

Study: Vaccination of 70 percent of US population could control swine flu pandemic

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An aggressive vaccination program that first targets children and ultimately reaches 70 percent of the U.S. population would mitigate pandemic influenza H1N1 that is expected this fall, according to computer modeling and analysis of observational studies conducted by researchers at the Vaccine and Infectious Disease Institute (VIDI) at Fred Hutchinson Cancer Research Center.

Published in the Sept. 11 issue of [Science Express](#), the early online edition of the journal Science, the study - which includes the first estimate of the transmissibility of [pandemic](#) H1N1 influenza in schools - recommends that 70 percent of children ages 6 months to 18 years be vaccinated first, as well as members of high-risk groups as identified by the U.S. Centers for Disease Control and Prevention. These groups include health care and emergency services personnel and those at risk for medical complications from pandemic H1N1 illness such as persons with chronic health disorders and compromised immune systems. Two doses of vaccine, delivered three weeks apart, may be needed to confer adequate protection to the virus.

Corresponding author Ira Longini, Ph.D., and colleagues emphasized that a combination of factors - the availability of an effective vaccine to protect people against pandemic H1N1, coupled with the timing of the outbreak - will determine how quickly the epidemic can be slowed. The researchers estimate that to bring the epidemic under control aggressive vaccination of the population must begin at least a month before the epidemic peak, concentrating on children as much as possible.

"Our estimates of pandemic H1N1 in households, schools and in the community places this virus in the higher range of transmissibility," said Yang Yang, Ph.D., first author of the paper and a staff scientist at VIDI.

Although social distancing and the use of antiviral medicines can be partially effective at slowing [pandemic flu](#) spread, vaccination remains the most effective means of pandemic influenza control, the authors conclude. From a cost effectiveness measure, vaccination remains the most effective, while closing schools and other social gathering places is the least cost effective.

Vaccination increases population-level immunity and lowers the effective reproductive number of the virus, which results in two main effects: slowing the spread of infection and reducing the height of the epidemic peak; and reducing the overall illness attack rate, hospitalizations and mortality.

Other key findings in the study:

- The current pattern of pandemic spread is most likely to be similar to the Asian influenza A (H2N2) pandemic of 1957-58. Substantial spread was expected to begin in early September with the epidemic peaking in mid to late October.

"In this case, child-first, phased vaccination would need to start as soon as possible, and no later than mid September to be effective for mitigation," said Longini, a biostatistician in the Center for Statistical and Quantitative Infectious Diseases at the Hutchinson Center. He is also a professor of biostatistics at the University of Washington School of Public Health. Longini said that the current U.S. plan called for the vaccination to probably start in mid October, which could still be effective if the epidemic peaked in November or December as it did

during the Hong Kong influenza A(H3N2) of 1968-69.

- Children will experience the highest illness attack rates based upon epidemiological observations from the U.S. and around the world. In addition, from an outbreak of pandemic H1N1 at a private school in New York last April, the authors estimate that the typical student will infect an average of 2.4 other children in his or her school.

Many findings in this study are based on epidemiological studies and vaccine trials in the past for seasonal influenza vaccines.

"We would hope to be able to estimate the effectiveness of pandemic vaccines and other mitigation measures so that we can understand the control of pandemic H1N1 influenza," said M. Elizabeth Halloran, D.Sc., M.D., a co-author of the study and member of VIDC and professor of biostatistics at the University of Washington School of Public Health.

- The predicted rate of pandemic H1N1 transmissibility - how many people an infected person will infect during influenza's infectious period in the beginning of an outbreak - is estimated to be 1.3 to 1.7. A value of 1.6 means that the epidemic could generate a total of 2.2 billion cases worldwide over a year. That translates to an overall illness attack rate of 32 percent of entire populations of a city or country. A person infected by someone else can expect to fall ill about two days after infection.

More information: "The Transmissibility and Control of [Pandemic Influenza](#) A (H1N1) Virus," *Science*, Sep 11.

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