recently discovered viruses, including the diverse phylogeny of the rhinoviruses, the newly discovered group C rhinoviruses and their association with more severe disease, the hMPV and their role behind RSV in lower respiratory tract infections in young children, the newly discovered HCoV and the HBoV. The HBoV with their global prevalence, high incidence in children, lack of knowledge of infections in adults and their ability to cause systemic infections opens up ongoing research opportunities. Thirdly, to establish respiratory virus surveillance as routine is feasible and cost effective in hospital environments as knowledge of a specific respiratory virus pathogen can lead to appropriate antiviral treatment, rational antibiotic usage and implementation of infection control protocols. The surveillance of community respiratory virus circulation is problematic as the linkages to patient management may be more tenuous, however, is important for extending our knowledge on the natural ecology of these viruses. Integration into existing influenza surveillance strategies should be considered.

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1.1.4: Avian influenza in humans: impact, surveillance and research

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Pandemic influenza arises from avian influenza viruses. Avian influenza viruses may also pose a zoonotic threat and [in the case of highly pathogenic avian influenza (HPAI) viruses such as H5N1 or H7N7] impact on the food supply and economy by affecting the poultry industry. Surveillance of animal influenza viruses (avian, pig) at the animal-human interface is therefore crucial to identify potential pandemic and zoonotic threats. Such information may allow intervention to remove (e.g., H7N7 viruses in Holland in 2003) or contain (e.g., H5N1 in some countries) such threats; to minimize opportunity for inter-species transmission to humans (modification of human risk-behavior and risk-environments) and facilitate pre-pandemic vaccine development. Over the last three decades, H5N1 (over 400 cases), H9N2 (10 cases) and H7 subtype (99 cases) avian viruses and also other subtypes (H1, H3) of swine viruses have been isolated on numerous occasions from humans with clinical disease. Limited seroepidemiological studies of avian influenza virus infections in humans have demonstrated infection with an even wider range of subtypes, but these data require confirmation using contemporary methods. The last pandemics arose from avian viruses that were not highly pathogenic in birds and therefore the pandemic threat may arise from viruses that cause little or no disease in humans and/or in birds. Surveillance in healthy birds (especially domestic livestock) and mild disease and seroepidemiology in humans is therefore important. Currently surveillance in both animals and humans is skewed towards severe disease (e.g., HPAI H5N1) and it is likely that this may bias our understanding of the true extent of inter-species transmission events caused by less pathogenic viruses (e.g., low pathogenic H9N2). Nevertheless, H5N1 remains the major focus for pandemic preparedness, not because of its inevitability as the next pandemic virus but because of the potential severity of such an event. H5N1 virus is currently entrenched in many countries in the Asia and Africa and continues to transmit zoonotically to humans but a virus capable of sustained human-to-human transmission has so far not emerged. Surveillance of human cases, and of case-clusters in particular, is essential to provide early warning of an emerging pandemic which may allow the rapid mobilization of interventions (antiviral, vaccines, public health measures) that may contain the outbreak at source or at least delay the spread of such a disease. Surveillance in humans and in animals provides genetic and antigenic information essential to assess changes in the virus that may increase human health risks and also to update pandemic vaccine strains so as to ensure that currently available pre-pandemic vaccines provide adequate cross-immunity to emerging H5N1 virus strains. Systematic collection, collation and sharing of clinical and epidemiological data from human H5N1 cases are important to provide a real time understanding of this pandemic threat. Systematic surveillance in live poultry markets (in regions where such markets are common) may help identify mechanisms of virus persistence, amplification and dissemination and provide options for intervention and control, not just of human disease but also of transmission in poultry. Close collaboration between those involved in public health, animal husbandry as well as wild-life conservation is essential for the success of such an endeavor.

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1.1.5: Panel discussion - aims of respiratory virus surveillance

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What relevance do routine surveillance and its further development have in countries with fewer resources and other substantive problems? To answer this question, it is helpful to know what routine surveillance costs in resource-rich countries, such as the United States. Such costs are difficult to calculate, but it is clear that the principal cost drivers are laboratory confirmation and the attendant diagnostic equipment and supplies. Cost savings can be realized by training existing healthcare staff to collect specimens, by testing for multiple pathogens simultaneously, and by adding surveillance for other viruses to an existing influenza surveillance system.

Is there any value in surveillance for viral diseases that have no treatment, especially in poor countries? Would epidemiological surveillance (monitoring for disease in general) be superior to virological surveillance (testing for specific pathogens) in this instance? Much of the recent emphasis on surveillance is being done to satisfy the World Health Assembly's International Health Regulations of 2005 (IHR 2005), but a better strategy, especially in dealing with administrators and policymakers, is to stress the burden of disease posed by pneumonia. Although pneumonia has several non viral causes, the burden of individual respiratory viruses can be estimated by using influenza as a model. In an era of evidence-based medicine, we must understand which viruses are circulating in our communities first, then later justify the cost-effectiveness of monitoring for them. Evidence of infection is