Emerging and Re-emerging Diseases

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Outline

- Global examples of emerging infections
- Contributing factors
- Challenges
- Lessons learnt
- Way forward
Global distribution of emerging & re-emerging infections

Emerging & Re-emerging?

- New infections
  - newly recognized
  - newly evolved

- Known infections
  - rapidly increasing in incidence,
  - spreading to new geographic areas or populations

- WHO, 2004
Emerging Infectious Diseases

- Translocation
- Encroachment
  - Introduction
  - "Spill over" & "Spill back"
- Agricultural Intensification
- Technology and Industry
- Human encroachment
  - Ecological manipulation
- Global travel
  - Urbanization
  - Biomedical manipulation

Wildlife
Domestic Animal
Human

Dasazak P. et al.
Science 2000 287:443
Table 1. Examples of novel, emergent zoonotic virus diseases

<table>
<thead>
<tr>
<th>Year of isolation</th>
<th>Place of isolation</th>
<th>Virus</th>
<th>Reservoir/spillover host</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>Venezuela</td>
<td>Guanarito virus</td>
<td>Rodents</td>
</tr>
<tr>
<td>1992</td>
<td>Slovenia</td>
<td>Dobra virus</td>
<td>Rodents</td>
</tr>
<tr>
<td>1993</td>
<td>United States</td>
<td>Sin Nombre virus</td>
<td>Rodents (Peromyscus maniculatus)</td>
</tr>
<tr>
<td>1994</td>
<td>Brisbane, Australia</td>
<td>Hendra virus</td>
<td>Fruit bats (Pteropus sp.)/horses*</td>
</tr>
<tr>
<td>1995</td>
<td>Sao Paulo, Brazil</td>
<td>Sabia virus</td>
<td>Rodents</td>
</tr>
<tr>
<td>1996</td>
<td>Florida, USA</td>
<td>Black Creek Canal virus</td>
<td>Rodents</td>
</tr>
<tr>
<td>1997</td>
<td>Argentina</td>
<td>Andes virus</td>
<td>Rodents</td>
</tr>
<tr>
<td>1997</td>
<td>Hong Kong (China)</td>
<td>Influenza H5N1</td>
<td>Wild birds/domestic poultry*</td>
</tr>
<tr>
<td>1999</td>
<td>Menangle, Australia</td>
<td>Menangle virus</td>
<td>Fruit bats</td>
</tr>
<tr>
<td>2000</td>
<td>Saudi Arabia</td>
<td>Alkhurma virus</td>
<td>Camels and sheep*</td>
</tr>
<tr>
<td>2000</td>
<td>Peninsular Malaysia</td>
<td>Nipah virus</td>
<td>Fruit bats/pigs*</td>
</tr>
<tr>
<td>2002–2003</td>
<td>China, Hong Kong (China)</td>
<td>SARS coronavirus</td>
<td>Bats/civets?*</td>
</tr>
<tr>
<td>2003–2004</td>
<td>Viet Nam, China</td>
<td>Influenza H5N1</td>
<td>Wild birds/domestic poultry*</td>
</tr>
<tr>
<td>2007</td>
<td>Melbourne, Australia</td>
<td>Dandenong arenavirus</td>
<td>Rodents?</td>
</tr>
<tr>
<td>2007</td>
<td>Peninsular Malaysia</td>
<td>Melaka virus</td>
<td>Fruit bats?</td>
</tr>
<tr>
<td>2007</td>
<td>Uganda</td>
<td>Bundibugyo ebolavirus</td>
<td>Fruit bats?/various animals (bush meat)*</td>
</tr>
<tr>
<td>2008</td>
<td>Lukasa, Zambia</td>
<td>Lujo virus</td>
<td>Unidentified rodents</td>
</tr>
<tr>
<td>2008</td>
<td>Perak, Malaysia</td>
<td>Kampar virus</td>
<td>Fruit bats?</td>
</tr>
</tbody>
</table>

* Spillover host, † Tick-borne
Contributing factors

• Population movements and the effect of urbanization

• Changes in land use such as from deforestation, irrigated agriculture

• Animal-human-environment interface

• Increasing globalization of food, trade and commerce

• Increasing worldwide movement of goods and air travel

• Changes in human behaviour
Contributing factors

- Technology and industry
  - improved detection and diagnostic procedures.
  - changing techniques in food processing, organ transplantation,

- Microbial adaptation and changes
  - mutation, natural selection and evolution
  - inappropriate use of antibiotics leading to antimicrobial resistance

- Human susceptibility to infections such as from immuno-suppression

- Breakdown in public health measures

- Climate changes, floods, drought, famine
Nipah Virus Outbreak

• Among pig-handlers
• September 1998 – May 1999
• Causative agent: A novel paramyxovirus i.e. Nipah virus
• Outcome:
  – 265 cases of acute encephalitis with 105 deaths
  – Mortality rate ≈ 40%
  – 1.1 million pigs culled
  – Direct economic impact (Loss of ≈ USD625 million)
Severe Acute Respiratory Syndrome (SARS) Impact

No. of probable cases (1/11/2002 – 31/07/2003), = 8,097 cases, Deaths = 774 in 29 countries

Estimation of the impact of SARS on economies, 2003

<table>
<thead>
<tr>
<th>Country</th>
<th>Reduction of GDP (USD billion)</th>
<th>%GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hong Kong</td>
<td>6.6%</td>
<td></td>
</tr>
<tr>
<td>China, mainland</td>
<td>5.8%</td>
<td></td>
</tr>
<tr>
<td>Taiwan</td>
<td>5.3%</td>
<td></td>
</tr>
<tr>
<td>Korea</td>
<td>0.5%</td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>2.3%</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>1.4%</td>
<td></td>
</tr>
<tr>
<td>Thailand</td>
<td>1.6%</td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>1.3%</td>
<td></td>
</tr>
<tr>
<td>Philippines</td>
<td>0.8%</td>
<td></td>
</tr>
</tbody>
</table>

Ministry of Health Malaysia
Avian Influenza H5N1

• Series of outbreaks in poultry population:
  – **August 2004**: Kelantan (5 districts)
  – **February 2006**: Federal Territory Kuala Lumpur
  – **March 2006**: Perak (3 districts) & Pulau Pinang (1 district)
  – **June 2007**: Selangor (1 district)

• No human cases of avian influenza
Pandemic H1N1 2009

• 12 April 2009: an outbreak of influenza-like illness in Veracruz, Mexico reported to WHO
• 15 May 2009: Malaysia’s first laboratory confirmed case (imported case)
• 11 June 2009: WHO declares pandemic alert level phase 6
• 21 June 2009: Malaysia’s first local transmission case reported
Pandemic Responses

Implementing Rapid Containment measure

Measures to sustain the essential social function
Challenges

- Preparedness
- Early & accurate surveillance
- Rapid response
- Prevention and control measures
- Early identification of pathogen
- Multi-sectoral cooperation
- Political commitment to invest of the uncertainty
- Cross-border issues
Milestones

1999: Inter Ministry Committee on the Control of Zoonotic Diseases

2001: Infectious Disease Surveillance Section, Disease Control Division

2002: Epidemic Intelligence Programme (EIP) Malaysia

2006: National Influenza Pandemic Preparedness Plan (NIPPP)

2007: National Crisis Preparedness and Response Centre (CPRC)

2008: Risk Communication Work Plan
The Way Forward

• IHR 2005

• APSED 2010

• ‘One Health’ approach
Asia Pacific Strategy for Emerging Diseases (APSED) 2010

8 focus areas:

• Surveillance, risk assessment & response
• Laboratory capacity
• Zoonoses collaboration between animal and human health sectors
• Infection Prevention and Control
• Risk Communications
• Public health emergency preparedness
• Regional preparedness, alert and response
• Monitoring and evaluation
Conclusion

• Surveillance, early detection and rapid response are the keys to reducing the risks from emerging diseases.

• Way forward through the scope of IHR (2005) with the One Health approach of collaboration and continued core capacity building using the APSED Strategy.

• Strong political commitment and well-trained and committed health workers crucial.
Terima kasih