Avian Influenza and Zoonotic Influenza -in the context of pandemic preparedness-

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Impact of pandemic influenza

Major influenza pandemics since 1918 and emergence of HPAI H5N1 viruses

Expert Reviews in Molecular Medicine © Cambridge University Press 2010

Emergence of pandemic influenza viruses

Genesis of swine-origin H1N1pdm influenza viruses

Points to monitor/assess pandemic threats

Influenza in animals (wild, domestic) H5, H7
Sporadic Human (zoonotic) infection
Emergence of Sustainable H-H infection
Influenza pandemic
Seasonal influenza

THE FAST OR THE FURIOUS

To exact the greatest toll, influenza needs to be both fast-spreading and highly lethal. Unlike the 1918 ‘Spanish flu’, the two recent outbreaks — H5N1 ‘bird flu’ and H1N1 ‘swine flu’ — only had one attribute each.

THE SLOW BUT DEADLY SPREAD OF H5N1

Between 2003 and 2011, H5N1, commonly known as bird flu, spreads across Asia but remains largely an avian virus.

CASES ON THE RISE

The mortality rate has risen with the number of cases worldwide.

2004–2006 H5N1

H5N1 2003

60% approximate proportion of fatalities for immunocompetent people infected with H5N1.

1977 H1N1 outbreak of Russian flu in China, similar to strain in circulation prior to 1957, spreads around the world disproportionately infecting people under the age of 23.
Human-Animal Collaborative Response to A/H5N2 in poultry in Ibaraki, 2004

- Animal sector
  - Jun – Oct 2004
  - 30 farms in Ibaraki prefecture
  - Culled 4.1 million poultries

- Health sector
  - Health monitoring: farmers and cullers
  - Health management of cullers
    - Prevent infection: precaution, personal protection
    - 25,151 person-days: health check at pre-/post-operation
    - 671 health conditions: heat-illness, headache, etc
  - Food-safety in food process facilities
  - Health education/communication
Suggested asymptomatic human infections by avian influenza virus

• Serological study (NT titer) among contacts to infected birds during culling operation

• A/H5N1 in Kyoto (2004)
  – No symptomatic infection in >7000 person-days cullers
  – 1 with seroconversion and 4 with high Ab titer in single serum among 58 tested in poultry workers and cullers
    MHLW(http://www.mhlw.go.jp/topics/bukyoku/kenkou/tori/041222/1.html)

• A/H5N2 in Ibaraki
  – No symptomatic infection
  – 20 persons showed >fourfold rise in Ab titer among 287 poultry farmers with pair-sera tested
## Notifiable Diseases (category, hospitalization)

<table>
<thead>
<tr>
<th>Cat.</th>
<th>No.</th>
<th>Diseases</th>
<th>Seriousness</th>
<th>Hospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>7</td>
<td>Ebola hemorrhagic fever, Plague, Smallpox, etc.</td>
<td>★★☆☆☆☆</td>
<td>Class I</td>
</tr>
<tr>
<td>II</td>
<td>5</td>
<td>Diphtheria, Polio, SARS, Tuberculosis, H5N1</td>
<td>★☆☆☆</td>
<td>If symptomatic, Class II</td>
</tr>
<tr>
<td>III</td>
<td>5</td>
<td>Cholera, Typhoid fever, EHEC infection etc.</td>
<td>★☆☆</td>
<td>If necessary, ordinary</td>
</tr>
<tr>
<td>IV</td>
<td>43</td>
<td>Hepatitis A, Malaria, Dengue fever, Rabies etc. (zoonosis, food/water-borne)</td>
<td>★☆☆</td>
<td>If necessary, ordinary</td>
</tr>
<tr>
<td>V</td>
<td>16</td>
<td>HIV/AIDS, Acute encephalitis, Amebiasis, VRE infection, etc.</td>
<td>☆☆☆☆☆☆</td>
<td>If necessary, ordinary</td>
</tr>
</tbody>
</table>
# Human infection with avian influenza virus (HIAIV) and influenza surveillance

<table>
<thead>
<tr>
<th>Category</th>
<th>Diseases</th>
<th>Reporting timing</th>
<th>Asymptomatic</th>
<th>Suspected cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>---</td>
<td>immediately</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>2</td>
<td>A/H5N1</td>
<td>Immediately</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>---</td>
<td>Immediately</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>AIVI(except A/H5N1, H7N9)</td>
<td>Immediately</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>5(notifiable)</td>
<td>---</td>
<td>Within 7 days</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Sentinel</td>
<td>Seasonal Influenza</td>
<td>Aggregated, within 7 days</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Designated ID</td>
<td>A/H7N9</td>
<td>Immediately</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Infectious Disease Surveillance System in Japan

Notifiable diseases

Sentinel-Reporting diseases

All clinics / hosp.

Sentinel clinics / hosp.

Clinical isolates and specimens

Case Report

Summary Report (wk/mo)

Health centers

Pref. Health Depts.

Pref. IDSCs

Pref. PHIs

Quarantine stations

MHLW

National IDSC (NIID)

Laboratories (NIID)

Reports

Specimens

Computer network

Patient (data entry by HCs)

Infectious agent (data entry by PHIs)

Information dissemination

National Institute of Infectious Diseases
Infectious Disease Surveillance Center
Weekly reports of influenza virus isolation/detection, from week 36 of 2012 to week 11 of 2013, Japan
(Infectious Agents Surveillance Report: Data based on the reports received before March 18, 2013 from public health institutes)

n=4135

(Data for current and previous weeks will be updated by additional reports.)
The continuum of pandemic phases, WHO post- A/H1N1pdm

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This continuum is according to a “global average” of cases, over time, based on continued risk assessment and consistent with the broader emergency risk management continuum.

Pandemic influenza risk management; WHO interim guidance,
Japanese strategy for pandemic preparedness plan

Objectives
● Prevent and control the spread of disease, and minimize (public) health impact
● Prevent interruption and collapse of social and economic activities

Source: ministry of health, labour and welfare
Stages of pandemic evolution and response, national and prefectural level

**National level**
- No. patients
- Pandemic emergence
- Unlinked cases (Community transmission)
- 1st case Japan

**Prefectural level**
- Stages varies by prefecture.
- Local interventions shall be based on local risk assessment

**Mitigation**
- Peak stage

**Review**
- Remission
- Reactivation

**Prevt entry**
- Emerge outside Jpn

**Prevt spread**
- Early stage
Summary

- Pandemic thread: multi-sectorial issues/ one health
- Avian influenza in poultry
  - Control in animals: animal sector
  - Prevent & assess human infection: health sector
- Human infection with H5, H7
  - ID surveillance
  - Assess transmissibility and severity in humans
- Pandemic influenza
  - Pandemic preparedness and response plan
  - Interventions based on risk assessment at all level
- Seasonal influenza
  - ID surveillance, virus surveillance, clinical management
Thank you