



THE SILENT INVADER: A COMPREHENSIVE REVIEW OF HUMAN METAPNEUMOVIRUS(HMPV)

Shinde Pooja Dilip¹, Shinde Nayan Pandurang²

(Department of Pharmacology, Pravara Rural College of Pharmacy Loni.)

ABSTRACT:

The review article explores key information about human metapneumovirus (hMPV), a virus that causes respiratory infections, particularly in young children, older adults, and people with weakened immune systems. First discovered in 2001, hMPV has since become recognized as a major contributor to both mild and severe respiratory illnesses around the world. In this review, we take a closer look at how the virus is structured, how it spreads, when and where it tends to circulate, and what symptoms it causes. We also cover how it's diagnosed, what makes it potentially dangerous, and what treatment options are currently available. Despite the lack of an approved vaccine or specific antiviral treatment, there's ongoing research aimed at better prevention and care. Because hMPV often mimics other respiratory viruses, accurate diagnosis and awareness are crucial. Gaining a better understanding of this virus can help improve how we manage infections and protect vulnerable populations.

KEYWORDS: Cold, Respiratory infections, Infants, Transmission, Pneumovirus, Pneumoviridae, Bronchitis, COVID-19, Mutation, Influenza, etc.

INTRODUCTION:

What is HUMAN METAPNEUMOVIRUS:

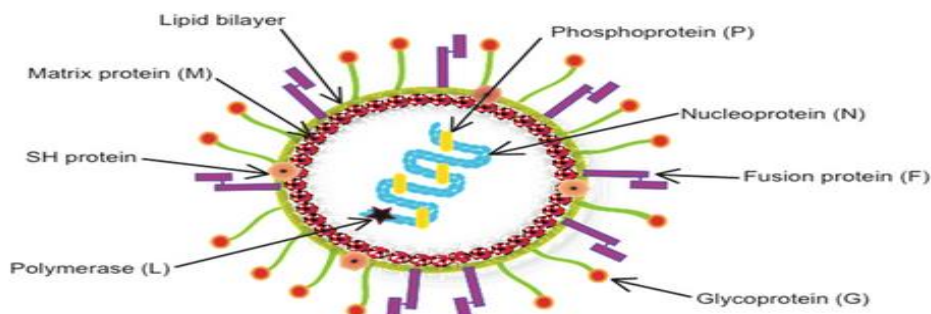
Human metapneumovirus (hMPV) is one of the viruses responsible for causing upper respiratory infections, commonly known as the common cold.[1] In most cases, it leads to mild symptoms, but for some people—especially the very young, elderly, or those with weakened immune systems—it can cause more serious illness. (Takeda M, 2016)

This virus is part of the *Pneumoviridae* family, which also includes respiratory syncytial virus (RSV). Although hMPV was officially discovered in 2001, evidence shows it has likely been circulating in the human population for many years. Today, it's found across the globe. (WHO, 2025)

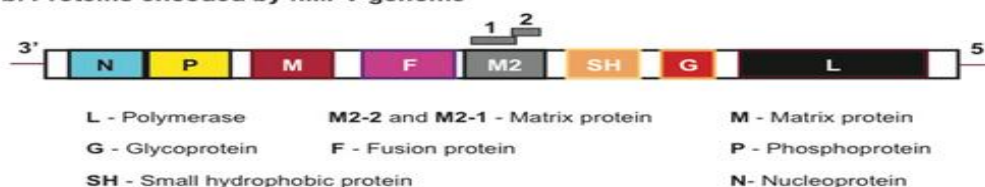
Much like other cold-causing viruses, hMPV spreads through tiny droplets released into the air when an infected person coughs, sneezes, or talks. It can also be picked up by touching contaminated surfaces—like door handles or railings—and then touching your face, particularly your eyes, nose, or mouth. Being in close contact or enclosed spaces with someone who's sick increases the risk of infection.

Characteristics of Human Metapneumovirus (hMPV)

a. Model structure of hMPV



b. Proteins encoded by hMPV genome



Human metapneumovirus (hMPV) is a notable cause of respiratory infections and shares many traits with other well-known viruses in the same category. Here's a closer look at its key features:

- **Virus Family:** hMPV is part of the *Pneumoviridae* family and is closely related to respiratory syncytial virus (RSV), both in structure and how they affect the body.[2]
- **Structure:** This virus has a single strand of RNA and is surrounded by an outer envelope, which plays a role in how it enters and infects cells.
- **How It Spreads:** hMPV spreads through tiny droplets released when an infected person coughs or sneezes. It can also be passed through direct contact or by touching contaminated objects and then touching the face.
- **Symptoms:** Infections can range from mild, cold-like symptoms to more serious illnesses such as bronchiolitis, pneumonia, and worsening of asthma.
- **Seasonal Trends:** Cases of hMPV tend to increase during late winter and early spring, following a seasonal pattern similar to other respiratory viruses.
- **Who's Most at Risk:** While anyone can get hMPV, it more commonly affects young children, older adults, and those with weakened immune systems or chronic lung conditions. (apollo, 2025)

TRANSMISSION:

Human metapneumovirus (hMPV) is mainly spread through exposure to respiratory secretions from infected individuals. This can happen through droplets released into the air when someone coughs or sneezes, through aerosols, or by touching contaminated surfaces (fomites) and then touching the face. Infections acquired in healthcare settings have also been documented.[3] hMPV typically circulates during the fall and winter months, with different subtypes tending to dominate in alternating seasons.

How It Spreads and Who's Most Vulnerable

Human metapneumovirus (hMPV) spreads primarily through close contact with an infected person. It is transmitted when respiratory droplets or aerosols are released into the air through coughing or sneezing. The virus can also survive briefly on surfaces, so practicing good hand hygiene is key to preventing its spread.

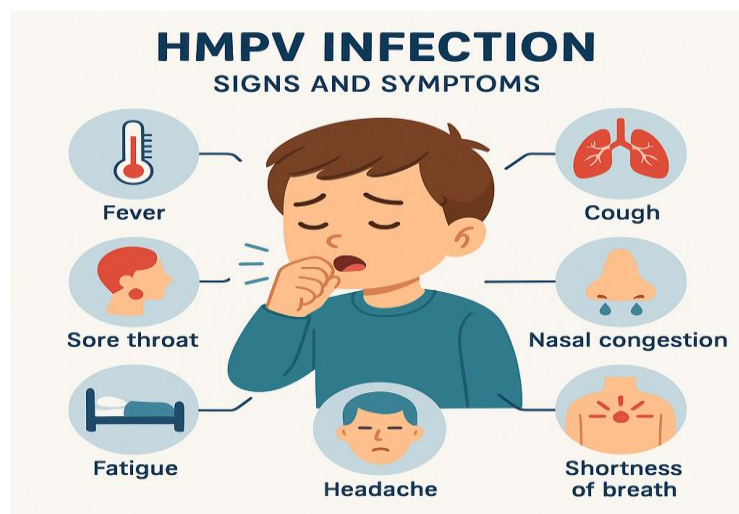
The incubation period for hMPV is typically between three and six days, which means a person can be contagious even before showing symptoms.[4] This makes controlling the spread of the virus more difficult and highlights the importance of preventive measures.

Infections caused by hMPV tend to affect children under 14 years old more severely, sometimes putting a strain on healthcare services due to the high number of cases.

SYMPTOMS AND COMPLICATIONS OF hMPV INFECTION:

Human metapneumovirus (hMPV) can cause a wide range of symptoms that often resemble those of other respiratory illnesses like the common cold, influenza, or even COVID-19. [5] Because of this overlap, it's not always easy to identify hMPV without specific diagnostic tests. Common symptoms include:

- Cough
- Fever
- Nasal congestion
- Sore throat
- Difficulty breathing or shortness of breath



For most people, these symptoms are mild and tend to clear up on their own within one to two weeks. However, in certain individuals—especially those who are very young, elderly, or have weakened immune systems—hMPV can lead to more serious health issues, such as:

- **Bronchiolitis:** Inflammation in the small airways of the lungs, commonly seen in infants and young children.
- **Bronchitis:** Involves swelling of the larger airways, often leading to a lingering cough and mucus buildup.
- **Pneumonia:** A more serious lung infection that can become life-threatening, particularly in vulnerable groups.
- **Asthma or COPD exacerbations:** People with pre-existing respiratory conditions may experience worsening of their symptoms.
- **Ear infections:** Especially in children, hMPV can contribute to secondary infections like otitis media.

The severity and length of illness can vary depending on factors such as age, immune function, and overall health. While the majority recover fully, those with underlying health issues are at a greater risk for complications and may require medical attention. (Agrawal, 2025)

How Is hMPV DIAGNOSED?

Diagnosing human metapneumovirus (hMPV) usually starts with a review of your symptoms, medical history, and any risk factors you might have. If a healthcare provider suspects hMPV or another respiratory infection, they may take a swab from your nose or throat. This sample is then tested in a lab using specialized techniques like PCR (polymerase chain reaction) or viral cultures to detect the virus. [6]

In more serious cases—especially for people with underlying health problems—additional tests might be needed. These can include chest X-rays or CT scans to check for signs of lung involvement, and sometimes a bronchoscopy to look inside the airways. Blood tests may also be done to rule out bacterial infections or assess how the immune system is responding.

It's important to note that testing for hMPV is usually done for those with more severe symptoms or for people at higher risk of complications—such as infants, older adults, or individuals with weakened immune systems. Getting an accurate diagnosis early helps guide proper treatment and reduces the risk of more serious health issues.

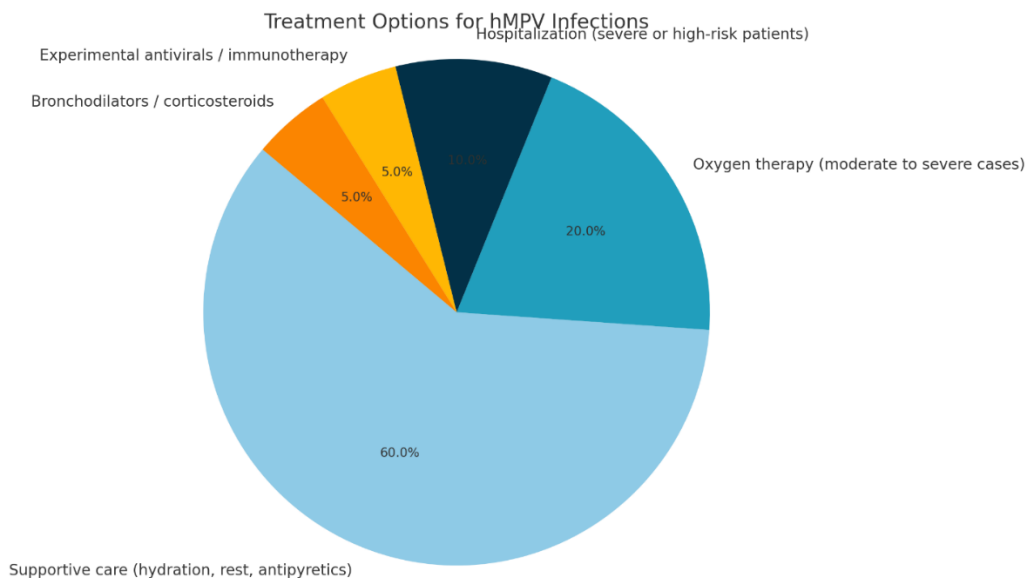
TREAYMENT Options for Hmpv:

Right now, there's no specific antiviral medication or vaccine to treat human metapneumovirus (hMPV). Instead, care mainly focuses on relieving symptoms and helping the body recover. Treatment is generally supportive and may include:

- **Rest and fluids:** Getting plenty of rest and staying well-hydrated helps your body fight off the infection more effectively.
- **Fever and pain relief:** Medications like acetaminophen or ibuprofen can help reduce fever and ease discomfort.
- **Nasal sprays and decongestants:** These can relieve stuffy noses and help improve breathing.
- **Humidifiers:** Adding moisture to the air can soothe irritated airways and reduce coughing.
- **Oxygen support:** In more serious cases, oxygen therapy may be needed if breathing becomes difficult.
- **Bronchodilators:** These may be used if the person has wheezing or tightness in the chest to help open up the airways.
- **Antibiotics:** These are only prescribed if there's a secondary bacterial infection, as they don't work against viruses like hMPV.

hMPV Infection Treatment Options (General Population)

- *Supportive care (hydration, rest, antipyretics) – 60%*
- *Oxygen therapy (for moderate to severe cases) – 20%*
- *Hospitalization (severe or high-risk patients) – 10%*
- *Experimental antivirals / immunotherapy (rare or investigational use) – 5%*
- *Bronchodilators / corticosteroids (if wheezing or underlying asthma/COPD) – 5%*



Here's the pie chart showing the treatment options for human metapneumovirus (hMPV) infections.

It's important to understand that antiviral drugs aren't routinely used for hMPV, partly because there's no proven benefit, and their misuse can lead to resistance and unwanted side effects. [7] Instead, the focus remains on early identification and managing symptoms properly. (Lenneke E M Haas 1, 2013)

Most people recover from hMPV on their own with rest and supportive care. However, individuals at higher risk—like infants, older adults, or those with weakened immune systems—should be monitored closely, as they may need more advanced medical attention.

Managing hMPV Symptoms:

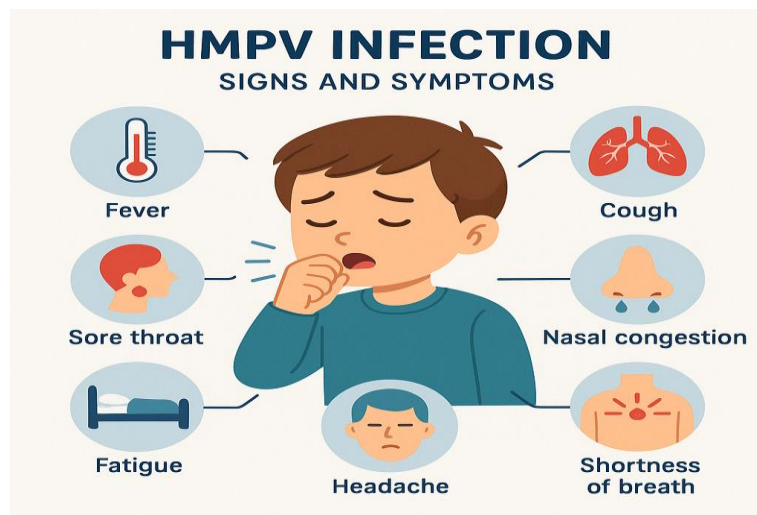
Since human metapneumovirus (hMPV) causes cold-like symptoms, most people can manage it at home with simple treatments. Over-the-counter medications can help ease common issues like fever, body aches, a stuffy nose, or coughing. Resting and drinking plenty of fluids are also important to support recovery.

At the moment, there's no approved antiviral medication specifically for hMPV. The good news is that most people start feeling better within a few days without the need for special treatment.[8]

However, if symptoms start getting worse, it's important to reach out to a healthcare provider. People who are more vulnerable—such as young children, older adults, or those with weakened immune systems—should check in with their doctor even if their symptoms seem mild, just to be safe.

In rare cases where someone becomes seriously ill and needs to go to the hospital, doctors may provide oxygen therapy to help them breathe more easily and recover faster. (Simon Loevenich, 2019)

How to Protect Yourself from HMPV: Practical PREVENTION Tips



Since there's currently no vaccine or targeted treatment for human metapneumovirus (hMPV), prevention plays a key role in reducing its spread. Many of the steps that helped limit the transmission of viruses like COVID-19 can also help protect against HMPV:[8]

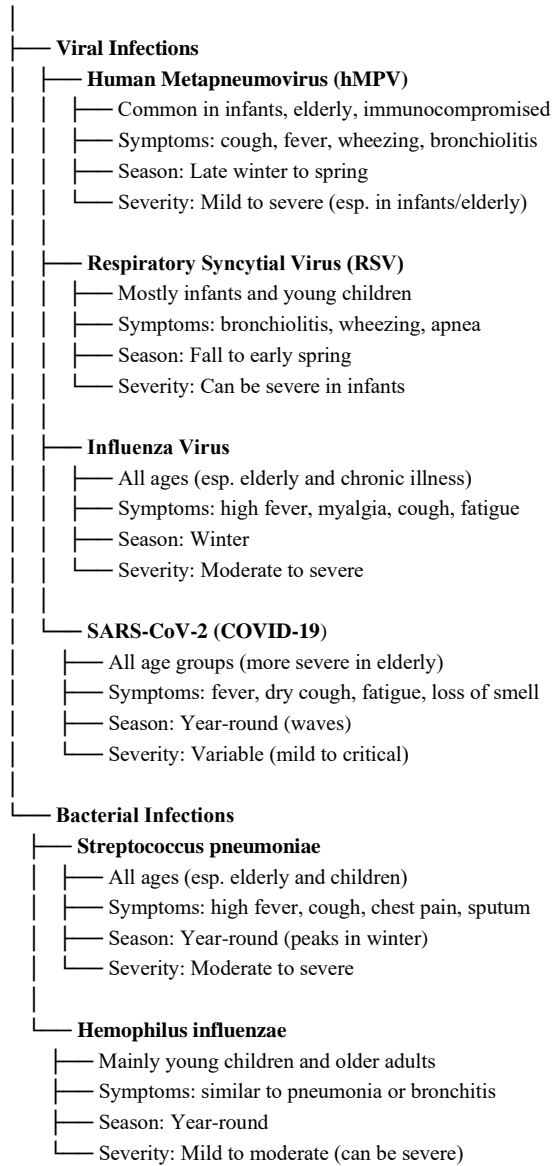
- **Wash your hands regularly:** Clean hands are one of your best defenses. Wash with soap and water for at least 20 seconds, especially after coughing, sneezing, or being in public places.
- **Practice good cough and sneeze etiquette:** Always cover your mouth and nose with a tissue or your elbow when you cough or sneeze to stop droplets from spreading.
- **Wear a mask in crowded spaces:** If you're in a place with poor ventilation or lots of people, especially during cold and flu season, wearing a mask can reduce your risk.
- **Keep your distance from sick individuals:** If someone around you is unwell, try to maintain some space to lower the chance of catching the virus.
- **Avoid touching your face:** Try not to touch your eyes, nose, or mouth with unwashed hands, as this is a common way viruses enter the body.[9]
- **Improve airflow indoors:** Open windows or use air purifiers to help keep the air fresh and lower the concentration of airborne viruses.
- **Stay home if you're sick:** Isolating yourself when feeling unwell helps protect others, especially those who are more vulnerable.
- **Disinfect surfaces often:** Clean objects and surfaces that are frequently touched—like phones, door handles, and countertops—to prevent indirect spread.
- **Support your immune system:** Eating a balanced diet, exercising regularly, getting enough sleep, and managing stress can all help your body fight off infections.
- **Stay current with vaccines:** While there's no vaccine yet for hMPV, being vaccinated against illnesses like the flu and pneumonia can reduce the risk of complications and overall respiratory illness burden. (Panda S, 2017)

Comparing HMPV with Other Respiratory Viruses:

Human metapneumovirus (HMPV) shares several similarities with respiratory illnesses like the flu and COVID-19, but there are also important differences that set it apart: (Esposito S, 2016)

- **Severity and Death Rate:** HMPV typically causes milder illness in most people, with the majority recovering within a couple of weeks. Serious cases tend to occur in individuals who are more vulnerable, such as the elderly or those with compromised immune systems. [10] Compared to influenza and COVID-19, HMPV generally has a lower risk of death, as the latter two can lead to more severe outcomes and have higher fatality rates in at-risk groups.
- **How It Spreads:** Like the flu, HMPV tends to be more active during the colder months, especially in winter and early spring, and it spreads through respiratory droplets. COVID-19, on the other hand, has shown year-round transmission and is more contagious overall. All three viruses can spread even before symptoms appear, which makes it difficult to control outbreaks early on.[11]
- **Mutation Rate:** HMPV changes at a slower rate than influenza and SARS-CoV-2 (the virus behind COVID-19), both of which are known for frequent mutations that lead to new variants. [12] This slower mutation rate in HMPV means it's less likely to suddenly become more contagious or severe, unlike the rapid strain shifts we often see with the flu and COVID-19.
- **Impact on Public Health:** Although HMPV does pose a risk—especially to young children, older adults, and those with existing health issues—it hasn't reached the same global health impact as influenza or COVID-19.[13] Vaccines and targeted treatments have helped reduce the burden of flu and COVID-19, while HMPV still lacks both. This makes preventive measures, such as good hygiene and infection control practices, even more essential. (apollo, 2025)

Respiratory Infections:



Current Overview:

- In many Northern Hemisphere countries, it's common to see a rise in respiratory illnesses during the winter months. [15] These seasonal spikes are largely due to the circulation of viruses like influenza, RSV (respiratory syncytial virus), human metapneumovirus (hMPV), rhinovirus, and mycoplasma pneumoniae. Countries with established public health monitoring systems are currently reporting elevated levels of influenza-like illness (ILI) and acute respiratory infections (ARI), which align with typical seasonal expectations.
- At present, many regions—especially in Europe, Asia, Africa, Central America, and the Caribbean—are seeing increased flu activity, although the dominant flu strains vary by location. Notably, hMPV is also being detected more frequently in certain areas, though not all countries track or report this data consistently. [16] Some concern has emerged about hMPV cases in China, but recent updates indicate that while infections have risen, the situation remains under control and consistent with seasonal norms.

Situation in China:

- Recent data from the Chinese Center for Disease Control and Prevention (China CDC), up to late December 2024, confirms that infections from common respiratory viruses—such as flu, RSV, and hMPV—have risen, especially in northern regions. However, this rise is in line with what's normally seen during winter. Influenza remains the most frequently reported virus, while in children aged 5–14, mycoplasma pneumoniae appears to be more prevalent. COVID-19 activity is currently low, although there has been a slight increase in severe cases. The XDV variant and its subtypes account for most of the recent COVID-19 cases.[17]
- Importantly, there have been no reports of unusual patterns or signs of healthcare systems being overwhelmed. Hospital usage is actually lower than it was during the same period last year, and no emergency alerts or responses have been initiated. Chinese officials have been actively sharing health guidance with the public to help reduce the spread of these infections.

Public Health Measures and WHO Guidance:

- With respiratory infections on the rise across many countries, public health officials are reminding people to take simple preventive steps. These include staying home when sick, practicing good hygiene like handwashing and covering coughs or sneezes, and using masks in crowded or poorly ventilated spaces.[18] Getting recommended vaccines also remains a key preventive strategy, especially for those most vulnerable.
- The World Health Organization (WHO) continues to encourage countries to maintain robust surveillance systems for tracking respiratory illnesses. WHO also supports an integrated approach to monitoring viruses like influenza and hMPV, tailored to each country's needs and capacities. [19] Updated guidelines are available to help health systems assess the severity of outbreaks and manage healthcare demands during seasonal peaks.

CONCLUSION:

Human metapneumovirus (HMPV) continues to be a notable concern for public health, especially among those more vulnerable to infections. Being aware of how it spreads and recognizing its symptoms early on can make a big difference in reducing the risk. Simple steps like practicing good hygiene and seeking medical advice when symptoms are severe or persistent can go a long way in keeping ourselves and others safe. Staying informed and proactive is key to prevention and overall well-being.

REFERENCES:

1. van den Hoogen, Bernadette G.; Jong, Jan C. de; Groen, Jan; Kuiken, Thijs; Groot, Ronald de; Fouchier, Ron A.M.; Osterhaus, Albert D.M.E. (2001). "[A newly discovered human pneumovirus isolated from young children with respiratory tract disease](#)". *Nature Medicine*. 7 (6): 719–724. doi:10.1038/89098. PMC 7095854. PMID 11385510.
2. ^ Jump up to: ^{a b c d} Williams, John V.; Harris, Paul A.; Tollefson, Sharon J.; Halburnt-Rush, Lisa L.; Pingsterhaus, Joyce M.; Edwards, Kathryn M.; Wright, Peter F.; Crowe, James E. Jr. (2004-01-29). "[Human Metapneumovirus and Lower Respiratory Tract Disease in Otherwise Healthy Infants and Children](#)". *New England Journal of Medicine*. 350 (5): 443–450. doi:10.1056/nejmoa025472. ISSN 0028-4793. PMC 1831873. PMID 14749452.
3. ^ *International Committee on Taxonomy of Viruses* (n.d.). "[Genus: Metapneumovirus](#)". Archived from the original on 2025-01-10. Retrieved 2025-01-10.
4. Williams, John V.; Wang, Chiaoyin K.; Yang, Chin-Fen; Tollefson, Sharon J.; House, Frances S.; Heck, Josh M.; Chu, Marla; Brown, Jennifer B.; Lintao, Linda D. (2006-02-01). "[The Role of Human Metapneumovirus in Upper Respiratory Tract Infections in Children: A 20-Year Experience](#)". *The Journal of Infectious Diseases*. 193 (3): 387–395. doi:10.1086/499274. ISSN 0022-1899. PMC 1586246. PMID 16388486.
5. Falsey, Ann R.; Erdman, Dean; Anderson, Larry J.; Walsh, Edward E. (2003-03-01). "[Human Metapneumovirus Infections in Young and Elderly Adults](#)". *The Journal of Infectious Diseases*. 187 (5): 785–790. doi:10.1086/367901. ISSN 0022-1899. PMID 12599052.
6. [Chu, Helen Y.](#); Renaud, Christian; Ficken, Elle; Thomson, Blythe; Kuypers, Jane; Englund, Janet A. (2014-12-01). "[Respiratory Tract Infections Due to Human Metapneumovirus in Immunocompromised Children](#)". *Journal of the Pediatric Infectious Diseases Society*. 3 (4): 286–293. doi:10.1093/jpids/piu100. ISSN 2048-7193. PMC 4240341. PMID 25419459.
7. van den Hoogen BG, de Jong JC, Groen J, et al. A newly discovered human pneumovirus isolated from young children with respiratory tract disease. *Nat Med*. 2001; 7:719–24. doi: 10.1038/89098. [DOI] [PMC free article] [PubMed] [Google Scholar]
8. Esper F, Boucher D, Weibel C, et al. Human metapneumovirus infection in the United States: clinical manifestations associated with a newly emerging respiratory infection in children. *Pediatrics*. 2003; 111:1407–10. Doi
9. Peiris JS, Tang WH, Chan KH, et al. Children with respiratory disease associated with metapneumovirus in Hong Kong. *Emerg Infect Dis*. 2003; 9:628–33. doi: 10.3201/eid0906.030009.

10. Wang SM, Liu CC, Wang HC, et al. Human metapneumovirus infection among children in Taiwan: a comparison of clinical manifestations with other virus-associated respiratory tract infections. *Clin Microbiol Infect.* 2006; 12:1221–4. doi: 10.1111/j.1469-0691.2006.01540. x.
11. American Academy of Pediatrics. [Human metapneumovirus](#). Red Book 2018 Report of the Committee on Infectious Diseases [online edition].
12. CDC. [Notes from the Field: Severe Human Metapneumovirus Infections — North Dakota, 2016](#). *MMWR.* 2017;66(28):486-8.
13. CDC. [Outbreaks of human metapneumovirus in two skilled nursing facilities — West Virginia and Idaho, 2011–2012](#). *MMWR.* 2013;62(46):909-13.
14. Heikkinen T, Österback R, Peltola V, Jartti T, Vainionpää R. [Human metapneumovirus infections in children](#). *Emerg Infect Dis* [serial the Internet]. 2008 Jan.
15. Pelletier G, Dery P, Abed Y et al. [Respiratory tract reinfections by the new human Metapneumovirus in an immunocompromised child](#). *Emerg Infect Dis* [serial on the Internet]. 2002 Sep.
16. Peña SA, Davis SS, Lu X, Sakthivel SKK, Peret TCT, et al. [Severe Respiratory Illness Associated with Human Metapneumovirus in Nursing Home, New Mexico, USA](#). *Emerg Infect Dis.* 2019 Feb;25(2):383-384.[AJL(1]
17. Stockton J, Stephenson I, Fleming D, Zambon M. [Human Metapneumovirus as a cause of community-acquired respiratory illness](#). *Emerg Infect Dis* [serial the Internet] 2002 Sep.
18. Va den Hoogen BG, de Jong JC, Goen J, Kuiken T, de Groot R, et al. [A newly discovered human pneumovirus isolated from young children with respiratory tract disease](#). *Nat Med.* 2001;7(6):719-24.
19. Widmer K, Zhu Y, Williams JV et al. [Rates of hospitalizations for respiratory syncytial virus, human metapneumovirus and influenza virus in older adults](#). *J Infect Dis.* 2012;206(1):56-62.

BIBLIOGRAPHY:

(n.d.).

1. Agrawal, D. P. (2025, april 4). Retrieved from <https://www.maxhealthcare.in/blogs/human-metapneumovirus-hmpv>: <https://www.maxhealthcare.in/blogs/human-metapneumovirus-hmpv>
2. apollo, a. (2025, FEB 18). *HEALTH LIBRARY*. Retrieved from APOLLOHOSPITALS.COM: <https://www.apollohospitals.com/health-library/human-metapneumovirus-hmpv>
3. Esposito S, M. M. (2016, AUG).
4. Lenneke E M Haas I, *. S. (2013, jan 8). Retrieved from <https://pmc.ncbi.nlm.nih.gov/articles/PMC3564111/>.
5. Panda S, M. N. (2017, may 14).
6. Simon Loevenich, J. M. (2019, oct 09).
7. Takeda M, S. Y. (2016, SEP).
8. WHO. (2025, JAN 10). *NEWSROOM*. Retrieved from [https://www.who.int/news-room/questions-and-answers/item/human-metapneumovirus-\(hmpv\)-infection](https://www.who.int/news-room/questions-and-answers/item/human-metapneumovirus-(hmpv)-infection): [https://www.who.int/news-room/questions-and-answers/item/human-metapneumovirus-\(hmpv\)-infection](https://www.who.int/news-room/questions-and-answers/item/human-metapneumovirus-(hmpv)-infection)