

6 January 2009

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Chem-Bio News– Pandemic Influenza Edition # 42

1. PERSONAL PROTECTIVE EQUIPMENT AND RISK FOR AVIAN INFLUENZA (H7N3):

“Understanding what obstacles prevent workers from wearing complete PPE is needed. Our study suggests that rigorous use of PPE by persons managing avian influenza outbreaks reduces influenza-like symptoms and conjunctivitis and potentially hazardous exposure to infected poultry materials.”

2. STUDY HINTS AT PNEUMONIA RISK WITH RESISTANT FLU VIRUSES: *“A newly published analysis of oseltamivir-resistant influenza viruses collected last winter in Norway hints that they may increase an infected person's risk of pneumonia and sinus infections, but the small number of patients in the study means the finding is no more than a hint at this point.”*

3. EFFICACY OF SOAP AND WATER AND ALCOHOL-BASED HAND-RUB PREPARATIONS AGAINST LIVE H1N1 INFLUENZA VIRUS ON THE HANDS OF HUMAN VOLUNTEERS: *“HH [hand hygiene] with SW [soap and water] or alcohol-based hand rub is highly effective in reducing influenza A virus on human hands, although SW is the most effective intervention.”*

4. A DECENTRALIZED MOLECULAR DIAGNOSTIC TESTING PLAN FOR PANDEMIC INFLUENZA IN THE ONTARIO PUBLIC HEALTH LABORATORY SYSTEM: *“Ontario Public Health Laboratories system (OPHL) is in the midst of a six-year plan to implement molecular tools for pandemic influenza diagnostics in one central and three regional public health laboratories.”*

5. TRANSMISSION OF INFLUENZA VIRUS IN A MAMMALIAN HOST IS INCREASED BY PB2 AMINO ACIDS 627K OR 627E/701N: *“Using the guinea pig, an animal which we have previously shown to model the human transmission of influenza, we have identified two specific residues in the viral polymerase, at PB2 positions 627 and 701, that can contribute to efficient transmission.”*

6. PULMONARY DELIVERY OF ISCOMATRIX INFLUENZA VACCINE INDUCES BOTH

SYSTEMIC AND MUCOSAL IMMUNITY WITH ANTIGEN DOSE SPARING: *"The 375-fold reduction in antigen dose and improved mucosal antibody responses, compared to the current vaccine, suggests that mucosal delivery via the pulmonary route may be particularly relevant in the event of an influenza pandemic, when vaccine supplies are unlikely to meet demand."*

CB Daily Report

Chem-Bio News

PERSONAL PROTECTIVE EQUIPMENT AND RISK FOR AVIAN INFLUENZA (H7N3)

By Oliver Morgan,¹ Comments to Author Mirjam Kuhne, Pat Nair, Neville Q. Verlander, Richard Preece, Marianne McDougal, Maria Zambon, and Mark Reacher
Journal of Emerging Infectious Diseases
January 2009

"An outbreak of avian influenza (H7N3) among poultry resulted in laboratory-confirmed disease in 1 of 103 exposed persons. Incomplete use of personal protective equipment (PPE) was associated with conjunctivitis and influenza-like symptoms. Rigorous use of PPE by persons managing avian influenza outbreaks may reduce exposure to potentially hazardous infected poultry materials."

"In April 2006, an outbreak of avian influenza occurred on 3 poultry farms in Norfolk, England (1). Reverse transcription-PCR (RT-PCR) of poultry blood samples and cloacal swabs detected low-pathogenic avian influenza (H7N3) on 1 farm, and veterinary investigation confirmed influenza subtype H7N3 on the 2 adjacent farms. Surveillance and protection zones were established around all infected premises, and all birds were culled. Persons who had been exposed were offered oseltamivir prophylaxis; those with influenza symptoms were offered oseltamivir treatment and influenza vaccination. All persons at risk were orally instructed to wear personal protective equipment (PPE)."

"Strict compliance with PPE use should be reinforced when outbreaks of avian influenza among poultry are being managed, as recommended in current guidance from the United Kingdom (6) and the European Centre for Disease Prevention and Control (7). Compliance tends to be suboptimal (8), possibly because of low risk perception among poultry workers (9). Understanding what obstacles prevent workers from wearing complete PPE is needed. Our study suggests that rigorous use of PPE by persons managing avian influenza outbreaks reduces influenza-like symptoms and conjunctivitis and potentially hazardous exposure to infected poultry materials."

The full article can be found at: <http://www.cdc.gov/eid/content/15/1/59.htm>

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STUDY HINTS AT PNEUMONIA RISK WITH RESISTANT FLU VIRUSES

By Robert Roos

CIDRAP News (Center for Infectious Disease Research & Policy – University of Minnesota)

December 31, 2008

“A newly published analysis of oseltamivir-resistant influenza viruses collected last winter in Norway hints that they may increase an infected person's risk of pneumonia and sinus infections, but the small number of patients in the study means the finding is no more than a hint at this point.

Increased resistance to oseltamivir (Tamiflu) in influenza A/H1N1 viruses emerged last winter in Europe, the United States, and elsewhere, and was first observed in Norway. Because nearly all H1N1 viruses tested in the United States so far this winter have shown resistance, the Centers for Disease Control and Prevention earlier this month changed its recommendations for use of antiviral drugs in flu patients. H1N1 is one of the three influenza subtypes that typically circulate each winter.”

The full article can be found at: <http://www.cidrap.umn.edu/cidrap/content/influenza/general/news/dec3108resist.html>

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EFFICACY OF SOAP AND WATER AND ALCOHOL-BASED HAND-RUB PREPARATIONS AGAINST LIVE H1N1 INFLUENZA VIRUS ON THE HANDS OF HUMAN VOLUNTEERS

By M. Lindsay Grayson, Sharmila Melvani, Julian Druce, Ian G. Barr, Susan A. Ballard, Paul D. R. Johnson, Tasoula Mastorakos, and Christopher Birch

Clinical Infectious Diseases

December 30, 2008

“Background. Although pandemic and avian influenza are known to be transmitted via human hands, there are minimal data regarding the effectiveness of routine hand hygiene (HH) protocols against pandemic and avian influenza.

Methods. Twenty vaccinated, antibody-positive health care workers had their hands contaminated with 1 mL of 107 tissue culture infectious dose (TCID)₅₀/0.1 mL live human influenza A virus (H1N1; A/New Caledonia/20/99) before undertaking 1 of 5 HH protocols (no HH [control], soap and water hand washing [SW], or use of 1 of 3 alcohol-based hand rubs [61.5% ethanol gel, 70% ethanol plus 0.5% chlorhexidine solution, or 70% isopropanol plus 0.5% chlorhexidine solution]). H1N1 concentrations were assessed before and after each intervention by viral culture and real-time reverse-transcriptase polymerase chain reaction (PCR). The natural viability of H1N1 on hands for >60 min without HH was also assessed.

Results. There was an immediate reduction in culture-detectable and PCR-detectable H1N1 after brief cutaneous air drying—14 of 20 health care workers had H1N1 detected by means of culture (mean reduction, 10³–4 TCID₅₀/0.1 mL), whereas 6 of 20 had no viable H1N1 recovered; all 20 health care workers had similar changes in PCR test results. Marked antiviral efficacy was noted for all 4 HH protocols, on the basis of culture results (14 of 14

had no culturable H1N1;) and PCR results (; cycle threshold value range, 33.3–39.4), with SW statistically superior () to all 3 alcohol-based hand rubs, although the actual difference was only 1–100 virus copies/•L. There was minimal reduction in H1N1 after 60 min without HH.

Conclusions. HH with SW or alcohol-based hand rub is highly effective in reducing influenza A virus on human hands, although SW is the most effective intervention. Appropriate HH may be an important public health initiative to reduce pandemic and avian influenza transmission."

The full article can be found at: <http://www.journals.uchicago.edu/doi/abs/10.1086/595845>

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A DECENTRALIZED MOLECULAR DIAGNOSTIC TESTING PLAN FOR PANDEMIC INFLUENZA IN THE ONTARIO PUBLIC HEALTH LABORATORY SYSTEM

Biotech Week

January 7, 2009

"The Ontario Public Health Laboratories system (OPHL) is in the midst of a six-year plan to implement molecular tools for pandemic influenza diagnostics in one central and three regional public health laboratories. This plan has been formulated as a consequence of: 1) experiences gained through severe acute respiratory syndrome (SARS), and comments of the members of the Expert Panel on SARS and Infectious Disease Control (i.e., the Walker report); 2) a review of pandemic preparedness literature; 3) historical and epidemiologic discussions about previous pandemics; and 4) suggestions made by various pandemic working committees."

"The OPHL plan includes: 1) an aggressive restructuring of the overall molecular microbiology testing capacity of the OPHL; 2) the ability to shift influenza testing of samples between designated OPHL laboratories; and 3) the development of screening tools for pandemic influenza diagnostic tests. The authors believe that investing in increased molecular testing capacity for regional laboratories outside the greater Toronto area will be beneficial to the OPHL system whether or not an influenza pandemic occurs."

The full article can be found at: (S.J. Drews, et. al., "A Decentralized Molecular Diagnostic Testing Plan for Pandemic Influenza in the Ontario Public Health Laboratory System". Canadian Journal of Public Health - Revue Canadienne de Sante Publique, 2008;99(5):387-390). Link not available.

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TRANSMISSION OF INFLUENZA VIRUS IN A MAMMALIAN HOST IS INCREASED BY PB2 AMINO ACIDS 627K OR 627E/701N

By John Steel, Anice C. Lowen, Samira Mubareka, Peter Palese

"To cause a pandemic, an influenza virus must transmit efficiently from human to human. The viral factors that enable person-to-person spread of influenza viruses remain elusive. Using the guinea pig, an animal which we have previously shown to model the human transmission of influenza, we have identified two specific residues in the viral polymerase, at PB2 positions 627 and 701, that can contribute to efficient transmission. Interestingly, the two adaptive mutations examined act independently to achieve the same phenotype. Furthermore, these residues impact the transmission of both H3N2 and H5N1 subtype influenza viruses in the context of a mammalian host. The common importance of these amino acids to two diverse virus strains—the human-adapted H3N2 and the more avian-like H5N1—indicates that their mutation may be a common route to the development of a transmission-competent virus. These findings suggest one feature that contributes to the making of a pandemic influenza virus."

The full article can be found at: <http://www.plospathogens.org/article/info%3Adoi%2F10.1371%2Fjournal.ppat.1000252;jsessionid=9B5372167E520F2EC32868C343FC33EB>

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PULMONARY DELIVERY OF ISCOMATRIX INFLUENZA VACCINE INDUCES BOTH SYSTEMIC AND MUCOSAL IMMUNITY WITH ANTIGEN DOSE SPARING

Health & Medicine Week
January 5, 2009

"Using a large animal model, we evaluated whether delivery of influenza vaccine via its mucosal site of infection could improve vaccine effectiveness. Unexpectedly, pulmonary immunization with extremely low antigen doses (0.04 μ g influenza) induced serum antibody levels equivalent to those resulting from a current human vaccine equivalent (15 μ g unadjuvanted influenza, subcutaneously) and vastly superior lung mucosal antibodies."

"Induction of this potent response following lung vaccination was dependent on addition of ISCOMATRIX adjuvant and deep lung delivery. Functional antibody activity, marked by hemagglutination inhibition, was only present in the lungs of animals that received adjuvanted vaccine via the lungs, suggesting this approach could potentially translate to improved protection."

"The 375-fold reduction in antigen dose and improved mucosal antibody responses, compared to the current vaccine, suggests that mucosal delivery via the pulmonary route may be particularly relevant in the event of an influenza pandemic, when vaccine supplies are unlikely to meet demand."

The full article can be found at: (J.L.K. Wee, et. al., "Pulmonary delivery of ISCOMATRIX influenza vaccine induces both systemic and mucosal immunity with antigen dose sparing". *Mucosal Immunology*, 2008; 1(6):489-496). Link not available.

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