACCELERATE PROGRESS IN COUNTRIES

INNOVATE TO SECURE THE FUTURE

COLLABORATE FOR MORE EFFECTIVE ACTION

INVEST FOR A SUSTAINABLE RESPONSE

STRENGTHEN ACCOUNTABILITY AND GLOBAL GOVERNANCE

SUSTAINABLE DEVELOPMENT GOALS

### Table 1. Gaps in syndromic testing at Level I and Level II healthcare facilities

<table>
<thead>
<tr>
<th>Purpose Syndromes</th>
<th>Fever without a known source</th>
<th>Septicemia</th>
<th>Sore throat, cough, URTI</th>
<th>TB</th>
<th>Pneumonia, LRTI</th>
<th>Diarrhea</th>
<th>Visible skin/soft tissue infection</th>
<th>Wounds (traumatic and chronic)</th>
<th>Urethral and vaginal discharge</th>
<th>UTI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level I</strong></td>
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<tr>
<td>Bacteria vs other</td>
<td>A</td>
<td>NA</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>A²</td>
</tr>
<tr>
<td>Bacterial ID (culture, NDT, ...)</td>
<td>NA</td>
<td>NA</td>
<td>A, B</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>A, B</td>
<td>NA</td>
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<tr>
<td>Antibiotic Susceptibility</td>
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<tr>
<td>Resistance Testing</td>
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<td><strong>Level II</strong></td>
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<td>A</td>
<td>A</td>
<td>NA</td>
<td>A²</td>
<td></td>
</tr>
</tbody>
</table>

* If test desired
- Available
- Not fully available or ideal
- Not available

A Reduce unnecessary antibiotic prescriptions; B Guidance for appropriate treatment of drug-resistant infections; C Surveillance

*Based on informal consensus of participants attending the Technical Consultation on In Vitro Diagnostics for AMR.

**Notes:**

1. MTB, the cause of human tuberculosis, was not subjected to review for inclusion in this prioritization exercise as it is already a globally established priority. And although priority TPPs to stimulate product development have been developed, more innovative new TB diagnostics are urgently needed. The section on TB was provided by the WHO Global TB Programme.

2. In case it is needed in special populations.

3. Infection marker.
Despite progress, resistance continues to grow...

2.8 million antibiotic-resistant infections in the US each year

35,000 deaths

47 million antibiotics courses prescribed each year for infections that don’t need antibiotics

Primary care prescribing reduced by 16.7% between 2014 and 2019

32% increase in antibiotic resistance BSI between 2014 and 2019

Largest study to measure the burden of antibiotic resistance in a LMIC

Patients who acquired MDR pathogen were 1.57 times more likely to die

Need to better quantify and track the burden of resistance across LMICs
A £8 million global prize that will reward a transformative, rapid, accurate, and affordable point-of-care diagnostic test that can significantly reduce antibiotic misuse or overuse, anywhere in the world.
What do competitors need to do to win the Longitude Prize?
Who's competing?

57 Teams

Australia
Belgium
Canada
France
India
Israel
Malaysia
The Netherlands
Sweden
Turkey
United Kingdom
United States

We have observed that there are two common scenarios

1. Tests designed for European and United States markets are finding VC and national gov’t support
2. Tests designed for LMICs - struggling to find financing and investment
   - Bacterial versus viral differentiation
   - Pathogen ID
   - Antibiotic susceptibility testing

- Microfluidics
- Lateral flow
- Biosensor/biowire
- Polymerase chain reaction (PCR)
Examples: Longitude Prize competitors

Lumos Diagnostics (United States)

Burnet Institute (Australia)
No shortage of new molecular diagnostic tests...
In general few pull mechanisms: Subscription style/service contracts bright spot

July 2019 the UK NHS announced its plan to test a ‘subscription’ style payment model to recognise overall value to NHS.

**Service contracts**

- Cover the populations rather than a contract
- Service contract for 5 to 10 years, **HIGHER** revenue to industry
- This model allows manufacturers to forecast revenue several years out
- Respects Stewardship, which attempts to use new ABXs sparingly
- Could this model be generalised -- LMIC contracts funded through global funding mechanisms
Catalysing Innovation and a Feasible Market Mechanism
New Multi-Stakeholder Fund

1. **New commitments** from governments and institutions leading the AMR fight to facilitate innovation and overcome the failed market for antibiotics and diagnostics. **AMR Investment Fund**

2. Will fund products based on WHO and member country priorities.

3. Leadership from governments with the support of development banks to explore different mechanisms to finance the fund, ensuring that predictable sources of investment will be available over the middle- and long-term. Impact Bonds could be a solution.

4. Based on the AMR Investment Fund’s initial success, scale-up could be achieved through established by G20 or other multilateral institution.

**European Investment Bank Portfolio Approach, Wellcome Trust Exploration, Big Pharma**

More info: longitudeprize.org (dollar bills)
Thank you to Till Bachmann (The University of Edinburgh) & David Anderson (The Burnet Institute) for their contribution.