# Local Prevalence Is Key for Rapid Flu Test Use

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Rapid influenza antigen detection tests are helpful during the peak of an epidemic but are of limited use when prevalence is less than 10%, Dr. Carlos G. Grijalva and associates reported.

"Unfortunately, the prevalence of influenza among children presenting with fever or respiratory symptoms is usually not known at the time of testing; therefore it is often difficult to derive appropriate interpretations of rapid-test results," the authors wrote (Pediatrics 2007;119:6-11).

Using data collected by the New Vaccine Surveillance Network in three U.S. counties over 4 consecutive years, the investigators compared provider-ordered rapid influenza test results with viral culture and reverse-transcription polymerase chain reaction (RT-PCR) results obtained from children older than 5 years who were hospitalized with respiratory symptoms or fever from October 2000 through September 2004. Outpatient surveillance data, also collected by the network, was used to estimate the weekly prevalence of influenza.

**When influenza prevalence was 5%, the positive predictive value of the rapid tests was about 50%; at the peak prevalence of 21%, the PPV was 85%.**

Several types of rapid influenza tests, with relatively similar reported sensitivities and specificities, were used, including Directigen A+B, Directigen A, Quick Vue A/B, and NOW Flu A/B.

Overall, 2,797 children were hospitalized during the 4 consecutive years of inpatient surveillance, and influenza infection was confirmed in 160 (6%). Only 270 of the 2,797 (10%) children had a rapid flu test ordered by the treating physician.

Of 41 children with influenza detected by standard methods, 26 were influenza-positive by a rapid test (sensitivity 63%). Among 229 children who tested negative for influenza by standard methods, 223 had a negative rapid-test result (specificity 97%), Dr. Grijalva of the Department of Preventive Medicine, Vanderbilt University School of Medicine, Nashville, Tenn., reported.

Then the investigators used the sensitivity and specificity of rapid tests from the inpatient surveillance and the weekly prevalence of influenza in outpatient settings to determine times when the rapid tests were most predictive of influenza.

During the 2002-2003 flu season, the weekly prevalence of influenza virus infection peaked at 21% (range 0%-21%) in the 767 children tested in the outpatient setting. In contrast, the weekly prevalence of influenza peaked at about 60% and remained above 30% for 5 consecutive weeks among 975 children tested during the 2003-2004 flu season.

At the beginning of the mild 2002-2003 season, when the prevalence of influenza was 5%, the predictive value of the rapid tests was about 50%, meaning that a positive result was equally likely to represent a true influenza infection or a false-positive result. But, a negative rapid-test result represented a true negative about 98% of the time.

At the peak prevalence of 21%, the positive predictive value (PPV) was 85%. Throughout the entire season, the PPV of the rapid tests was 70% or greater for only 4 weeks, the authors wrote.

During the moderately severe 2003-2004 season, nearly 97% of positive rapid tests were true positives. In contrast, about 37% of children with a negative rapid-test result were false negatives. During the 7 weeks when the influenza prevalence was 15% or more, the PPV of the rapid tests was 80% or higher.

"As our study shows, the knowledge of influenza circulation in the community is fundamental for the interpretation of rapid influenza test results," wrote the authors, whose work was funded by a Centers for Disease Control and Prevention New Vaccine Surveillance Network cooperative agreement. Co-author Dr Katherine A. Poehling of the Department of Pediatrics, Vanderbilt University School of Medicine, received support from the Robert Wood Johnson Foundation Generalist Physician Faculty Scholar Program and from a K23 grant from the National Institutes of Health and the National Institute of Allergy and Infectious Diseases. ■