A new tool for identifying onset of local influenza outbreaks

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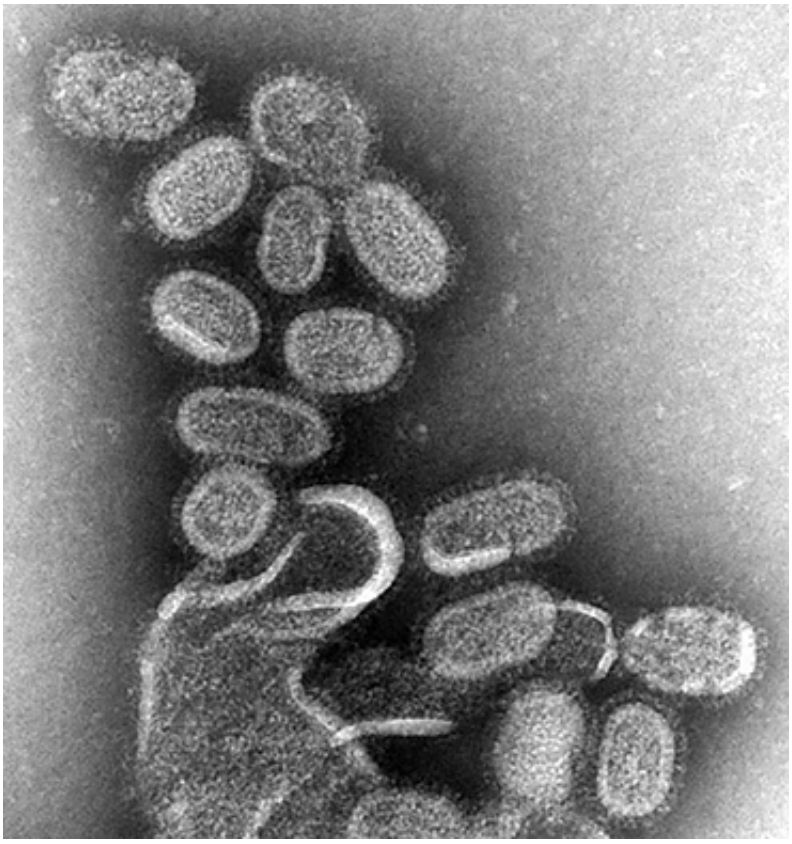

Electron microscopy of influenza virus. Credit: CDC

Predicting the beginning of influenza outbreaks is notoriously difficult, and can affect prevention and control efforts. Now, just in time for flu season, biostatistician Nicholas Reich of the University of Massachusetts Amherst and colleagues at Johns Hopkins have devised a simple yet

accurate method for hospitals and public health departments to determine the onset of elevated influenza activity at the community level.

Hospital epidemiologists and others responsible for public health decisions do not declare the start of flu season lightly, Reich explains. In hospitals, a declaration that flu season has started comes with many extra precautions and procedures such as added gloves, masks and gowns, donning and doffing time, special decontamination procedures, increased surveillance and reduced visitor access, for example.

"There's also healthcare worker fatigue to consider," he adds, "it's a lot to ask of healthcare workers to continue these important preventative measures when they just aren't seeing a lot of flu around their workplace."

"All the extra precautions cost time and money, so you don't want to declare flu season too early. For hospitals, there is a strong incentive to define a really clear period as flu season. It does not start the moment you see the first case in the fall. If you begin the full response too early, you set yourself up for a long slog and too much effort will be spent on too few cases. You want to be as effective and efficient as possible in your preparations and response."

Details of the new open-source, publicly available tool designed by Reich, of the School of Public Health and Health Sciences at UMass Amherst, with Dr. Trish Perl of the Johns Hopkins University School of Medicine and others in Colorado, Florida and New York, appear in the current issue of *Clinical Infectious Diseases*.

The authors say their algorithm, or statistical technique, which they call Above Local Elevated Respiratory Illness Threshold (ALERT), will help to signal that influenza transmission is rising in a given region and will

assist public health officials, researchers, doctors and hospitals with prevention and healthcare delivery.

ALERT should not require doctors, nurses, hospitals, clinics or public health departments to collect any new data, but instead uses routinely collected information such as weekly counts of laboratory-confirmed influenza A cases.

To develop the new metric, Reich and colleagues used years of surveillance data of confirmed flu cases at two large hospitals in Baltimore and Denver. They obtained weekly counts of confirmed influenza A cases at the 200-bed Children's Hospital at Johns Hopkins and the 414-bed Children's Hospital of Colorado from 2001 through 2013.

They used 2001 through 2011 data to create the algorithm, then tested its performance in the 2011-12 and 2012-13 seasons in the two locations. At Johns Hopkins, 71 and 91 percent respectively of all reported cases fell in the ALERT period, while at Colorado Children's the ALERT period captured 77 and 89 percent of all cases, the authors report. Results suggest "that the ALERT algorithm performs well at predicting the beginning and end of a seasonal period of increased influenza incidence," they add.

To use the algorithm, hospital epidemiologists upload as many years of their own institution's historical flu data as possible to the web-based ALERT applet and then "tune the dials" that control the algorithm to customize the results for their purposes, Reich says. "The more years of data you have, the better," he notes. "We have applied it in places with only three to five years of data and it's still been a useful tool, but the more years you have the more accurate it will be."

The ALERT algorithm helps users pick a threshold number of new cases

per week that will signal the start of the season. But as the authors point out, choosing the right threshold poses a challenge. "To guide the user to an evidence-based decision, the ALERT algorithm summarizes data from previous years as if each of several thresholds had been applied." For each threshold, it calculates and reports a set of summary metrics, from which the user can select one that meets their local needs.

Based on local historical data inputs, the tool defines a time window or "ALERT period" when elevated incidence is estimated to occur.

Reich explains, "People will look at the output from ALERT and do a cost-benefit analysis. We don't try to do this for them, but the algorithm can help you to estimate the threshold at which you should start to think about declaring that flu season has started. And, very importantly, your staff can have a sense that it will not go on forever, but that for the next 11 or 12 weeks, for example, you'll be taking the extra precautions."

Provided by University of Massachusetts Amherst