Influenza A virus in swine worldwide: a call for increased surveillance and research

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Abstract

Pigs and humans have shared influenza A viruses (IAV) since 1918, and many interspecies transmission events have been documented. Despite this interplay, relatively little is known regarding IAV circulating in swine around the world compared to what is known for avian and human IAV. This gap impedes our understanding of how swine- and human-adapted viruses impact the ecology and evolution of IAV as a whole and the true impact of swine IAV on human health. The pandemic H1N1 of 2009 underscored the need for greater surveillance and sharing of data on IAV in swine. Here, we review the current state of IAV in swine around the world, highlight the collaboration between international organizations and a network of laboratories engaged in human and animal IAV surveillance and research, and emphasize the need to increase information in high priority regions. The need for global integration and rapid sharing of data and resources to fight IAV in swine and other animal species is apparent, but this effort requires grassroots support from government, practicing veterinarians and the swine industry and, ultimately, requires significant increases in funding and infrastructure.

Need for global influenza monitoring in swine

Benefits to animal health

- Establish a baseline of the dominant SIV subtypes and lineages in different geographic regions to inform and measure success of control strategies
- Comparison of continents and regions, tracking of major changes in the epidemiology, and detection of novel and variant viruses in a timely manner
- Optimization of diagnostic techniques and assistance in the selection of IAV vaccine strains for pigs
- A better understanding of the antigenic and genetic evolution of IAV in swine over time
- Insight into epidemiology and modes of transmission
- Understanding human-to-swine transmission
- Understanding the significance of IAV in acute respiratory disease and in the porcine respiratory disease complex
- A collection of viruses for applied and fundamental experimental research and vaccine development

Benefits to public health

- Timely identification, characterization and reporting of emerging influenza viruses to inform diagnostic, antiviral and vaccine preparedness
- Data about the role of swine IAV as a zoonosis
- Identifying determinants of risk for the role of swine IAV in human influenza pandemic preparedness
- Bi-directional sharing of information between human and animal health sectors

Challenges to SIV surveillance globally

- Previous lack of coordinated efforts and networks for sharing
- Limited government infrastructure for non-reportable diseases like swine IAV
- Lack of reference labs with swine IAV expertise in some high-priority regions
- Large amount of genetic and antigenic diversity worldwide (Figure 1)
- Non-biased representative sampling is difficult
- Producer and veterinary participation is voluntary
- Lack of financial and human resources requires prioritization of efforts (Figure 2)
- Determinants of risk to pigs and people are relatively unknown

References


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