Impact on AI infections at human-animal interface a global perspective

K Vandemaele

Global Influenza Programme

WHO Geneva
Current situation human infections with non-seasonal influenza
Confirmed A(H5N1) human cases reported to WHO

Number of Confirmed Human H5N1 Cases
by month of onset as of 2017-09-28

- Azerbaijan (8)
- Bangladesh (8)
- Djibouti (1)
- Cambodia (56)
- Egypt (359)
- Canada (1)
- Indonesia (200)
- Nigeria (1)
- Iraq (3)
- Laos (2)
- Myanmar (1)
- Pakistan (3)
- Thailand (25)
- Turkey (12)
- Viet Nam (127)

Month of onset

Number of Cases
A(H5N1) human activity since 2003

Areas with confirmed human cases for avian influenza A(H5N1) reported to WHO, 2003-2017*
A(H5) activity in birds 2017
A(H5) activity humans

2 new A(H5N1) cases
860 A(H5N1) cases/453 fatal
16 A(H5N6) cases/11 fatal
Confirmed H7N9 human cases reported to WHO as of 29 September 2017

1564 cases/39% fatal
28 HPAI cases
A(H7) activity birds 2017
Other human infections with non-seasonal influenza since Sept 2016

<table>
<thead>
<tr>
<th>Subtype</th>
<th>Country reporting</th>
<th>Cases</th>
<th>Clinical severity</th>
<th>Exposure</th>
</tr>
</thead>
<tbody>
<tr>
<td>H7N2</td>
<td>USA</td>
<td>1</td>
<td>mild</td>
<td>To an infected cat.</td>
</tr>
<tr>
<td>H9N2</td>
<td>China</td>
<td>4</td>
<td>mild</td>
<td>2 with exposure to backyard poultry; 1 no clear exposure history</td>
</tr>
<tr>
<td>H1N1v</td>
<td>Italy, Switzerland, the Netherlands</td>
<td>3</td>
<td>2 severe, 1 mild</td>
<td>All 3 with swine exposure</td>
</tr>
<tr>
<td>H1N2v</td>
<td>USA</td>
<td>3</td>
<td>mild</td>
<td>All 3 had swine exposure</td>
</tr>
<tr>
<td>H3N2v</td>
<td>Canada, USA</td>
<td>31</td>
<td>mild, severe</td>
<td>All had swine exposure preceding illness</td>
</tr>
</tbody>
</table>
Impact of human infections with non-seasonal influenza
Impact

- Numbers of confirmed human infections remain relatively low

- Stressed surveillance systems
  - Investigation and contact follow up
    - On average, 21 and 18 contacts were traced for each A(H7N9) case in urban and rural areas respectively; compared to 90 and 63 for A(H5N1).
      (Comparative epidemiology of human infections with avian influenza A(H7N9) and A(H5N1) viruses in China, B Cowling et al, Lancet. 2013 Jul 13; 382(9887): 129–137.)

  - Scale up surveillance

  - Cleaning of contaminated environments/closing of markets

- High impact on food resources, stock markets, tourism.
Biggest fear: pandemic potential

- Estimated mortality from 2009 pandemic:
  - 123,000 and 203,000 pandemic influenza respiratory death (Simonsen et al, PloS med 2013, Nov 26)
  - 201,200 respiratory deaths (range 105,700–395,600); (Dawood et al, Lancet)

- Estimated mortality from 1918 pandemic: 50 million deaths

- A severe pandemic could cost over 3% of the global economy's gross national product, between one and two trillion dollars in the worst-case scenario. Sources: IMF, World Bank
Actions to reduce impact
One Health at WHO

To effectively detect, respond to, and prevent outbreaks of zoonoses and food safety problems, epidemiological data and laboratory information should be shared across sectors.

Government officials, researchers and workers across sectors at the local, national, regional and global levels should implement joint responses to health threats.

- **Strategic/policy collaborations with international agencies and partners**

- **Technical collaborations with international agencies and partners**

- **Disease-specific cross-sectoral technical projects**
WHO actions in close collaboration with FAO/OIE

- Enhance early detection and risk assessment
  - TIPRA, monthly and ad hoc risk assessments.
  - Capacity building (under PIP framework and with other partners).
  - Longitudinal influenza Surveillance Network (LISN)

- Guidance and recommendations, if countries are experiencing infections with AI

- Pandemic Preparedness
  - GISRS and Candidate Vaccine Viruses
  - PIP framework
  - Research Agenda
Why TIPRA
- A **standardized** and **transparent** approach
- **Hazard** characterization, exposure and context
- Identification of **gaps of knowledge**

Risk question:
*What is the risk of human-to-human transmission of the virus?*
- Likelihood
- Impact

Nine risk elements – risk stratification defined

Multi-step approach

http://www.who.int/influenza/areas_of_work/human_animal_interface/tipra
Viet Nam Coordinated Surveillance for Influenza and Other Viruses with Pandemic Potential

Use existing influenza-related surveillance platforms at the human-animal interface:

<table>
<thead>
<tr>
<th>Approach</th>
<th>Expected Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expand influenza virus characterization</td>
<td>Monitor virus diversity and evolution</td>
</tr>
<tr>
<td>Test existing specimens for other viruses with epidemic/pandemic potential</td>
<td>Understand the virological and epidemiological landscape</td>
</tr>
<tr>
<td>Share outputs across sectors for joint situation analysis and risk assessment</td>
<td>Inform response and control activities by providing-evidence base</td>
</tr>
</tbody>
</table>

Two locations: based on high-risk market chains and confluence of human, livestock and wildlife influenza surveillance activities.
GISRS

- Established in 1952
- Currently 143 National Influenza Centers (NICs) in 113 Member States
- 6 WHO Collaborating Centers
- 4 WHO Essential Regulatory Laboratories
- 13 WHO H5 reference laboratories, and ad hoc groups
Updating of candidate vaccine strain viruses twice a year during Vaccine Composition Meeting

OFFLU

A(H1N2)v

A(H3N2)v
New candidate vaccine viruses

**Influenza A(H3N2)v candidate vaccine viruses**

Based on the available antigenic, genetic and epidemiologic data, a new CVV based on an A/Ohio/13/2017-like virus is proposed. The available A(H3N2)v CVVs are listed in Table 8.

<table>
<thead>
<tr>
<th>Candidate vaccine viruses</th>
<th>Type</th>
<th>Institution*</th>
<th>Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/Minnesota/11/2010 (NYMC X-203)</td>
<td>Conventional</td>
<td>CDC</td>
<td>Yes</td>
</tr>
<tr>
<td>A/Indiana/10/2011 (NYMC X-213)</td>
<td>Conventional</td>
<td>CDC</td>
<td>Yes</td>
</tr>
<tr>
<td>IDCDC-RG55C (A/Ohio/28/2016-like)</td>
<td>Conventional and reverse genetics</td>
<td>NIBSC</td>
<td>pending</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CDC</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Candidate vaccine viruses in Preparation**

<table>
<thead>
<tr>
<th>Preparation</th>
<th>Type</th>
<th>Institution</th>
<th>Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>A/Ohio/13/2017-like</td>
<td>Reverse genetics</td>
<td>CDC</td>
<td>pending</td>
</tr>
</tbody>
</table>

*Institution distributing the candidate vaccine viruses:
- CDC - Centers for Disease Control and Prevention, United States of America
- NIBSC - National Institute for Biological Standards and Control, a centre of the Medicines and Healthcare products Regulatory Agency (MHRA), United Kingdom
Pandemic Influenza Preparedness (PIP) Framework

- Innovative Partnership that aims to increase global preparedness for pandemic influenza

- Brings together Member States, industry, civil society organizations, other partners and WHO to improve “on an equal footing”:

  - Sharing of Influenza viruses with human pandemic potential with GISRS
  - Sharing of Benefits arising from virus sharing, e.g. vaccines, antivirals and other pandemic response products
Joint External Evaluation

The Joint External Evaluation Tool is intended to assess country capacity to prevent, detect, and respond to public health threats.

Countries can request a JEE mission to help them identify the most urgent needs within their health system.

The JEE will help engage with stakeholders and partners initiatives to support country outbreak and health emergency preparedness.

Current zoonoses guide (2008)

- Developed jointly by animal health and public health sectors (WHO/OIE/FAO)
- Practical guidance on:
  - Setting up a coordination mechanism
  - Surveillance and information sharing
  - Coordinated responses
- Will be updated
  - Planning and preparedness
  - Joint risk assessment for specific threats
  - Training and workforce development
  - Risk communication

http://www.wpro.who.int/publications/docs/Zoonoses02.pdf
Areas for improvement

- Rapid data and virus sharing (virus and sequence data)
  - Including on LPAI and influenza circulating in the swine population.
- Linked databases (animal and human health, clinical outcomes and virology, …)
- Joint investigations, risk assessment and communications at all levels.
Acknowledgment

- Aspen Hammond
- Ann Moen
- Wenqing Zhang
- Gina Samaan
- GISRS network
THANKS