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Society for Risk Analysis

Study Details Pathways to Flu Virus Exposure, Validates Preventative Measures

McLean, VA – With estimates that half the population of the United States could be infected with the 2009 H1N1 flu virus this fall and winter, a new study examines four flu exposure pathways and quantifies the risk posed by each pathway, which, the analysis found, varies based on changes in viral concentrations.

The findings are particularly important as vaccines for the 2009 H1N1 virus – sometimes referred to as “swine flu” – are unlikely to be widely available before October, leaving modification of behavior as the key initial frontline method to prevent illness as children return to school and the fall/winter flu months approach. The study appears in the September issue of the peer-reviewed journal *Risk Analysis*, published by the Society for Risk Analysis.

“Relative Contributions of Four Exposure Pathways to Influenza Infection Risk” calculates the risks involved with each kind of exposure in a setting where a person attends a bed-ridden individual ill with influenza. In examining ways of reducing the risk of preventing infections through each pathway, the study supports general advisories to cover coughs, wash hands frequently, and disinfect surfaces. The study also substantiates the benefits of caregivers using gloves and a filtering-facepiece respirator, if possible, when they are present in a confined room with an individual ill with influenza.

Researchers Dr. Mark Nicas of the University of California Berkeley’s School of Public Health, and Dr. Rachael M. Jones of the University of Illinois Chicago’s School of Public Health, used sophisticated modeling and examined available research to show infection rates in four pathways of exposure dealing with direct skin contact and inhalation of cough particles. The relative likelihood of being infected by the different exposure routes were: 1) hand contact with contaminated surfaces, 31 percent; 2) inhaling small particles carrying virus when in the room, 17 percent; 3) inhaling relatively large particles carrying virus when three feet or closer to the infected person, 0.52 percent; and 4) close contact spraying of cough droplets carrying virus onto the membranes of the eyes, nostrils and lips, 52 percent.

Since incidents of infection were documented with each pathway, Nicas and Jones conclude, “Non-pharmaceutical interventions for influenza should simultaneously address potential exposure via hand contact to the face, inhalation, and droplet spray.” Nicas points out that while health care workers and caregivers attending known or suspect influenza patients are a high-risk group, individuals in classrooms or crowded stores with people emitting H1N1 virus into the air

also face inhalation risks. The study points to the need to cover coughs, disinfect touching surfaces, and protect against airborne cough particles.

The article notes that because several strains of the flu virus (including the 2009 H1N1) can attach themselves to molecules throughout the upper and lower respiratory tract, it is important not to exclude any one pathway, such as inhalation of the airborne virus, as an important contributor in certain circumstances. Smaller virus particles can travel greater distances and more easily attach to the respiratory tract (small and large particle exposure constitute two exposure pathways addressed under the “inhalation” category). And inhalation is a pathway distinct from being sprayed on the face with cough droplets that travel through the air. The researchers found when virus concentrations are increased in their model, the inhalation pathways grow in importance while the droplets from the cough spray pathway decreases. Thus, all four exposure pathways should be addressed when someone is sick, as it is difficult to know which one poses the most risk as virus concentrations change.

According to an August estimate from the President’s Council of Advisors on Science and Technology, H1N1, a type “A” virus like some of those included in the Nicas/Jones study, could infect half the U.S. population this fall and winter, potentially hospitalizing up to 1.8 million people and causing as many as 90,000 deaths – more than double the number that occur in an average flu season.

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Note to editors: The complete study is available upon request from Lisa Pellegrin/Steve Gibb or may be accessed at <http://www3.interscience.wiley.com/cgi-bin/fulltext/122466317/HTMLSTART>