Largest study of its kind documents causes of childhood community-acquired pneumonia

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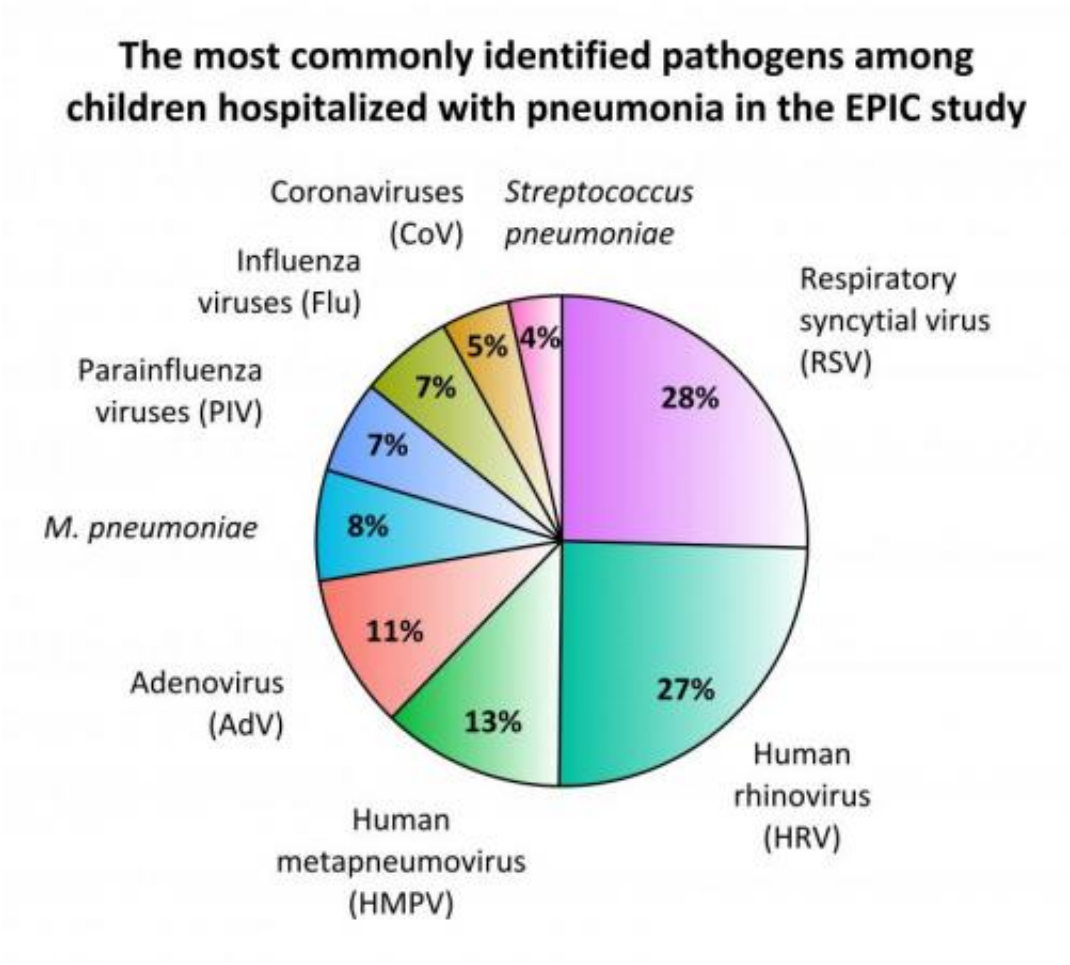

To investigate causes of childhood community-acquired pneumonia -- the leading cause of hospitalizations in US children -- University of Utah Health Sciences collaborated with the Centers for Disease Control and Prevention on the largest study of its kind, the Etiology of Pneumonia in the Community. The results, which document over a dozen causative pathogens, were published in *The New England Journal of Medicine*. Credit: Chris Stockmann

With the chill of winter comes a spike in community-acquired pneumonia (CAP), which spreads more easily as people retreat indoors and come into close contact. The lung infection triggers persistent coughing, chest pain, fever, and difficulty breathing, and is particularly hard on the very young and the very old. In fact, pneumonia is the leading cause of hospitalization among U.S. children, with estimated medical costs of $1 billion annually.

To investigate the specific causes and prevalence of childhood CAP, the Centers for Disease Control and Prevention (CDC) led the Etiology of Pneumonia in the Community (EPIC) study in collaboration with institutions including University of Utah Health Sciences. They report that among children diagnosed with pneumonia, viral infections were much more common than bacterial infections (73 vs. 15 percent), and respiratory syncytial virus (RSV) was the most commonly detected pathogen. The results, which could inform improved strategies for prevention and treatment, were published in *The New England Journal of Medicine*.

"Over the last three decades, introduction of Haemophilus influenzae type b and pneumococcal conjugate vaccines has significantly lowered the incidence of bacterial pneumonia in children," says co-investigator Andrew Pavia, M.D., chief of the division of pediatric infectious diseases at University of Utah School of Medicine. "Our results are consistent with previous findings, and support continuing immunization efforts to maintain the reduction in bacterial pneumonia.

"It's also important to understand how causes of pneumonia have changed so we can better approach the illness, which still leads to high rates of hospitalization among children."

To address this need, 2,638 children with pneumonia symptoms were enrolled in the study between July 2010 and June 2012 at three hospitals: Primary Children's Hospital in Salt Lake City, Le Bonheur Children's Hospital in Memphis, and Monroe Carell Jr. Children's Hospital in Nashville. Of the 2,222 whose chest X-rays confirmed the diagnosis, their body fluid samples were assayed for bacterial and viral pathogens. Children with recent hospitalization or severe immunosuppression were excluded.

More than a dozen bacterial and viral pathogens were found in children of all ages, 21 percent of whom required intensive care. RSV was found the most frequently, and was more common in children under age 5 than in older children (37 vs. 8 percent), as was adenovirus (15 vs. 3 percent) and human metapneumovirus (15 vs. 8 percent). In children between ages 5 and 18, the most common pathogen was the bacteria Mycoplasma pneumonia, which was detected more frequently than in younger children (19 vs. 3 percent). Half of the children hospitalized with pneumonia were age 2 or younger, demonstrating that the very youngest carry the largest burden.

"The results help define the role of viruses as major players in pediatric pneumonia and shows a need for new therapies that can reduce the severity of viral pneumonia," says Chris Stockmann, co-investigator and senior research analyst at the University of Utah.

The second most commonly detected pathogen among children with pneumonia was rhinovirus, the predominant cause of the common cold. Interestingly, the pathogen was also found in a large percentage of matched "controls" who had no symptoms (22 percent with pneumonia vs. 17 percent without). One interpretation is that rhinovirus infections do not commonly lead to pneumonia. Another is that some types of rhinoviruses cause a runny nose while others cause severe pneumonia that leads to hospitalization.

Pavia cautions that because samples came from just three hospitals, reported trends may not accurately reflect the U.S. population. Further, rates of bacterial infection may be underrepresented since bacterial diagnostic tests are less sensitive than those for viruses. The latter may partially explain why no pathogens were detected in 19 percent of children diagnosed with pneumonia.

"The study raises a lot of questions but also provides a lot of answers," says Pavia. "To continue to lower the incidence of pneumonia, we need to find ways to prevent viral causes. We also need to develop better diagnostic tests so that we can accurately target treatment and avoid antibiotic overuse, and speed recovery."

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