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Neurologic complications of influenza in pediatric patients

The Massachusetts Department of Public Health (MDPH) is investigating reports of pediatric patients experiencing neurologic complications associated with influenza virus infection. Influenza in children typically presents with abrupt onset of fever, nonproductive cough, malaise and myalgia. Other common symptoms include sore throat, nausea, and nasal congestion. Although influenza is usually an acute, self-limited, and uncomplicated illness in healthy children, it can be associated with serious complications in some children, including nervous system complications. Neurologic complications associated with influenza in the pediatric population are heterogeneous. The most common influenza associated neurologic complication is seizure, followed by encephalopathy or encephalitis. Less common complications include acute necrotizing encephalopathy (ANE), meningitis, myelitis and secondary bacterial meningitis or brain abscess. Prior studies have suggested that children with pre-existing neurological disorders and children who are unvaccinated against flu have a higher risk of neurologic complications of influenza.^{1,2} However, although children with chronic neurological conditions are particularly vulnerable to influenza complicated by neurologic symptoms, most children with neurologic complications of influenza do not have chronic conditions. Hospital length of stay, rate of ICU admission and death are greater in children with neurologic complications of influenza compared with those without these complications.³ Unfortunately, surviving children with the severest forms of neurologic complications (ANE) are likely to have substantial persistent health impacts.

Recently, Massachusetts clinicians treating children have observed a possible increase in the number of cases of children with influenza with neurologic complications compared to prior seasons. Similar possible increases have been observed in other jurisdictions throughout the US. At this time, it is not clear why increased cases of neurological complications associated with influenza are being observed this season. One possible explanation is that we are experiencing a relatively high rate of influenza, yielding higher than typical number of cases with complications. Other possible reasons include that the circulating influenza type(s) confer higher risk or that the affected population has a higher risk than before. In response to concern about influenza with neurologic involvement in children, MDPH is making several recommendations.

Clinical and diagnostic considerations:

- Please be reminded that influenza is one of several viral and bacterial infections that can cause neurological signs and symptoms in children.
- Include influenza infection in the differential diagnosis of a child presenting with influenza-like illness followed by acute, new onset neurologic symptoms not explained by an existing neurological condition. Clinical presentations may be consistent with encephalopathy, encephalitis, cerebral edema and meningitis. Symptoms can include new onset seizures, mental status changes, new onset ataxia, catatonia, mutism and severe lethargy. Include testing for influenza in the medical evaluation of these patients.
- Consider urgent neurology and infectious diseases consultation and neurologic imaging for patients presenting with new neurologic symptoms and recent influenza like illness and/or positive influenza testing.
- Assure that all children 6 months of age and older are vaccinated against influenza each season. Influenza vaccination may be protective against neurologic and other complications associated with influenza. Children who have not already received a flu vaccine this season, should get one.

Reporting of cases:

- Please promptly report patients ≤ 21 years of age with new onset neurological symptoms and positive influenza testing within 10 days of symptom onset to MDPH. Please report both current cases and all prior cases occurring since October 1, 2024. Epidemiologists will request information about each patient addressing pre-existing health conditions, onset date and symptoms, laboratory results and the results of any imaging studies. Please call 617-983-6800 24/7 to report.
- Please submit influenza specimens from these patients to the Massachusetts State Public Health Laboratory (SPHL). When sending the clinical specimens to SPHL, please follow the collection and shipping instructions, "Specimen Collection for Respiratory Virus Testing Instructions." Specimens must be accompanied by a completed "Respiratory Surveillance Specimen Submission form." Both documents can be found on the MA SPHL website: <https://www.mass.gov/lists/state-public-health-laboratory-specimen-submission-forms>.
- Please call MDPH (24/7) 617-983-6800 with any questions.

References

1. Donnelley E, Teutsch S, Zurynski Y, Nunez C, Khandaker G, Lester-Smith D, Festa M, Booy R, Elliott EJ, Britton PN. Contributors to the Australian Paediatric Surveillance Unit, Severe Influenza-Associated Neurological Disease in Australian Children: Seasonal Population-Based Surveillance 2008-2018. J Pediatric Infect Dis Soc. 2022;11(12):533.

2. Frankl S, Coffin SE, Harrison JB, Swami SK, McGuire JL. Influenza-Associated Neurologic Complications in Hospitalized Children. *J Pediatr.* 2021;239:24.
3. Antoon JW, Hall M, Herndon A, Johnson DP, Brown CM, Browning WL, Florin TA, Howard LM, Grijalva CG, Williams DJ. Prevalence, Risk Factors, and Outcomes of Influenza-Associated Neurologic Complications in Children. *J Pediatr.* 2021;239:32.