Non virological factors that could influence influenza emergence

Past experience – new paradigms for future threats

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April 2010, Verona

Goals

1. Identify non virological characteristics for the emergence of zoonotic and pandemic AI viruses
2. While taking stock of the experience from the last 6 years
3. Options for the future and new approaches

Why You’ll Be Wearing Masks Again

The world may have dodged a deadly flu pandemic this time. We won’t always be so lucky.

BY BRYAN WALSH
Key non virological factors

Institutional

- Public and private veterinary and animal production services
  - Weaknesses of veterinary services
  - Outbreak investigation, tracking source of infection
  - Public private partnership
  - Compensation schemes

Key non virological factors

Cultural

- Fighting cocks
- Festivals (Spring festival, China & Tet festival in Vietnam) fostering sharp increase in trade
- Release of wild birds (e.g. Hong-Kong)
- Cultural/religious preference for live meat
Key non virological factors

Ecological

When humans and domestic animals encroach on ecological niches they create new opportunities for cross-species transmission of diseases.

Key non virological factors

Farming and production

- Century old production systems associated to rapid industrialization of animal production in Asia
  - Domestic ducks were first moved from rivers to cultivated rice fields at the start of the Qing dynasty in the middle of the 17th century (shortridge)
  - The current global epidemic of AI originated in rice paddies of South East Asia that had been wetland sanctuaries (R. Wallace)
  - Greater mix of influenza serotypes increasing genetic reassortment
  - Rapid evolution of poultry production systems
  - China liberalizing economy and creation of Special economic zones for trade (e.g Guangdong and Shenzhen)
  - Development continues (agro-park in Shaanxi province with a capacity of 3Million head/year)

- Broader perspective: Industrialized countries (trade, high productivity, generation of pandemic strains or other EIDs)
Key non virological factors

- Predictive capacity of Early Warning Systems
  & articulation with Response systems

Options for the future

- Some of the institutional, production and cultural elements can be addressed fairly easily and in the short term while other will require a longer term approach and be associated with achievement of longer term development objectives
Options for the future

- Integrated risk management approach

Human-animal interface
Agro-ecological
AI Risk factors
Marketing chain component

Human health risks

Introduction → Establishment → Re-occurrence

Inputs → Production → Marketing → Consumers

Live Bird Markets Survey in South China —— H5N1
### Variable: Risk of infection in county (Odds Ratios)

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<th>Human outbreaks</th>
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* Bayesian Credible Interval (BCI) does not contain 1; based on univariable Bernoulli Bayesian model, with a spatially unstructured random effect.
Options for the future

• Integrated approach “Environment, agriculture and infectious diseases”
• Still at an embryonic stage – needs strengthening through One (Eco) Health Approach
• Strengthening VS and EW systems (from national to global, from Research to Policy)
• Engage countries in the process
• Explore innovative techniques in a multidisciplinary approach (SNA, socio-economic, Ecological resilience applied to traditional epidemiology)

Thank you for your attention