Preparing for the Next Infectious Disease Emergency

Lucille Blumberg
National Institute for Communicable Diseases, South Africa
A prioritised list of severe emerging diseases with the potential to generate a public health emergency

• Key gaps in development of vaccines, therapeutics, diagnostic tests

• Transitioning from research /preparedness to action
You can only predict things after they have happened.
E. Ionesco. Le Rhinocéros (1959) act 3

The future ain't what it used to be
Yogi Berra

Predicting the unpredictable: critical analysis and practical implications of predictive anticipatory activity
Many prioritisation exercises have been performed before

- New or known diseases
- Natural, deliberate, accidental outbreaks
- Special demands of WHO
- Excluded diseases managed through different platforms/programmes eg influenza, malaria, TB/HIV
Formulate criteria, weight for importance, assess diseases against criteria

- Agent-based factors
- Host-based factors
- Clinical disease factors
- Public health capacity/impact factors
- Epidemiological factors
- Broader context factors

Adapted from ECDC: Best practices in ranking emerging infectious diseases threats, 2015
WHO publishes list of top emerging diseases likely to cause major epidemics

A panel of scientists and public health experts convened by WHO met in Geneva this week to prioritise the top five to ten emerging pathogens likely to cause severe outbreaks in the near future, and for which few or no medical countermeasures exist. These diseases will provide the basis for work on the WHO Blueprint for R&D preparedness to help control potential future outbreaks.

The initial list of disease priorities needing urgent R&D attention comprises: Crimean Congo haemorrhagic fever, Ebola virus disease and Marburg, Lassa fever, MERS and SARS coronavirus diseases, Nipah and Rift Valley fever. The list will be reviewed annually or when new diseases emerge.
Elements for prioritization

- Spill over potential
- Human transmissibility (inc population immunity, behavioural factors)
- Severity or case fatality rate
- Evolutionary potential (evolvability)
- **Available countermeasures**
- Difficulty of detection or control
- Public health context of the affected area
- Potential scope of outbreak (risk of international spread)
- Potential societal impacts
Prioritized Diseases

**Urgent**
- Filovirus diseases (i.e. EVD & Marburg)
- Lassa Fever
- Rift Valley Fever
- Highly pathogenic emerging Coronaviruses (relevant to humans, MERS Co-V & SARS)
- Crimean-Congo haemorrhagic fever
- Nipah

**Serious**
- Chikungunya
- Zika
- Severe Fever with Thrombocytopenia Syndrome
Also considered......

- Dengue Fever (already established initiatives)
- Plague (medical countermeasures and Public Health control measures exist)
- Avian influenza causing severe human disease
- Carbapenem-resistant Enterobacteriaceae
- Monkeypox
• Specific versus ‘broad’ approach
• Consequences of not prioritising
• Optimising interventions
• New diseases/pathogens…limited data
Anything can happen anywhere..

Index patient, ex Lusaka, Zambia?
Tick bite fever

Johannesburg
4 cases amongst health workers

Health department clueless about killer virus, but tells the public:
‘Don’t panic’

Tests negative for Lassa, Marburg, Ebola, Crimean Congo fever..
Tick Bite Fever, Q fever, Leptospirosis.....
VIRAL HAEMORRHAGIC FEVER SYNDROME

“VHF” Infection Control
Contact tracing and monitoring

‘New Arena virus’ LUJO

EID 2009 Paweska
PLOS 2009 Lipkin
EID 2011 Ishii
J Gen Virology 2012 Ishii
Efficacy and effectiveness of an rVSV-vectored vaccine expressing Ebola surface glycoprotein: interim results from the Guinea ring vaccination cluster-randomised trial

Phase 3 cluster-randomized study: novel EBV vaccine - rVSV-ZEBOV
‘Ring vaccination’ of 7651 contacts of EBV patients in Guinea (90 clusters) either immediately/21 days
100% protection of contacts vaccinated immediately AM Henao-Restrepo The Lancet July 2015

‘From villages such as Méliandou, the 2014 outbreak spread to urban areas, including Freetown’s Kroo Bay. Crowding, poverty, and scant health services accelerated Ebola transmission, heightening fear and resentment.’
Source Pete Muller National Geographic Feb 2016
Next steps

- Decision instrument needed for new diseases
- Review landscape and repeat prioritization on annual basis; regular methodological review
- Emergency advice as needed for urgent prioritization
- Operational plan for initiating action during a health event
Preparing for the inevitable

A Blueprint for research & development