Diagnostic needs to address emerging health threats like AMR

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AMR is a growing health threat and already a great killer globally

700,000 deaths today from drug-resistant strains of common bacterial infections, HIV, TB, and Malaria...

... that could reach 10 million deaths/year in 2050

480,000 new cases of multidrug-resistant tuberculosis in 2015

Estimated global cost between $10 trillion and $27 trillion from 2017 to 2050

Potentially affecting any person anywhere with the worst consequences for the most vulnerable:

People suffering from life threatening diseases, weakened hospitalized patients, newborns contracting infections of resistant bacteria

# The critical role of diagnostics across the AMR global action plan

<table>
<thead>
<tr>
<th>Action</th>
<th>Diagnostics to detect</th>
<th>Pathogens</th>
<th>Resistance</th>
<th>Antibiotics</th>
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<tbody>
<tr>
<td>Reduce incidence of infections and unintentional exposure</td>
<td>Human infection prevention and control</td>
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<td>Clean water and sanitation</td>
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<tr>
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<td>Animal infection prevention and control</td>
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<td>Food safety</td>
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<td>Environmental contamination</td>
<td>✓</td>
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<td>✓</td>
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<td>Optimize use of medicines</td>
<td>Human use</td>
<td>✓</td>
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<tr>
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<td>Animal &amp; agricultural use</td>
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<td>Laboratory capacity &amp; surveillance</td>
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<td>Development of new therapeutics</td>
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<td>Quality</td>
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Diagnosis as the first prescription helps avert the AMR crisis and its major impact on health and economic stability

Reduce antibiotics overuse

Ensure appropriate treatment

Enable infection control and surveillance

Protect new drugs

- Reduce selective pressure on pathogens by restricting use of Ab and of sub-standard drugs
- Halt spread of resistance through screening and isolation
- Dx surveillance enables global and national AMR control strategies

Saving "the global good"

- Treat faster and correctly
- Reduced risk of acquiring resistant infections
- Preserve the gut microbiome to help prevent future infections

Saving patient’s lives

- Reduce hospital care costs due to resistant infections
- Better return on drug discovery investments by preserving efficacy for longer

Saving money
Malaria tests as a driver of antibiotic overuse

South East Asia*

Positive tests: ~1.5 million

Negative tests: ~142.5 million

Africa*

Neg tests: ~73 million

Pos tests: ~74 million

Malawi: 60% of under-fives with fever but no antibiotic need were prescribed an antibiotic.

Malaria RDT negatives 16.8 times higher antibiotic overtreatment odds.

(Johansson et al. 2016. WHO Bull)

Tanzania: 60-95% of Malaria RDT negatives were prescribed an antibiotic. (Bastiaens, 2011, Malaria Journal)

Laos: Half of Dengue patients received antibiotics. (Lubell, 2016, PLOS One)

*2014 World Malaria Report:

#RDT/microscope
Triage tests to guide health care workers in treatment and referral decisions
Triage tests to reduce the overuse of antibiotics
Support dedicated product development and demonstrate impact

- Develop target product profiles (TPPs)
- Support/advise development of:
  - Multiplexed biomarker assay (BD)
  - Malaria + CRP assay (SD Biosensor)
- Validation of host biomarkers in LMICs to understand utility in context of common co-morbidities
- Develop sample biorepository to help assay development
- Understand the utility of using a biomarker test and how it impacts prescription and outcome
Pathogen identification and DST testing to target treatment
Support dedicated product development and demonstrate impact

- Retrospectively mapping the causes of fever

- Develop target product profiles (TPPs)
  - Simplified blood culture tool
  - Multiplex platform to support fever management of severe patients (MSF/FIND/WHO)

- Support/advise development of:
  - Multiplexed RDT for 8 pathogens aiming to guide treatment decisions particularly in SEA (Chembio)
  - Simplified on-step blood culture device (Specific Technology)
  - Multiplex fever diagnostic program in partnership with MSF

- Understand the utility of using a rapid pathogen ID test for positive blood cultures in a pilot in a tertiary hospital in Botswana
Conclusions

- AMR and other emerging threats require a multitude of responses

- Diagnostics needs to be addressed across the entire value chain

- Diagnostic tools used in HIC are not always transferable to LMICs

- Supporting, cross cutting activities (TPPs, biorepositories, pipeline scoping …) as important as clinical trials & product development

- Important to not forget the individual patient over the population

- *Not one partner can address a challenge! Strong partnerships are the solution.*
New diagnostic solutions bring game-changing possibilities and can spark real progress in the health of people in lower- and middle-income countries.

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