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Update: Influenza-Associated Deaths Reported Among Children Aged <18 Years — United States, 2003–04 Influenza Season

Since October, 42 influenza-associated deaths among children aged <18 years have been reported to CDC. All patients had influenza virus infection detected by rapid antigen testing or other laboratory testing methods. This report describes preliminary findings based on data provided from multiple states, as of December 17, 2003. To improve surveillance, CDC has requested that all influenza-associated deaths of children aged <18 years be reported to CDC through state health departments.

Among the 42 reported deaths, 20 (48%) patients were male, and 21 (50%) were female; the sex of one patient was not reported. Twenty-three (55%) of the children were aged <5 years, and 13 (31%) were aged 6–23 months (Table 1). The median age was 4 years (range: 9 weeks–17 years). Seventeen (40%) of the children had underlying chronic medical conditions (Table 2); the previous medical status for four (10%) children was unknown. Among the 21 patients who had no underlying chronic medical condition, five had invasive bacterial co-infections, including three caused by methicillin-resistant *Staphylococcus aureus* (MRSA), one by *Streptococcus pneumoniae*, and one by Group A streptococcus. Three children with underlying chronic medical conditions had invasive bacterial co-infections, including one caused by MRSA, one caused by *Streptococcus pneumoniae*, and one caused by *Neisseria menigitidis*.

Influenza vaccination status was available for only seven patients; five (aged 1 year, 14 months, 20 months, 3 years, and 8 years) were not vaccinated; two (aged 21 months and 5 years) received 1 dose of influenza vaccine; however, their previous vaccination history was unknown. Influenza A viruses were isolated from 11 (26%) patients; 29 (69%) infections were detected by rapid diagnostic testing or by direct fluorescent antibody testing of respiratory specimens. In two (5%) patients, evidence of influenza A virus infection was solely by immunohistochemical staining (IHC) of postmortem tissue specimens at CDC (Figure). Five cases that were positive by rapid antigen testing of respiratory specimens also were tested by IHC; all five also had influenza A viral antigens detected in bronchial epithelium tissues obtained at autopsy. CDC continues to work with state health departments to collect additional information on all cases.

TABLE 1. Age distribution of 42 influenza-associated deaths reported among children aged <18 years — United States, 2003–04 influenza season*

Age	No.	(%)
<6 mos	1	(2)
6–23 mos	13	(31)
2– 4 yrs	9	(21)
5–11 yrs	9	(21)
12–17 yrs	10	(24)

* Preliminary data as of December 17, 2003.

TABLE 2. Underlying chronic medical conditions reported in 17 influenza-associated deaths among children, aged <18 years — United States, 2003–04 influenza season*

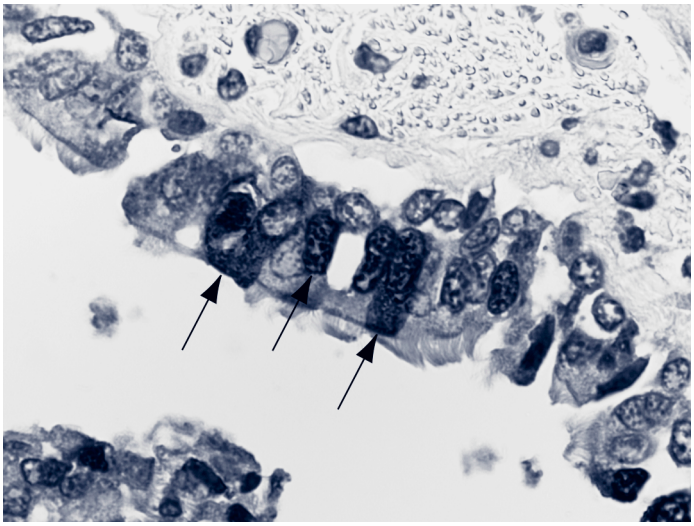
Underlying chronic medical condition	No. children affected†
Autoimmune disorder (i.e., SLE§)	1
Cerebral palsy	2
Chromosomal abnormality	1
Endocrine disorder (i.e., hypothyroidism)	1
Genetic disorder (i.e., Huntington's disease)	1
GI¶ disorder (i.e., gastroesophageal reflux disease or biliary atresia)	2
Developmental delay	2
Mental retardation	2
Pulmonary disease (i.e., asthma or reactive airway disease)	3
Organ transplant (i.e., heart)	1
Seizure disorder (e.g., epilepsy)	3
Others (e.g., Pierre Robin syndrome and Cornelia de Lange syndrome)	2

* Preliminary data as of December 17, 2003.
† Certain children had more than one condition.
§ Systemic lupus erythematosus.
¶ Gastrointestinal.

Reported by: *State and local health departments. Influenza Response Team, J Wright, DVM, A Likos, MD, N Bhat, MD, EIS officers, CDC.*

Editorial Note: Influenza-associated deaths are not reportable conditions in the United States, and the average annual

FIGURE. Influenza A viral antigens (dark areas indicated by arrows) demonstrated by immunohistochemical staining, in ciliated bronchial epithelial cells from a deceased child with influenza A virus infection



Photo/CDC

number of such deaths is unknown. However, cases of sudden death associated with influenza in previously healthy children in the United States have been reported (*1*; CDC, unpublished data, 2003). During 1990–1999, approximately 92 influenza-associated respiratory and circulatory deaths were estimated to have occurred annually among children aged <5 years (*2*). However, this estimate was based on mathematical modeling and not on counting fatalities associated with laboratory-confirmed influenza virus infection.

Among the 42 reported cases, laboratory-confirmed influenza virus infection was found in all of the children. Influenza can be confirmed by various methods, including commercially available rapid tests, viral culture, direct fluorescent antibody, reverse transcriptase polymerase chain reaction, IHC of tissues collected during autopsy (*3*), and paired serology.

CDC Request for Reports of Influenza-Associated Deaths Among Children

During the 2003–04 influenza season, CDC is requesting that all influenza-associated deaths among children aged <18 years be reported to CDC through state health departments. In addition, CDC is requesting submission of postmortem tissue specimens and autopsy reports where available. Influenza viral isolates in fatal cases also should be sent to CDC for antigenic characterization.

To report the influenza-associated death of a child aged <18 years, state health departments should contact CDC's Influenza Branch, telephone, 800-232-4636; e-mail, eocinfluenza@cdc.gov. Case-reporting and specimen-collection forms will be made available to state health departments and medical examiners via the *Epidemic Information Exchange,* available at http://www.cdc.gov/mmwr/epix/epix.html. When completed, the forms should be sent with a cover sheet headed ATTN: Fatal Case Reporting to CDC via fax, 888-232-1322.

References

1. CDC. Severe morbidity and mortality associated with influenza in children and young adults—Michigan, 2003. MMWR 2003;52:837–40.
2. Thompson W, Shay D, Weintraub E, et al. Mortality associated with influenza and respiratory syncytial virus in the United States. JAMA 2003;289:179–86.
3. Guarner J, Shieh WJ, Dawson J, et al. Immunohistochemical and in situ hybridization studies of influenza A virus infection in human lungs. Am J Clin Path 2000;114:227–33.