

# Flu-Related Neurologic Complications: Risk Factors

BY DENISE NAPOLI  
Assistant Editor

Age between 2 and 4 years and the existence of an underlying neurologic or neuromuscular disease are independent risk factors for influenza-related neurologic complications in children, Dr. Jason G. Newland and his colleagues reported.

In a retrospective cohort study conducted from June 2000 to May 2004, Dr. Newland, then of the Children's Hospital of Philadelphia, and his colleagues analyzed 842 patients aged 1 week to 21 years with laboratory-confirmed influenza. Of these, 72 patients experienced an influenza-related neurologic complication, including seizures (56), encephalopathy (8), postinfectious encephalopathy (2), stroke secondary to hypotension (4), and aseptic meningitis (2).

In the study based on an analysis of nine contiguous zip codes surrounding the hospital, the investigators also concluded that the incidence of influenza-related neurologic complications is approximately 4 cases per 100,000 child-years in the United States (*J. Pediatr.* 2007;150:306-10).

Dr. Newland, now of Children's Mercy Hospital in Kansas City, Mo., and his colleagues used logistic regression to determine that being an age between 6 months and 4 years put patients at elevated risk for developing neurologic complications, with the greatest risk

occurring between 2 and 4 years—with an odds ratio of 10.

In addition, compared with patients who did not have a history of a neurologic or neuromuscular disease (NNMD), children who had such a history (including febrile seizures, an incident of encephalopathy, or developmental delay) also were more likely to have a seizure or other complication during influenza infection, with an odds ratio of 6.6. Although not previously reported in association with influenza, this is not entirely unexpected because patients with an NNMD—especially those with a history of seizures—are likely to have seizures during an acute illness, the investigators said.

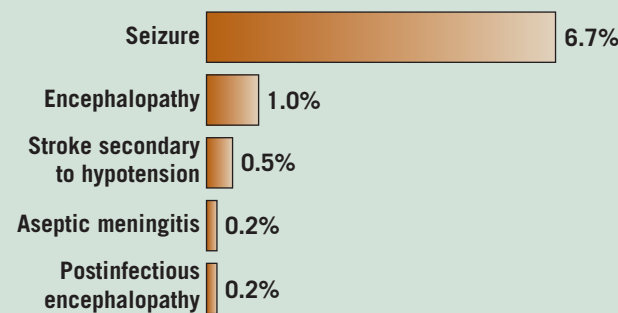
Neither influenza type nor season put patients at any increased risk for neurologic complications.

Dr. Newland and his associates' findings are in contrast to reports from Japanese investigators during the past decade about severe and frequent influenza encephalopathy—including fatal encephalopathy rates reported as high as 25%-37%—in that country. Only 1% of patients in this study were hospitalized with influenza, and no deaths were reported in the U.S. investigation.

Limitations of this study included the fact that the areas surrounding the hospital represent a predominantly African American population, "and so our findings may not be generalizable to the rest

of the country." Another is that, because influenza testing is typically performed only on patients with cough and rhinorrhea, infected patients who did not present this way may not have been diagnosed and, therefore, tallied. Also, "the definition of acute encephalopathy is somewhat arbitrary and may both under- and overidentify patients with the acute onset of neurologic symptoms," they wrote. ■

## Seizure Is the Most Frequent Flu-Related Neurologic Complication



Note: Based on a study of 842 patients aged 1 week to 21 years with laboratory-confirmed influenza.  
Source: *J. Pediatr.* 2007;150:306-10

ELSEVIER GLOBAL MEDICAL NEWS

## Full Vaccination Wards Off Influenza in Young Children

BY KERRI WACHTER  
Senior Writer

Full immunization in children aged 6-59 months and partial immunization in children aged 24-59 months provide significant protection from influenza, even when the match between vaccine and circulating strains is suboptimal, Carrie M. Shuler, D.V.M., an epidemiologist with the Georgia Division of Public Health, and her colleagues reported.

However, children aged 6-23 months with partial vaccination had no benefit in terms of influenza protection, the authors wrote (*Pediatrics* 2007;119:587-95).

The researchers evaluated the effectiveness of the trivalent inactivated influenza vaccine at a private pediatric practice in Atlanta during the 2003-2004 influenza season.

During that season, only one-quarter of circulating influenza viruses nationally and in Georgia were similar antigenically to the vaccine strain.

Case patients (290) were identified as having laboratory-confirmed influenza between Nov. 1, 2003, and Jan. 31, 2004. Case patients were randomly matched with two control children based on age.

Children who had received two doses of the vaccine at least 1 month apart and at least 14 days before the date of symptom onset (the anchor date for the case child and matched control children) were considered fully vaccinated.

Children who were vaccinated during a previous season needed only one dose during the 2003-2004 season that was administered at least 14 days before the anchor date to be considered fully vac-

nated. In all, 322 children were considered fully vaccinated.

A child was considered partially vaccinated if he had not been vaccinated in a previous season and had received two doses of vaccine since September 2003, with an anchor date less than 14 days after the second dose. A child also was considered partially vaccinated if she had not been vaccinated in a previous season and had received only one dose since September 2003 and was vaccinated at least 14 days prior to the anchor date. In all, 103 children were considered partially vaccinated.

Children who received no doses during the 2003-2004 season on or before the anchor date and children who had received one dose since September 2003 that was administered less than 14 days prior to the anchor date were considered unvaccinated. In all, 445 children were considered unvaccinated.

Fully vaccinated children aged 6-23 months had a significant reduction (52%) in influenza, compared with unvaccinated children.

Likewise, fully vaccinated children aged 24-59 months had a significant reduction (45%) in influenza, compared with unvaccinated children.

Partially vaccinated children aged 24-59 months also had a significant reduction (65%) in influenza, compared with unvaccinated children. However, partially vaccinated children aged 6-23 months did not have a significant reduction in influenza, compared with unvaccinated children who were not vaccinated the previous season (adjusted odds ratio 1.70). ■

## Under a Third of Asthmatic Kids Got a Flu Vaccine in 2004-2005

BY DIANA MAHONEY  
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Less than one-third of children with asthma between the ages of 2 and 17 years received the influenza vaccine during the 2004-2005 influenza season, according to the first national estimate of influenza vaccine coverage in children with asthma by the Centers for Disease Control and Prevention.

While this rate is approximately three times higher than that reported for nonasthmatic children, the "inadequate" numbers indicate "that opportunities for vaccination during health-care provider visits likely are being missed," according to Susan M. Brim of the CDC's National Center for Environmental Health and her colleagues (*MMWR* 2007;56:193-6).

With data from the 2005 National Health Interview Survey (NHIS)—a cross-sectional, household interview survey in the United States—the CDC investigators analyzed influenza vaccine coverage rates for the 5,124 youth aged 2-17 years represented in the database and determined that 29% of children with current asthma had received the influenza vaccine for the September 2004-February 2005 influenza season, compared with 10.3% of their nonasthmatic peers.

Of the children with current asthma, vaccine coverage was highest—at 32.9%—in the 2- to 4-year-old age group, compared with 28% in both the 5- to 12-year-old and 13- to 17-year-old age categories. Children who had experienced an asthma attack or episode within the 12 months prior to the survey (35.9% of those with asthma) were more likely to have been vaccinated than

children with current asthma but no past-year history of an asthmatic episode (20%). Children aged 5-12 years with current asthma and no past year history of an asthmatic episode had the lowest vaccination coverage rate, at 16.4%, in the asthma group, the authors reported.

When the data were analyzed based on the number of health care visits per child during the 12 months preceding the survey, influenza vaccine coverage among children with asthma was directly related to the number of visits. "Approximately 10.8% of children with current asthma who had one health-care visit in the preceding year were vaccinated, whereas 42.0% of children with [10 or more] visits were vaccinated," Ms. Brim and her associates wrote.

Because the 2005 NHIS was the first to include questions on influenza vaccination in the child portion of the survey, "the results of this analysis cannot be compared with previous years," according to the authors. "Analysis of NHIS data from 2006 and future years will allow determination of trends in national influenza vaccination coverage in children with asthma."

Such monitoring is essential for the design of public health strategies for increasing influenza vaccination coverage that targets all children with asthma, particularly those with the lowest coverage rates, the authors stressed. Continued monitoring also will be necessary to determine whether and to what extent changes, such as the 2006 revision to Advisory Committee on Immunization Practices (ACIP) influenza vaccination recommendations to include all children between the ages of 6 and 59 months, will impact actual coverage rates, they noted. ■