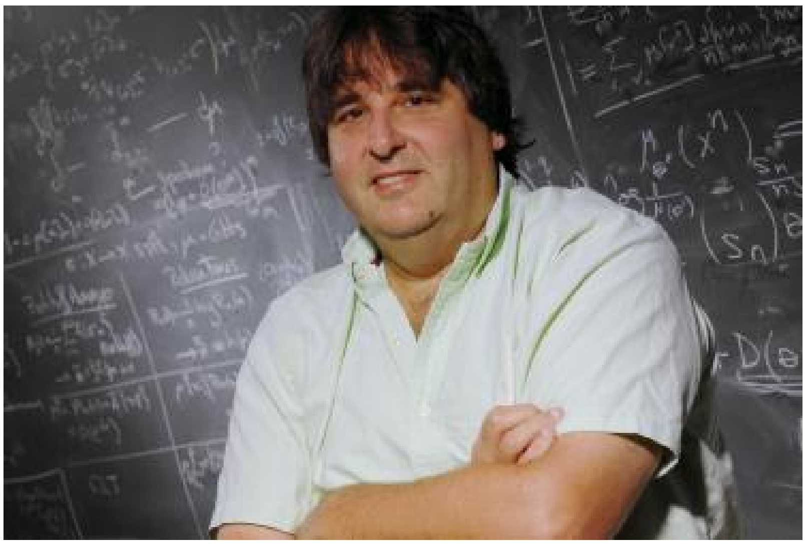
New study offers insight on pandemic flu

April 26 2013, by Karen Templeton



Researchers including Professor Howard Weiss of the Georgia Institute of Technology have modified the most widely used infectious disease model to account for the impacts of news media coverage. (Credit: Gary Meek)

(Medical Xpress)—Pandemic flu continues to threaten public health, especially in the wake of the recent emergence of an H7N9 low pathogenic avian influenza strain in humans. A recent study published in *PLoS ONE*, a peer-reviewed scientific journal, provides new information for public health officials on mitigating the spread of infection from emerging flu viruses. The report brings new insight into the H1NI pandemic of 2009, and may help officials prepare for future pandemics.

Georgia Institute of Technology participated in the research, which was led by Mississippi State University. Marshall University and Universidad Miguel Hernández in Spain also collaborated on the study.

During the 2009 H1N1 pandemic, along with the last three flu pandemics of 1918, 1957, and 1968, the United States experienced multiple peaks, or waves, of infection. Normal seasonal flu outbreaks have only one peak of infection—the number of cases starts very low, increases to a maximum, then decreases to a very low level, and remains at a low level until the next flu season. In this study, the team developed models to explain possible causes of the multiple peaks in pandemic flu, which are largely unknown.

"With the H1N1 pandemic in 2009, we experienced multiple waves of infection," said Henry Wan, associate professor at Mississippi State. "The first wave began in March 2009 and peaked in late June and early July. Then there were fewer cases in August and then a second, larger wave hit in late October and early November. But China only experienced a single wave of infection. So we created infection models and analyzed the outcomes."

The models showed that border control had some small effects on outbreaks.

"In 2009, China instituted strict border controls at the onset of the outbreak," said first author Anna Mummert, assistant professor of mathematics at Marshall University. "We developed models explaining the occurrence of the multiple peaks and tested border control strategies to determine if a strict border control in the United States could reduce the total number of infections."

Four of the models indicated that if that stricter border control is related to fewer waves of infection.

"What was really remarkable was that all of the models showed that strong border control would not have decreased the total number of infections," said Howie Weiss, professor in Georgia Tech's College of Sciences.

The effects of vaccinations were studied in the models, and the authors concluded that the actual H1N1 vaccination distribution schedule played only a small role in curtailing the outbreak. While it has been thought that the timing of school vaccinations played a large role in producing the second wave of infections, the models did not show a strong link, but indicated that an earlier vaccination schedule could have helped.

The research team plans further collaboration in understanding influenza viruses and their spread.

"We are fortunate to have each other's expertise in mathematical modeling and infectious diseases," Wan said. "Our goal is to provide timely information to health organizations and others who work on infectious disease prevention."

More information: dx.plos.org/10.1371/journal.pone.0060343.

Provided by Georgia Institute of Technology