Seasonal & Avian Influenza

HKDU Symposium
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Seasonal Influenza

- Features of winter and summer seasons in 2015
- Vaccination recommendations
Summary of local influenza activity in 2015

- Usually 2 influenza seasons in HK annually
  - Winter: Jan - Mar
  - Summer: Jul - Aug
- 2014/15 winter season lasted from Jan to mid-Apr (~17 weeks) with influenza activity peaked in early Feb
- 2015 summer season lasted from mid-Jun to early Aug (~8 weeks) with influenza activity peaked in early Jul
An extraordinary winter season in early 2015

- A bad season attributed to:
  1. Predominance of H3N2 (>90%) which mainly affected elderly (who are more likely to develop complications and even have fatal outcome);
  2. Mismatch of circulating H3N2 virus with the vaccine strain, resulting in marked decrease in vaccine effectiveness (overseas estimates: nil to 18%)
  3. Aging population in HK → ↑ frail elderly as compared to previous H3N2 seasons
     - Net ↑ 167,300 persons aged ≥65 year between 2009 & 2014
     - Annual ↑ >4% in population size of ≥65 years in past 3 years
Predominance of drifted H3N2 in both winter & summer seasons in 2015

- About 90% of positive influenza virus detections in both seasons were A(H3N2)
- Majority belonged to the drifted Switzerland strain (antigenically different from the Texas strain in vaccine)
Large no. of institutional ILI outbreaks during 2014/15 winter season

- 432 outbreaks reported to CHP from 28 Dec 2014 – 25 Apr 2015
  - Residential care home for the elderly (46%), primary school (25%), kindergarten/child care centre (9%), secondary school (8%), residential care home for the disabled (6%), hospital (3%), others (2%)

<table>
<thead>
<tr>
<th>Type</th>
<th>Total no. in HK</th>
<th>No. with ILI outbreaks</th>
<th>% of institutions affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCHE</td>
<td>750</td>
<td>200</td>
<td>26.7%</td>
</tr>
<tr>
<td>Primary school</td>
<td>571</td>
<td>109</td>
<td>19.1%</td>
</tr>
<tr>
<td>Special school</td>
<td>61</td>
<td>5</td>
<td>8.2%</td>
</tr>
<tr>
<td>RCHD</td>
<td>311</td>
<td>25</td>
<td>8.0%</td>
</tr>
<tr>
<td>Secondary school</td>
<td>535</td>
<td>34</td>
<td>6.4%</td>
</tr>
<tr>
<td>KG/CCC</td>
<td>1,003</td>
<td>40</td>
<td>4.0%</td>
</tr>
</tbody>
</table>
Weekly rates of admissions with principal diagnosis of influenza in public hospitals

Max: 3.38 / 10,000 population (≥65 year)

Max: 5.55 / 10,000 population (≥65 year)

Peak: 3.22 / 10,000 population (<5 year)

H3N2 virus was also predominately circulating (>90%).
## Surveillance of severe influenza cases in HK

**Case definitions / reporting criteria of severe cases with laboratory confirmation of influenza infections**

<table>
<thead>
<tr>
<th>Adult (during influenza season only)</th>
<th>Cases who required admission to intensive care unit (ICU) or died</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paediatric (year-round)</td>
<td>Cases with severe influenza associated complications (either severe pneumonia requiring assisted ventilation or admission to ICU; sepsis; shock; encephalopathy; or myocarditis) or died</td>
</tr>
</tbody>
</table>
Enhanced surveillance of ICU or death cases (≥18 years) in winter season

- Cumulative 647 cases (including 501 deaths), greatly exceeded number in previous seasons since 2011
- 93% H3N2 infection
- 92% had chronic medical diseases [94% among fatal cases]

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>All severe cases (including deaths)</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cumulative no.</td>
<td>Cumulative incidence*</td>
</tr>
<tr>
<td>18-64</td>
<td>86 (13.3%)</td>
<td>1.67</td>
</tr>
<tr>
<td>65-74</td>
<td>86 (13.3%)</td>
<td>15.98</td>
</tr>
<tr>
<td>75-84</td>
<td>196 (30.3%)</td>
<td>52.04</td>
</tr>
<tr>
<td>≥85</td>
<td>279 (43.1%)</td>
<td>178.16</td>
</tr>
<tr>
<td>Total</td>
<td>647</td>
<td>9.97</td>
</tr>
</tbody>
</table>

*per 100,000 population in the age group
Top 5 chronic diseases among adult severe influenza cases

<table>
<thead>
<tr>
<th>Medical conditions</th>
<th>No. among cases with any underlying medical condition (N = 581)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiovascular</td>
<td>221 (38.0%)</td>
</tr>
<tr>
<td>Neurological</td>
<td>213 (36.7%)</td>
</tr>
<tr>
<td>Diabetes mellitus (DM)</td>
<td>205 (35.3%)</td>
</tr>
<tr>
<td>Metabolic diseases other than DM</td>
<td>135 (23.2%)</td>
</tr>
<tr>
<td>Respiratory</td>
<td>122 (21.0%)</td>
</tr>
</tbody>
</table>

1. Included cases up to 24 Apr noon, 2015
2. Only 49 patients (7.6%) were not known to have any underlying disease.
3. Among 581 cases with underlying diseases, 119 (20.6%) had 1 disease; 153 (26.3%) had 2 diseases; 149 (25.6%) had 3 diseases and 160 (27.5%) had ≥4 diseases.
Paediatric influenza associated complications/deaths in winter season

- From 2 Jan to 24 Apr, cumulative 18 cases (including one death)
- Age range: 9 months - 16 years (median 3 years)
- All were H3N2 infections
- 6 (33.3%) had chronic medical diseases

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Cumulative no. of cases (including deaths)</th>
<th>Cumulative incidence per 100,000 population</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5</td>
<td>11 (61%)</td>
<td>3.44</td>
</tr>
<tr>
<td>6-17</td>
<td>7 (39%)</td>
<td>1.02</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>1.79</td>
</tr>
</tbody>
</table>
The older the age, the higher the cumulative incidence in winter season.
2015 summer influenza season

• A milder season when compared with winter
• Positive% for influenza among respiratory specimens increased to around 26% in late Jun to early Jul, and then started to decrease
• Major circulating viruses: A(H3N2) (88%) & influenza B (10%)
• Epi features similar to 2014/15 winter season but peak activity and duration less than winter
• Current activity retuned to baseline
Enhanced surveillance of ICU or death cases (12 Jun – 7 Aug)

Adult (≥18 years)
- 185 cases (including 135 deaths)
- Age range: 18 – 104 years (median 81 years)
- 73.5% H3N2, 14.6% A untyped, 10.3% B, 1.1% H1 and 0.5% both H3N2 & B
- 89% had chronic medical diseases

Paediatric (<18 years)
- 4 cases (no fatal case)
- Ages: 1, 7, 11, 15 years
- All were H3N2 infections
- 2 out of 4 had chronic medical diseases
Majority of severe adult cases had underlying illness, especially elderly.

Proportion of severe cases with chronic diseases by age group (2011-2015)
WHO recommendation on seasonal influenza vaccine composition in 2015/16 (Northern Hemisphere)

• Trivalent composition
  – an A/California/7/2009 (H1N1)pdm09-like virus;
  – an A/Switzerland/9715293/2013 (H3N2)-like virus*;
  and
  – a B/Phuket/3073/2013-like virus*

(*different from respective component in 2014/15 vaccine)

• Quadrivalent vaccines containing 2 influenza B viruses contain the above 3 viruses and a B/Brisbane/60/2008-like virus.

• Same as those used for the 2015 Southern Hemisphere vaccine
Local recommendations for 2015/16 influenza season

• Priority groups (same as last year)
  – **pregnant women (highest priority)**
  – elderly persons living in residential care homes
  – long-stay residents of institutions for the disabled
  – persons aged ≥50 years
  – persons with chronic medical problems
  – health care workers
  – children aged 6 months to 5 years
  – poultry workers
  – pig farmers and pig-slaughtering industry personnel

• Both trivalent (IIV3) & quadrivalent (IIV4) inactivated influenza vaccines are recommended for use in HK

• Based on local laboratory data, IIV3 potentially prevent majority of influenza burden, while IIV4 may offer additional protection against influenza B
Consideration of persons who had received 2015 Southern Hemisphere vaccine

- Persons vaccinated with 2015 SH vaccine are recommended to receive one 2015/16 NH vaccine, *with an interval of at least 4 weeks between 2 doses*, taking following factors into consideration:
  
  - Protection provided by vaccine is expected to last for at least one season but it wanes with time, especially in elderly
  
  - Immunity built up before summer season in 2015 will decrease over time and may become too low to provide protection in coming 2015/16 winter season
2015/16 vaccination programmes will be launched
Avian Influenza A(H7N9)

• Updated global and local situation
• Management of suspected cases in HK
Global situation

- 3 distinct waves of infection since its emergence in March 2013
- Cumulatively, 677 confirmed H7N9 cases (including at least 275 deaths) reported globally:
  - 2013: 148 cases; 2014: 323 cases; 2015: 206 cases (as of 31 Jul)
- Apparent seasonal pattern with most cases occurring in winter and early spring
- Current disease activity at low level
H7N9 viruses taken root in poultry in Mainland China

- During 2\textsuperscript{nd} wave in 2014, H7N9 isolation rate in market chickens was 3\% on average, even >15\% in some cities it reached\textsuperscript{1}

- Under the national avian influenza H7N9 monitoring program by the Chinese Ministry of Agriculture, poultry and environmental samples tested positive for H7N9 by virological test from Jan to May 2015 in Anhui, Fujian, Guangdong, Hubei, Hunan, Jiangsu & Shanghai\textsuperscript{2}

2. According to data published by Ministry of Agriculture
Geographical distribution

- All human infections occurred in Mainland China so far, especially eastern provinces.
- Only 20 cases (3%) were exported to other places but not resulting in secondary transmission.

In the 3rd wave (n=217), **Guangdong** (72), **Zhejiang** (45) and **Fujian** (41) were the most affected areas.
In 3rd wave since Nov 2014, 217 cases have been reported by mainland health authorities, with Guangdong (72 cases), Zhejiang (45 cases), Fujian (41 cases) & Jiangsu (22 cases) most affected.

Geographical distribution of human cases of avian influenza A(H7N9) reported in Guangdong since November 2014 (latest case was reported on 7/3/2015)

Cases were exported from Mainland China to Canada (2 cases) & HK (3 cases)
Summary of cases in HK

- 1st imported case confirmed on Dec 2, 2013
- 13 confirmed H7N9 cases (including 5 fatal cases) were identified (3 cases in 3rd wave since end of 2014)
- Latest case confirmed on Feb 22, 2015
- 7 M & 6 F, with ages ranging from 5 months to 85 years (median 65 years)
- All were imported from Guangdong
- Extensive contact tracing did not identify any secondary cases
Risk factors associated with infection

Case control studies found the following association with H7N9 infections:

**Risk factors**

- Direct contact with poultry
- Environment-related exposures (include visiting live poultry market, buying freshly slaughtered poultry or birds in live poultry market)
- Chronic medical conditions (e.g. COPD, on immunosuppressive medications)
- Obesity

**Protective factor**

- Frequent hand washing


# Comparison of human cases of H5N1 & H7N9

<table>
<thead>
<tr>
<th></th>
<th>H5N1 (in Mainland China, November 2003 – June 8, 2015)</th>
<th>H7N9 (including cases exported from Mainland China, as of June 17, 2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total no. of cases</td>
<td>50</td>
<td>677</td>
</tr>
<tr>
<td>Sex (M : F)</td>
<td>26 : 24 (1.1 : 1)</td>
<td>466 : 211 (2.2 : 1)</td>
</tr>
<tr>
<td>Age range (years)</td>
<td>2 – 75</td>
<td>0.4 – 91</td>
</tr>
<tr>
<td>Median age (years)</td>
<td>26.5</td>
<td>57</td>
</tr>
<tr>
<td>Case fatality rate (%)</td>
<td>62.0</td>
<td>40.6</td>
</tr>
</tbody>
</table>
Risk assessment

• Most cases reported direct exposure to live poultry or contaminated environments, including live poultry markets.

• Transmissibility of H7N9 virus among humans remains low with no sufficient evidence of sustained human-to-human transmission.

• Closing live poultry markets in some affected cities in Mainland China was highly effective in reducing the risk for infection in humans.

• Further human cases are expected in affected and possibly neighboring areas and sporadic human cases may be imported to HK.

• H7N9 virus is generally susceptible to the antiviral oseltamivir.
Management of suspected cases in HK

• Bundled approach in managing suspected cases fulfilling reporting criteria in public hospitals:
  • Immediate isolation and notification to CHP for epidemiological investigation
  • Laboratory test by hospitals and CHP’s Public Health Laboratory Services Branch
Reporting criteria (1)

• An individual fulfilling both the Clinical Criteria **AND** Epidemiological Criteria should be reported to CHP for further investigation

**Clinical Criteria**

- A person with acute respiratory illness, characterized by fever (temperature $>38^\circ{\text{C}}$) and cough and/or sore throat, OR
- A person with pneumonia, OR
- A person died of unexplained acute respiratory illness.
### Epidemiological Criteria

<table>
<thead>
<tr>
<th>Influenza A (H5)</th>
<th>Influenza A (H7N9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One or more of the following exposures in the 7 days prior to symptom onset:</td>
<td>One or more of the following exposures in the 10 days prior to symptom onset:</td>
</tr>
<tr>
<td>- contact with a human case of influenza A (H5)/(H7N9): <strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>- contact with poultry or wild birds or their remains or to environments contaminated by their faeces in countries/areas with documented avian influenza A (H5)/(H7N9) infection in birds and/or humans in the recent 6 months <em>(see List of affected areas)</em>: <strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>- consumption of raw or undercooked poultry products in countries/areas with documented avian influenza A (H5)/(H7N9) infection in poultry and/or humans in the recent 6 months <em>(see List of affected areas)</em>: <strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>- close contact with a confirmed influenza A (H5)/(H7N9) infected animal other than poultry or wild birds; <strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>- worked in a laboratory that is processing samples from persons or animals that are suspected from avian influenza infection; <strong>OR</strong></td>
<td></td>
</tr>
<tr>
<td>- worked in the live poultry industry.</td>
<td></td>
</tr>
</tbody>
</table>
Local management of close contacts

- Antiviral prophylaxis with oseltamivir at treatment dose for 5 days
- Medical surveillance for 10 days after last exposure
- Wear face mask for 10 days since last exposure to a confirmed case while the case was infectious
- No restrictions for work or other daily activities during surveillance period
- If close contacts are contraindicated / intolerant to or refuse antiviral prophylaxis, they will be quarantined for 10 days since last exposure
Thank you