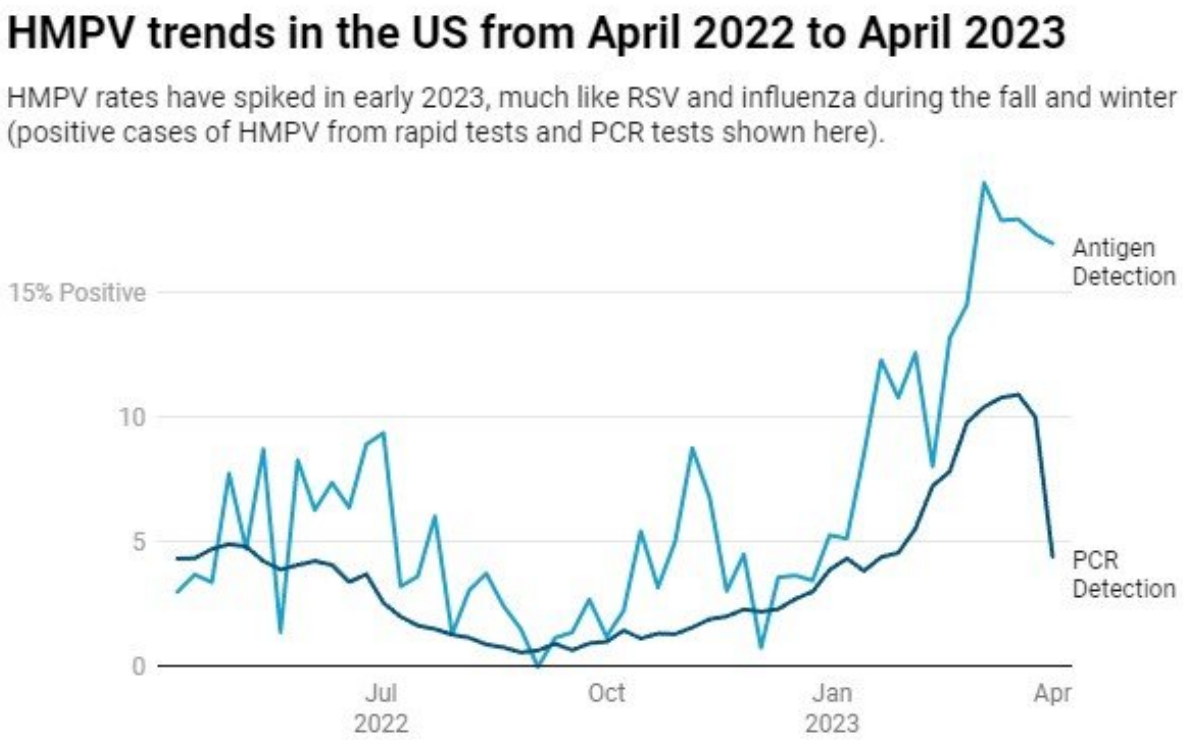
Medical Xpress

Human metapneumovirus is filling ICUs this spring—a pediatric infectious disease specialist explains

April 12 2023, by John V. Williams



Credit: The Conversation

In the year 2000, Dutch scientists went on a mission of exploration—not to discover lands or riches, but to identify unknown causes of acute respiratory infections.

These illnesses, from the common cold to pneumonia, have been a plague on mankind throughout history. Most are caused by viruses, so if you've ever been told "you probably have a virus" by a clinician, they were likely correct. However, respiratory illnesses can be much more severe than simple colds.

Respiratory infections are the leading cause of death in children under 5 globally and a major reason for hospitalization of children in developed countries. They are also a major cause of disease and death among people at high risk for severe disease, such as premature infants, older adults and those with underlying conditions.

However, meticulous research studies by many groups over decades had failed to identify a virus or bacteria in every person with an acute respiratory illness. Did this failure to detect a microbe result from tests that weren't good enough, or viruses that doctors and scientists didn't know about? The answer was partly the first; modern molecular tests are much better, so doctors find more known viruses.

But the Dutch group discovered a new virus, human metapneumovirus, abbreviated HMPV or MPV, which turns out to be a leading cause of respiratory infections. HMPV often presents like other common respiratory viruses, with congestion, cough and fever.

As a pediatric infectious disease specialist and virologist, I have led my team in HMPV research for over 20 years, and I've personally cared for many children with this infection. I've received emails from colleagues, clinicians and parents all over the country and the world with questions about severe and tragically fatal cases.

The U.S. saw a spike in HMPV detections during the first few months of 2023. This trend is similar to the higher-than-normal case rates of respiratory syncytial virus, or RSV, and influenza in the fall of 2022 and

winter of 2023, likely related to decreased population immunity after two years of wearing face masks and social distancing.

Still, I find that many people even in health care are unfamiliar with this virus.

Origins of human metapneumovirus

The human metapneumovirus was isolated from people with acute respiratory infection and sequenced in 2001 using a combination of specialized culture and molecular techniques.

It is related to RSV, which is the leading cause of serious respiratory infection in children and a major problem in adults. Both viruses are in the same large group with measles, mumps and parainfluenza viruses, all of which are leading causes of childhood disease.

However, abundant data shows that HMPV is distinct from its cousin RSV in many ways. First, the order of genes in its genome is quite different. In addition, HMPV is missing two genes that RSV uses to overcome the immune response that would normally target it; yet HMPV has its own ways to block immunity.

Third, genetic analysis by several different groups shows that the closest recent ancestor of HMPV is a bird virus, avian metapneumovirus. This is an agricultural pathogen of chickens and turkeys. Evolutionary and genetic analysis suggests that the human virus diverged from the bird virus several hundred years ago. This is an example of a zoonosis: an animal virus that jumps to humans. In this case, HMPV became established as a permanent pathogen of humans.

Understanding how HMPV successfully made the leap might help predict which other animal viruses could be capable of transforming into

primary human pathogens. The recent H5N1 bird flu outbreak—which has been transmitted to humans only to a limited extent—illustrates this risk.

HMPV in children

Despite its being recognized only two decades ago, many studies have confirmed that HMPV is a major cause of respiratory infection in humans. Initial research groups focused on children and quickly discovered that HMPV caused respiratory infections in children worldwide, including Canada, Australia, Japan, Hong Kong, South Africa and Argentina.

Indeed, HMPV is a common cause of acute respiratory disease in children in every country examined, and most children get the infection for the first time by age 5. One study using samples collected over 25 years in the U.S. found that HMPV was the second most common cause of lung infection in children after RSV. Other studies of multiple children's hospitals in U.S. cities found that HMPV was the second most common cause of respiratory infections, leading to hospitalization and pneumonia.

Children with underlying risk factors, such as those born prematurely and those with conditions like asthma, or those who have compromised immune systems, such as organ transplant recipients or children being treated for cancer, are at higher risk for severe HMPV. Most children who become hospitalized with HMPV are otherwise healthy before they acquire it, yet many require intensive care from the illness.

Not just for kids

HMPV is also a common cause of serious lung infections among adults.

This is especially true in adults over 65 years old, or those with underlying conditions. A New York study over four winters found that HMPV was as common in hospitalized older adults as RSV or influenza, with similar rates of ICU care and death.

Studies over three winters in Nashville of adults over age 50 detected rates of HMPV hospitalization and emergency department visits that were similar to RSV and influenza. HMPV and RSV were more common than the flu in people 65 and older, presumably because many were vaccinated against the flu.

Another national study of adults hospitalized for pneumonia showed that HMPV was as common as RSV, and nearly as common as influenza. As in children, HMPV is a particular problem for adults with chronic conditions such as asthma, cancer or chronic obstructive pulmonary disease, also called COPD.

Similar to the dire effects of flu and COVID-19 in nursing homes, HMPV has also caused numerous outbreaks among vulnerable older adults in long-term care facilities.

Why HMPV is still so underrecognized

Despite being a common cause of serious respiratory disease, HMPV remains underdiagnosed by clinicians and little recognized by the general population. Most people with an acute respiratory illness don't get any testing, and if they do, only complex molecular testing can detect HMPV. But this testing is usually done only for hospitalized patients under select circumstances.

People tend to believe what they see, and therefore even health care professionals are most aware of diseases they test for frequently. But HMPV circulates predictably every year, and in North America the peak

is typically February through May. So if you've had a cold recently this winter or spring, HMPV was a likely culprit. Children's hospitals around the country are seeing an increased number of cases, including many in the ICU. Based on past research, this is almost certainly happening in adults too—it's just that usually only those patients with severe illness are tested for HMPV.

A dearth of treatments

Right now, there are no specific antiviral drugs to treat HMPV as there are for flu and COVID-19. As with the many other respiratory viruses that cause colds, most infected people will do just fine with rest and fluids.

But some may develop trouble breathing and need to seek medical attention. Children or adults with serious underlying conditions should be especially careful, and just as with COVID-19, using hand sanitizer and washing hands can reduce transmission.

Preventive vaccines and antibodies for HMPV are in development but are still a way off. So, for the moment, wear a mask if you're sick and avoid others who are sick. You may dodge a repeat engagement with this virus that you've had but hadn't heard of.

Provided by The Conversation