Ongoing efforts to identify pathogens that have the greatest pandemic potential?

Ana Maria Henao-Restrepo
R&D Blueprint for epidemics
WHO Emergencies programme
In May 2015, the Sixty-Eighth World Health Assembly

“...welcomed the development of a blueprint, in consultation with Member States and relevant stakeholders, for accelerating research and development in epidemics or health emergency situations where there are no, or insufficient, preventive, and curative solutions, taking into account other relevant work streams within WHO”.”
Resources for disease R&D are finite and the number of potential pathogens is very large; therefore, there is a pressing need to reduce fragmentation and make best use of the available resources.

Collaboration and coordinating of resources around an agreed list of priority pathogens will continue to enable the global scientific community to better allocate finances in a cost-effective way.
Previously prioritization efforts

Prior to Covid-19

- Building on lessons from the Ebola outbreak in West Africa 2014-6
- Focus on priority pathogens
- With consideration of Disease X
- Emphasis on viral threat and limited consideration of bacterial ones
- Research agenda primarily on vaccine development

Fig. 2. Priority pathogens compiled from WHO Blueprint (blue), Coalition for Epidemic Preparedness Innovations (Orange), UK Vaccine Research and Development Network (purple), National Institute of Allergy and Infectious Disease Priority A list.
In December 2015, WHO convened a workshop to identify elements to be used to prioritize diseases and to agree on an initial list of diseases to be urgently addressed under the WHO R&D Blueprint.
## Past Prioritization Efforts

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ebola and Marburg</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Lassa fever</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Rift Valley fever</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Crimean-Congo haemorrhagic fever</td>
<td>Yes</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>MERS-CoV and SARS</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Nipah and henipaviral diseases</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>“Disease X”</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Chikungunya</td>
<td></td>
<td>Yes</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>Hantavirus</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dengue</td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other arenaviruses</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smallpox</td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zika</td>
<td></td>
<td></td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
</tbody>
</table>
Viral Family and Prototype Pathogen Approach

• It is challenging to research and develop medical countermeasures for all viruses

• In recent years there has been growing support for the selection of representative (or prototype) viruses within a viral family as pathfinders in generating evidence and filling knowledge gaps that may then be applicable to other viruses in the same family.

• Viral Family approach offers a framework for rapid research on, and product development response for, other viruses within that family.

Figure 1. National Institute of Allergy and Infectious Diseases (NIAID) prototype pathogen approach: prototype selection, research and development, and clinical trials.
Current Prioritization Efforts Since Covid-19

- Focus on viral families and representative or prototype viruses within each family
- Considering bacterial threats in the context of Anti-Microbial Resistance (AMR)
- Research agenda covering medical countermeasures beyond vaccines
- Building on lessons from the COVID-19 pandemic
- Continued consideration of Disease X

Recent Prioritization Efforts

UK Vaccine Network

- National perspective
- Focus on research to develop vaccines
- Prioritization based on expert review of available information on diseases that represent a known or potential epidemic threat and cross-checked with the state of vaccine availability for those diseases
Recent Prioritization Efforts

NIH-NIAID

- National perspective
- Focus on research to develop vaccines and monoclonal antibodies
- Prioritization based expert review of viral families and prototype pathogens with high pandemic potential and low / moderate resources for research or existing countermeasures
Recent Prioritization Efforts

European Commission (HERA)

• Regional perspective

• Focus on research to develop vaccines and treatments

• Prioritization focused on:
  o Pathogens with high pandemic potential
  o Chemical, biological and nuclear threats
  o Antimicrobial resistance
R&D Blueprint Prioritization

- Global perspective building on recent prioritization approaches
- Focus on research and innovation including to support development and evaluation of vaccines, therapeutics and diagnostics
- Prioritization based viral families and priority pathogens with high risk of generating a graded emergency, a PHEIC, or pandemic
- Based on evidence and expert reviews
Screening

Viral Family Review Groups (VFRG) and a Bacterial Review Group (BRG) will be constituted to undertake an independent screening exercise.

Using a screening questionnaire, each family and pathogen within a family will be reviewed against criteria for:

- Transmission (absence of control measures)
- Virulence
- Availability of medical countermeasures

The outcome of the screening will be a shortlist of families and pathogens for deeper prioritization.
Prioritization

- A Prioritization Advisory Committee (PAC) composed of the chairs for each family review group
- The PAC will include additional expertise: social scientists, vaccine developers, decision scientists, donor, country representation
- The PAC will review shortlist from the screening process against additional criteria: public health context, societal impact...etc
- The aggregation will involve multiple criterion decision analysis (MCDA) techniques

Diagram:
- Shortlist of pathogens from the screening process
- Rating of pathogens against the prioritization criteria
- Aggregation (MCDA)
- Final rating during 2-day meeting
Disease X

Will be considered as a separate case within the R&D Blueprint prioritization exercise

The outcome of this meeting will feed into the prioritization of and research agenda for “Disease X”

WHO is communicating with all the ongoing prioritization efforts to include national regional perspectives in a global effort
Thanks

Colin Sanderson
Patrick Lydon
Nigel Gay
Regine Coste