
Early Lessons from the H1N1 Pandemic: Critical Illness in Children Unpredictable but Survivable

These and other findings were published online on Dec. 31 in the journal *Pediatric Critical Care Medicine*, in what is believed to be the first published analysis of critical H1N1 illness in children.

The Johns Hopkins analysis shows that 12 out of the 13 very ill children had underlying medical conditions that made them more vulnerable, including sickle cell disease, asthma and HIV. Complications varied from temporary kidney failure to acute respiratory distress syndrome, dangerously low oxygen levels and dangerously low blood pressure.

An important finding was that rapid screening tests were initially negative in eight out of the 13 children, underscoring the need for more sensitive tests.

Therefore, researchers say, all critically ill children with flu-like symptoms regardless of test results should be treated preemptively with antiviral medications. Past research has shown that antiviral medications are most effective in healthy people with the flu if taken within 12 to 48 hours after symptoms begin. Johns Hopkins currently treats all hospitalized patients with unexplained fever and flu-like symptoms regardless of test results.

"Our most surprising, and perhaps most important finding, is that the H1N1 virus behaves unpredictably and variably from one patient to the other and even within the same patient from day to day, so we must be on our toes and react fast by adjusting therapy," says lead investigator Justin Lockman, a pediatric critical-care specialist at Johns Hopkins Children's.

Investigators caution that more and larger studies are needed to guide future practice and recommendations for H1N1 treatment in children.

"Our analysis did reveal some interesting patterns and trends, but it also showed us how much more we have to learn about the behavior of this new and intriguing virus," says senior investigator David Nichols, M.D., professor of anesthesiology/critical care and pediatrics at the Johns Hopkins School of Medicine.

The Hopkins team analyzed data from 140 pediatric patients diagnosed with H1N1 between June 2009 and August 2009, of whom 13 went on to develop critical illness and were admitted to the pediatric intensive care unit (PICU) at Hopkins Children's. The novel flu strain, originally called swine flu, emerged for the first time in April 2009.

Other findings reported in the article include:

Asthma was the most common underlying chronic condition (11 of the 13 children had it), followed by neuromuscular diseases like cerebral palsy.

Nearly half of the children became so sick they needed a ventilator to help them breathe. However, no children died or required ECMO (extra-corporeal membrane oxygenation), a last-resort critical-care device that takes over the patient's lungs and heart to oxygenate and circulate the blood when the patient's organs can no longer do so.

One-fourth of the children developed dangerous secondary bacterial infections, more often than previously believed, which points to the need for watchful monitoring for such infections in children with H1N1.

Co-investigators include William Fischer, M.D.; Trish Perl, M.D., M.Sc.; and Alexandra Valsamakis, M.D. Ph.D.; all of Hopkins.

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