WHO Global Update:

Public health risks from influenza viruses circulating in swine

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Global Situation

- ??????????
- “Increasing” number of human cases detected/reported
- National/International notification requirements

IHR (2005) Case definition:
Human influenza caused by a new subtype

- State Parties to the IHR (2005) are required to immediately notify WHO of any **laboratory confirmed case** of a **recent human infection** caused by an influenza A virus with the **potential to cause a pandemic**. Evidence of illness is not required for this report.

- An influenza A virus is considered to have the potential to cause a pandemic if the virus has demonstrated the **capacity to infect a human** and if the heamagglutinin gene (or protein) is **not a variant or mutated form** of those, i.e. A/H1 or A/H3, circulating widely in the human population.

- An infection is considered recent if it has been confirmed by positive results from **polymerase chain reaction (PCR), virus isolation, or paired acute and convalescent serologic tests**. An antibody titre in a single serum is often not enough to confirm a recent infection, and should be assessed by reference to valid WHO case definitions for human infections with specific influenza A subtypes.

Human infections: USA (Jan 2011- Mar 2012)

- H3N2 TrR H3N2 (USA strain SIV) with A(H1N1)pdm09 M gene
  - 7 sporadic in 3 states
    - 6 exposed to pigs or contaminated environments
    - 1 no known exposure (potentially H2H, swine worker, untested)
  - 3 in epi-linked cluster (plus 2 ILI epi-linked no confirmation)
- H1N2, H1N1

Human cases

- Viruses appear to reflect those circulating in swine in region at the time of infection
- Variable, generally mild, clinical presentation (subclinical ←→ ILI)
- No deaths
- Most have exposure to swine or other infected humans
  - Some exposures unclear

Public health risk assessment for flu at the HAI
(same as last year)

- **Before human cases occur** assessment based on antigenic and genetic characteristics of viruses identified/circulating in animals

- **Mostly UNABLE** to identify what constitutes an increased PH risk, due to:
  - PH risks associated with sequence mutations and markers??
    - lack of linked virological and epidemiological information
    - lack of "contextual" information (ecology, current pattern of virus circulation, management system, human innate/acquired immunity, etc)
  - Limited surveillance scope (humans and animals)
    - No global baseline

Overarching question (still)

What are the public health risks from influenza viruses in swine?

WHO perspective: Two aspects (still)

- WHO's role re SIV in humans and at the human-swine interface
- What WHO would like to learn from AH through SIV surveillance or research

What we need to know: PH & interface

- *Epidemiology and clinical*
  - Baseline frequency and severity of human cases
  - Changes in frequency and/or severity of human infections
  - Activities putting humans at risk for infection/disease
  - Types of animal workers at risk for infection/disease
  - Differences between exposure risks and disease risks
  - Host factors (genetic, acquired immunity)

- *Virology*
  - Characteristics of viruses infecting humans (including antiviral sensitivity)
  - Whether viruses infecting humans reflect the spectrum of circulating animal viruses or if they are a subset of the viruses circulating in animals
    - and if a subset, identification of any common differentiating characteristics.

What we would like to know: AH

- *Epidemiology*
  - Transmission dynamics of SIVs, including seasonality
  - Changes in epidemiology
- *Virology*
  - Distribution of subtypes and strains infecting swine (and other species!)
  - Whether viruses circulating in swine are sensitive to antiviral drugs
    - Oseltamivir, adamantines, zanamivir
    - genetic screen follow up with phenotypic testing
  - Viral factors associated with cross-species transmission to/from swine
    - especially from birds to swine
  - Distribution and characteristics of H2 viruses in swine
  - Changes: in distribution, circulation of “new” subtypes, when there are cross-species events

This requires…

- On animal health side:
  - Epidemiological and virological surveillance and monitoring in swine = baseline and changes
- On public health side:
  - Epidemiological surveillance and monitoring in high-contact humans for exposure (serological testing required) and disease (ILI/SARI surveillance required) = baseline and changes
  - A better understanding of serological reactions (e.g. cross reactions, persistence of antibody, conditions for seroconversion)
  - Virological surveillance and monitoring in humans
- At the interface:
  - Tests/reagents to specifically distinguish strains serologically
  - Mechanism for sharing information
  - Mechanism for early joint assessment of emerging events

More information

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Naming

- Yet to find system that meets all needs and concerns
- Request for tripartite to continue conversation

Summary

- Lack of understanding of global incidence of human infections with influenza viruses circulating in swine
- Little understanding of PH risks at the human-swine interface
  - Epidemiology
  - Impact
- Significant gaps in swine influenza virus (SIV) surveillance - AH and PH - worldwide

Thank you!

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