

Think locally when treating individually

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By taking local biosurveillance data into account when assessing patients for communicable diseases, doctors may be able to make better diagnostic decisions, according to researchers at Children's Hospital Boston. For instance, in the case of strep throat, awareness of local epidemiology at the time of diagnosis could help more than 166,000 people avoid unnecessary antibiotic treatment in the United States every year and catch more than 62,000 missed cases.

A research team led by Andrew Fine and Kenneth Mandl of the Children's Hospital Informatics Program (CHIP) and Department of Emergency Medicine reported these findings on September 20 in the [Annals of Internal Medicine](#).

A person's risk of becoming infected with an infectious disease relies on the disease's local incidence: that is, how many people in a given area are infected with it in a given time period. However, doctors seeing individual patients rarely have access to the real-time, population-level biosurveillance data that would give them this kind of awareness. Even if they do, there are few recognized methods for formally and quantitatively incorporating such information into the clinical decision making process.

"There is a disconnect between the clinical and public health points of view that needs to be addressed if we are to improve the ways we diagnose [communicable diseases](#) clinically," said Mandl, who leads CHIP's Intelligent Health Laboratory. "We wanted to see whether it is feasible to use real time biosurveillance data to influence patient care."

To do so, Fine and Mandl looked to strep throat (or group A streptococcal pharyngitis), a common bacterial infection. Doctors often base the decision to test an individual for strep throat on a symptom scale called the Centor score, which, while recommended by the American College of Physicians and the U.S. [Centers for Disease Control and Prevention](#) (CDC), is not perfect. "Even with evidence-based tools, group A strep is still frequently misdiagnosed," said Fine. "We see a lot of overtreatment with antibiotics, which contributes to the rise of antibiotic resistance. At the same time, a false negative diagnosis can lead to missed days of work or school and increased risk of medical complications and local transmission."

Using data on 82,062 patient visits for strep throat provided by MinuteClinic, CVS Caremark's retail health clinic business, in nine markets across six states, the researchers modeled the accuracy of Centor scores alone versus scores adjusted using a biosurveillance statistic of their own design called recent local proportion positive (RLPP) to account for strep throat incidence in those markets. RLPP relates the number of patients positive for a disease in a particular area to the number tested in that area over a certain time period, in this case a 14-day window.

"It would make sense that if group A strep is present in a population, a patient going to the doctor at that time for a sore throat would be more likely to actually have strep throat," Mandl explained. "That was our baseline assumption."

The analysis revealed that an awareness of local incidence could significantly impact a patient's chance of having strep throat and, as a result, diagnosis and treatment. Extrapolating to the 10.5 million patient visits for strep throat that occur in the U.S. every year, Fine and Mandl estimated that an additional 166,616 patients could be spared unnecessary antibiotic treatment, while 62,537 previously missed

patients would be correctly diagnosed as positive.

Andrew Sussman, M.D., President, MinuteClinic and Senior Vice President/Associate Chief Medical Officer, CVS Caremark, said, "sharing de-identified summary information about our patient's illnesses with health care leaders is one way we work within the health care system to improve the quality of care. We were pleased to participate in this important study with researchers from Children's Hospital Boston recommending ways to improve how all providers may test and diagnose for illnesses like strep throat in the future. The work demonstrates how our clinics collaborate with other health care providers to improve individual patient care by accessing aggregate patient data and integrating efforts."

The strep throat results add to the growing body of literature supporting the case to incorporate biosurveillance into the diagnostic process. Previously, Mandl and Fine found that accounting for local incidence increases diagnostic accuracy for meningitis, pertussis, and Lyme disease. They also demonstrated that epidemiologic context is actually a better predictor of whether an infant has pertussis than the presence or absence of any disease symptom except for cyanosis.

"We're creating a blueprint for feeding population-level data into the clinic that we hope will help bring tighter integration between public health surveillance and clinical care," said Mandl. "Over time, the broad adoption of tools like electronic medical records will make it much easier to gather this kind of epidemiologic information and disseminate it to clinicians as a way of supplementing their diagnostic toolkit."

Provided by Children's Hospital Boston

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