Cell phones help track of flu on campus

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Credit: Peter Griffin/Public Domain

New methods for analyzing personal health and lifestyle data captured through wearable devices or smartphone apps can help identify college students at risk of catching the flu, say researchers at Duke University and the University of North Carolina-Chapel Hill.

With help from a mobile app that monitors who students interact with and when, epidemiologist Allison Aiello of UNC and statistician Katherine Heller of Duke have developed a model that enables them to

predict the spread of influenza from one person to the next over time.

Unlike most infection models, which focus on population-level changes in the proportion of people likely to get sick, this approach gives a personalized daily forecast for each patient, Heller said.

In theory, doctors could use such data to identify and alert at-risk students before they get sick or start to feel symptoms, or to encourage them to stay at home to avoid infecting other students.

The researchers presented their findings Aug. 12 at the 21st International Conference on Knowledge Discovery and Data Mining in Sydney, Australia.

Although this year's flu season won't reach its peak until the winter, it starts to ramp up as early as October, and college campuses nationwide are getting ready. Close living quarters, low flu vaccination rates and busy social calendars make college students particularly prone to catching the virus.

Of the nation's 18 million undergraduates, more than one in five are likely to get the flu this year. That could mean up to two weeks of fever, chills, muscle aches, scratchy throat, runny stuffy nose, congestion and sneezing, not to mention missed classes and extracurriculars.

To test the model, the researchers applied it to a study of roughly 100 students at the University of Michigan.

For 10 weeks during the 2013 flu season, the students carried Google Android smartphones with built-in software, iEpi, that used Wi-Fi, Bluetooth and GPS technology to monitor where they went and who they came in contact with from moment to moment.

The students also recorded their symptoms every week online. Students who reported coughing and fever, chills or aches provided throat swabs to determine whether they had a cold or the flu.

The model then returned the odds that each student would spread or contract the flu on a given day, and identified the personal health habits—such as hand-washing or getting a flu shot—that might help them beat the odds or hasten their recovery.

Not surprisingly, when a student got sick, his or her friends were more likely to get sick too.

The researchers also found that students who smoked or drank took longer to recover.

"We didn't have this kind of personalized health data until a few years ago," Heller said. "But now, smartphones and wearable health and fitness devices allow us to collect information like a person's heart rate, blood pressure, social interactions and activity levels with much more regularity and more accurately than was possible before. You can keep a continuous logbook."

"We want to leverage that data to predict what people's individual risk factors are, and give them advice to help them reduce their chances of getting sick," Heller said.

 More information: "Hierarchical Graph-Coupled HMMs for

Heterogeneous Personalized Health Data," K. Fan, M. Eisenberg, A. Walsh, K. Heller and A. Aiello. Proceedings of the 21th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, August 2015. DOI: 10.1145/2783258.2783326

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