The Importance of Diagnostics in Epidemic Preparedness and Response

Rosanna W Peeling
Professor & Chair, Diagnostics Research
Director, International Diagnostics Centre
Professor, University of Manitoba
Diagnostics for Epidemic Preparedness for Pathogen X:

1. Surveillance to provide early outbreak alerts
   - 1.1 monitor known pathogens of epidemic potential
   - 1.2 Align pathogen surveillance with syndromic surveillance
   - 1.3 One Health approaches for surveillance in the animal sector

2. Invest in diagnostic test development, evaluation and access
   - 2.1 Create inventory of Target Product Profiles (TPPs) for known pathogens
   - 2.2 Map landscape of diagnostics available and effectiveness
   - 2.3 Invest in test development and evaluation

3. Facilitate research to track evolution of known pathogens and potential of animal pathogens to cross the species barrier
   - 3.1 Translate research findings into policy or models to predict risks and potential impact
   - 3.2 Open access resource for tool development

4. Create an ecosystem for data connectivity to turn data into real time intelligence for early warning alerts
   - 4.1 Map the landscape of smartphone-based and other innovative platforms for data digitization and connectivity
   - 4.2 Ensure data governance and address confidentiality and privacy concerns

5. Promote mechanisms for accelerating equitable access
   - 5.1 Set up regional biobanking and evaluation networks
   - 5.2 Promote regulatory reliance or convergence
   - 5.3 Address procurement and supply chain issues

Globally accessible diagnostics and deep-sequencing tools to establish continuous and sustained global surveillance of disease and variants

Building clear communication channels and TRUST among stakeholders, including the public
Importance of Diagnostics for Emergency Response for Pathogen X:

1. Confirm clinical diagnosis to guide patient management and enable public health measures to be implemented without delay

2. Refine clinical case definition for reporting & surveillance
   standardized case definition is critical for reporting and collation of surveillance data to inform public health measures and monitor effectiveness of disease control strategies

3. Enable research to identify vulnerable population, understand modes of transmission, facilitating modelling to estimate impact of control strategies

4. Facilitate data display for extent of outbreak, hotspots and evolving trends to inform health professionals, political leaders and the public to allow everyone to play a part in the response

5. enable drug and vaccine trials

Diagnostics for case detection is the primary means of controlling transmission before availability of drugs and vaccines
Lessons Learnt from Vaccine Innovation during the COVID-19 Pandemic

- The lightning speed at which COVID-19 vaccines were developed, evaluated and deployed challenged our paradigm of tool development.

- It shows what is possible when there is:
  - political will
  - funding
  - architecture or infrastructure to support implementation

- Diagnostic development is often funded during outbreaks but funds are rapidly re-allocated once the outbreak is over, leaving countries ill-prepared for the next outbreak (e.g. meningitis, ebola, zika).
Access to COVID-19 Tools (ACT) Accelerator to Address Inequity of Access

Pandemics do not create new problems, they just make us face problems we have long ignored:

https://media.nature.com/original/magazine-assets/d41586-020-01265-0/d41586-020-01265-0.pdf 30 April 2020
Digital technology adoption has the power to improve patient access, engagement, and outcomes.

The convergence of digitisation, diagnostic, and information technologies has allowed us to have a connected system that allows testing data to be turn into intelligence in real time to inform control strategies.

Digital technology has long been considered a game-changer for many aspects of health care delivery but digital technology adoption remains slow in most health care organizations.

Use diagnostic data to set up data display (e.g. dashboards) to keep the public, politicians and healthcare providers informed of latest trends – transparency engenders trust and allow everyone to have the knowledge and tools to do their part in the public health response.
Investing in Diagnostics for Public Health

- Governments often consider diagnostics as a cost to the healthcare system instead of adding value and as a result, diagnostics are under-valued and under-invested

  Findings of the Accelerating Diagnostic Access Project, funded by the Wellcome Trust

- 47% of the global population has little to no access to diagnostics

- Investment in diagnostics will pay for itself many times over: for every $ spent on diagnostics for 6 priority diseases, the savings can range from $3-24)


Countries need to invest in a robust and sustainable diagnostic and laboratory infrastructure that serves as the backbone of a health system, with data connectivity and appropriate technologies at every level (from ultra-sophisticated detection and sequencing technology at the top, to point-of-care diagnostics in the community)

Diagnostic testing serves as the eyes and ears of the healthcare system, sounding alarms of unusual disease patterns, sending early outbreak alerts, and monitoring the effectiveness of the emergence response

CEPI is an innovative partnership between public, private, philanthropic and civil organizations founded in 2017 by the governments of India and Norway, the Bill & Melinda Gates Foundation, Wellcome and the World Economic Forum.

To date, CEPI has also received investment from the governments of Germany, Japan, Australia, Belgium, Canada with industry involvement. It has reached $620m of its target $1bn funding.

A public-private partnership for diagnostics based on the CEPI model?
Summary

• Diagnostics are critical for preparedness and emergency response for Pathogen X:
  – Case detection
  – Surveillance
  – Research to understand epidemiology, inform policy and address equitable access
  – Enabling drugs and vaccine trials

• In the early days of an outbreak, before drugs and vaccines were available, case detection using diagnostics was the only tool we have to guide patient management and implement public health measures to control transmission

• Many governments consider diagnostics to be a cost to the health care system instead of adding value and as a result, diagnostics are under-valued and under-invested

• In recognition of the importance of diagnostics as a tool for patient management, surveillance and research, countries need to invest in a robust public health laboratory infrastructure that serves as the backbone of a healthcare system, listening in to unusual trends in preparedness, enabling case detection and monitoring effectiveness of control strategies during emergency response

• Public-private partnerships are needed to make innovation and equitable access of diagnostics a reality
Thank you