Surveillance for influenza in pigs: A WHO perspective

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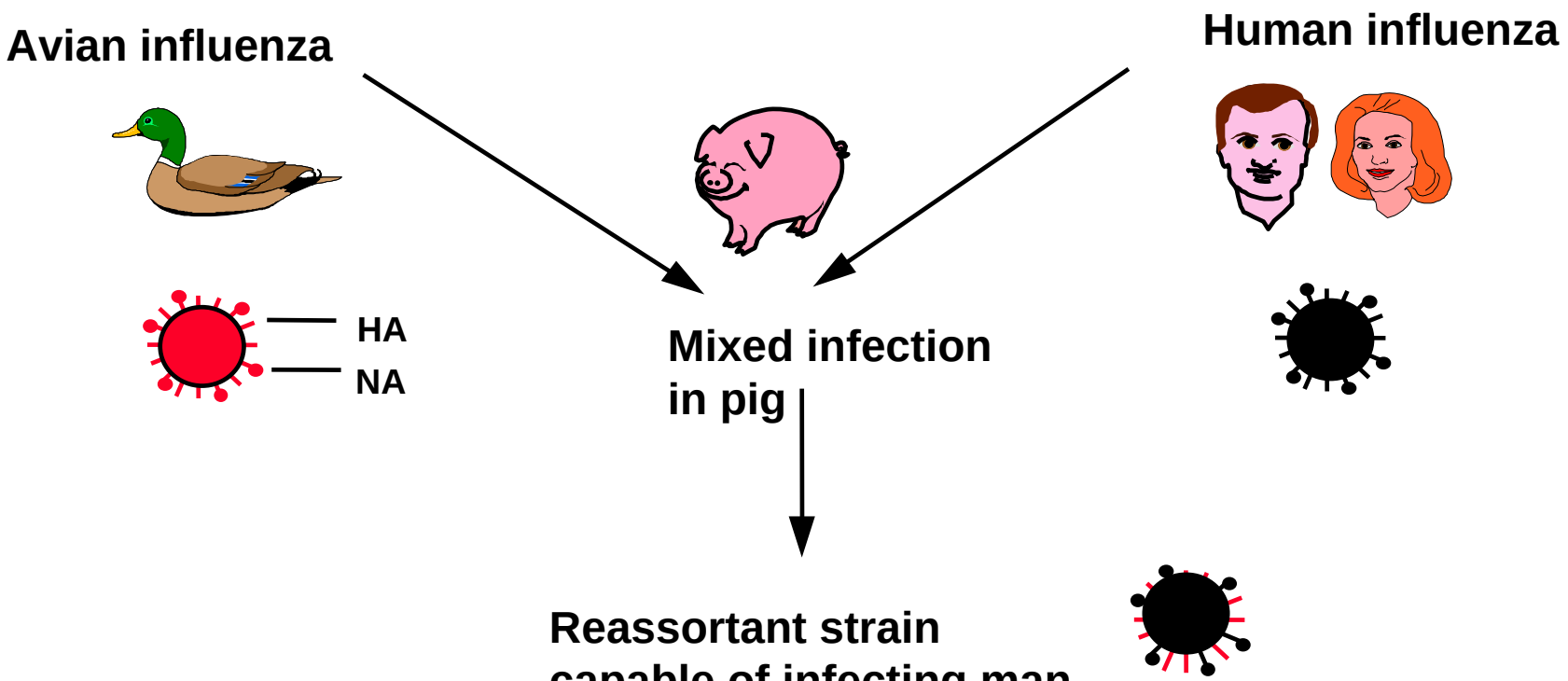
Lessons (re)learned from H1N1 pandemic

- Little understanding of role of swine in emerging zoonotic and pandemic influenza threats
- Significant gaps in swine influenza virus (SIV) surveillance worldwide
- Little understanding of PH risks at the human-swine interface

Genetic reassortment hypothesis (influenza A virus)



Courtesy Dr D. Lavanchy, WHO, 1996

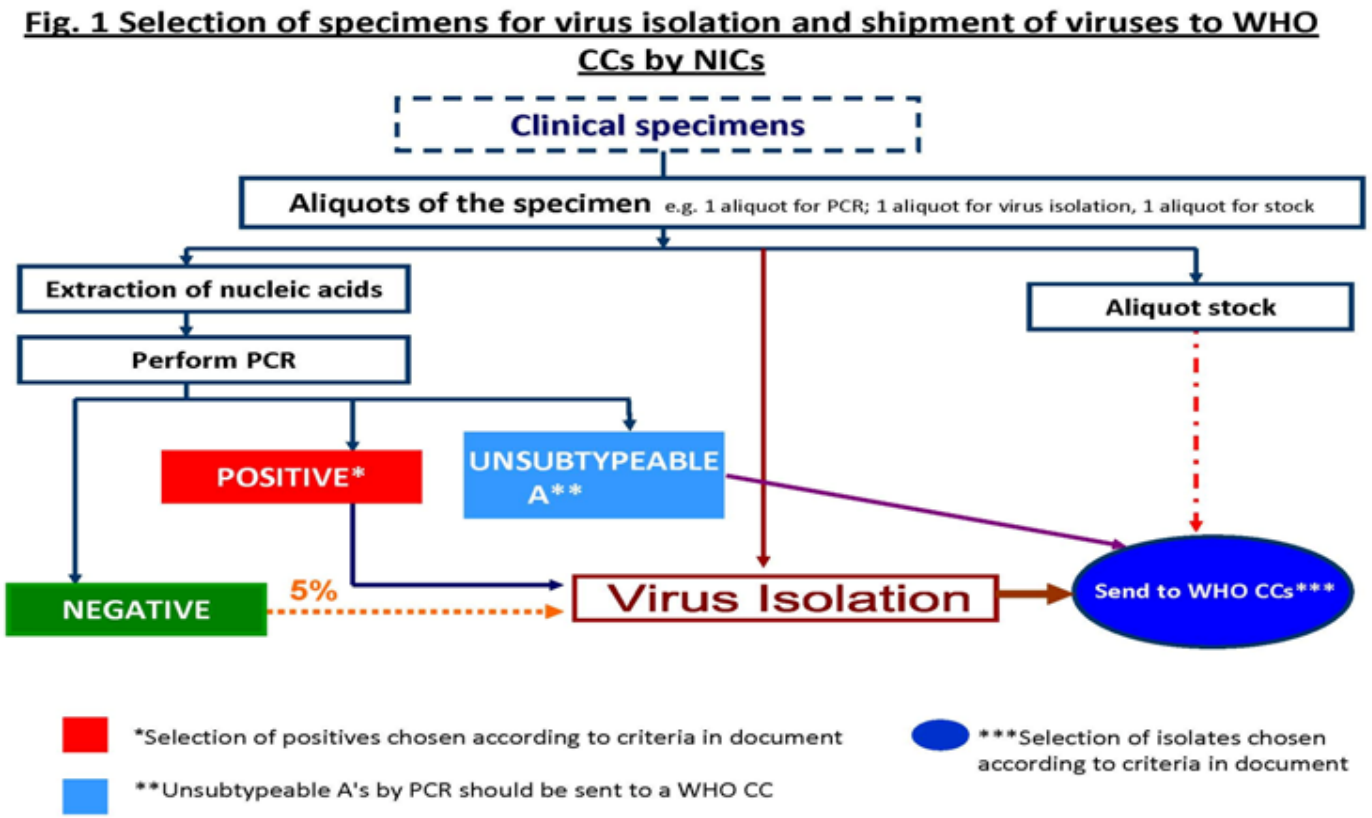
Public health risk assessment

- Before human cases occur, assessment based on virological characteristics of viruses identified/circulating in animals

- However, we are mostly UNABLE to identify what constitutes an increased PH risk, due to:
  - poor understanding of PH risks associated with influenza 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)
  - insufficiently broad surveillance scope (humans and animals)
    - No global baseline

Flu A (+) “Unsubtypables”

- Need standard PH algorithms (including prioritisations)
- Need correct, most up to date, reagents for PCR, antigenic, and serologic testing



WHO perspective: Two aspects

- 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

Overarching question

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

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

Thank you!

World Health Organization