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# **SUSHRUT**

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Theme: What is HMPV & How to prevent it



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## Article: 1

### **Recent Surges in Human Metapneumovirus (HMPV): Prevention Strategies, Diagnostic Approaches, and Treatment Insights**

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#### **Abstract**

The present review aims to discuss comprehensively about the Human Metapneumovirus (HMPV) which is a respiratory pathogen belonging to the family Paramyxoviridae. Since December 2024, northern China has seen a significant rise of respiratory diseases, including HMPV particularly among youngsters. The Chinese Center for Disease Control and Prevention stated that HMPV was responsible for 6.2% of positive respiratory disease tests and 5.4% of hospitalizations during this time. Similar increases in HMPV cases have been seen in Malaysia, Kazakhstan, India, and Italy. India verified the first instances in early January 2025, including infections in newborns. Human Metapneumovirus initially identified in 2001 in the Netherlands, HMPV is now recognized as a global cause of respiratory infections, particularly among vulnerable populations such as young children, the elderly, and immune compromised individuals. Its potential to cause widespread outbreaks has raised concerns about its pandemic potential. Polymerase Chain Reaction (PCR) testing is considered as the most sensitive and specific approach for identifying HMPV. It entails amplifying viral RNA from respiratory specimens (such as throat swabs, nasopharyngeal swabs, and sputum samples). There are currently no licensed antiviral medications for HMPV. However, some supportive therapy may be proved as beneficial in the HMPV infections. Among these, supplemental oxygen therapy, anti-pyretics (Acetaminophen or Paracetamol), Beta-2 agonists (Albuterol etc.), corticosteroids (Prednisolone etc.), Ribavirin (its efficacy against HMPV is not well documented), hydration therapy and antibiotics are included.

**Keywords:** Human Metapneumovirus, Respiratory Infections, Polymerase Chain Reaction (PCR) Testing, Supportive Therapy, Global Outbreaks.

#### **Introduction**

Human Metapneumovirus (HMPV) is a significant cause of acute respiratory infections worldwide, particularly affecting children, older adults, and immune compromised

individuals. First identified in 2001, HMPV belongs to the Paramyxoviridae family and shares clinical similarities with Respiratory Syncytial Virus (RSV) and influenza. Over the past decade, HMPV has increasingly contributed to seasonal outbreaks, with recent surges drawing global attention. These outbreaks highlight the virus's potential to strain healthcare systems and necessitate urgent improvements in prevention, diagnosis, and treatment. The emergence of HMPV in post-pandemic scenarios has sparked concerns due to increased transmission rates and severity in certain populations. Despite advancements in molecular diagnostics, the lack of a specific antiviral treatment or vaccine presents significant challenges. This article explores recent outbreaks, effective prevention strategies, advances in diagnostic techniques, available therapeutic approaches, future research prospects, and the challenges associated with managing HMPV.<sup>1,2</sup>

### **Methodology**

To assess the recent trends in HMPV outbreaks, a comprehensive review of epidemiological reports, clinical trials, and public health data was conducted. Information sources include peer-reviewed journals, WHO and CDC reports, hospital surveillance records, and infectious disease registries. This study also incorporates data from real-world case studies and research on innovative diagnostic tools and therapeutic interventions.<sup>3</sup>

### **Data collection & analysis**

**Epidemiological trends:** Recent outbreak data from multiple countries were analyzed to determine transmission patterns, high-risk populations, and seasonal variations.

**Diagnostic advances:** Literature on molecular diagnostics, antigen-based detection, and serological assays was reviewed.<sup>4</sup>

**Therapeutic approaches:** Studies on existing symptomatic treatments and emerging antiviral therapies were assessed.

**Prevention strategies:** Public health guidelines, infection control measures, and community awareness programs were examined to evaluate their effectiveness in containing outbreaks.

### **Results**

#### **Recent outbreak trends**

Recent epidemiological data indicate a sharp rise in HMPV cases, particularly in the aftermath of the COVID-19 pandemic. Several factors contribute to this surge:

**Reduced immunity:** Lockdowns and reduced viral exposure during the pandemic may have led to lower population immunity.

**Increased testing:** Enhanced surveillance and wider use of multiplex respiratory panels have improved detection rates.

**Seasonal patterns:** Outbreaks are commonly reported in late winter and early spring, similar to RSV.

**Hospitalization rates:** Severe cases requiring hospitalization are predominantly seen in children under five and elderly individuals.

#### **Advancements in diagnostics**

Accurate and timely diagnosis of HMPV is crucial for effective management. Traditional diagnostic approaches often misidentify HMPV as influenza or RSV, leading to inappropriate treatments. Recent advancements include:

**Reverse transcription polymerase chain reaction (RT-PCR):** The gold standard for detecting HMPV with high specificity and sensitivity.

**Rapid antigen tests:** While less sensitive than RT-PCR, these tests provide quick point-of-care results.

**Serological testing:** Used primarily for epidemiological studies rather than routine clinical diagnosis.

**Multiplex assays:** Capable of detecting multiple respiratory viruses simultaneously, improving differential diagnosis.

**Therapeutic insights:** Currently, no specific antiviral treatment exists for HMPV. Management primarily involves supportive care, including:

**Symptomatic treatment:** Fever reduction (acetaminophen/ibuprofen), hydration, and oxygen therapy for severe cases.

**Bronchodilators & corticosteroids:** Occasionally used in patients with preexisting lung conditions but not universally recommended.

**Antiviral drug research:** Ongoing trials are investigating potential antiviral agents, including fusion inhibitors and monoclonal antibodies.

### **Prevention strategies**

Given the absence of a vaccine, prevention efforts focus on reducing transmission through:

**Hand hygiene & respiratory etiquette:** Frequent hand washing, mask usage, and avoiding close contact with infected individuals.

**Environmental cleaning:** Disinfecting high-touch surfaces in healthcare and childcare settings.

**Public awareness campaigns:** Educating communities on recognizing symptoms and taking preventive measures.

**Protecting high-risk groups:** Special precautions for elderly individuals and immune compromised patients.

### **Future prospective**

**Vaccine development:** While there is no licensed HMPV vaccine, research is underway to develop candidate vaccines using recombinant technology. Live-attenuated and subunit vaccines are among the promising candidates under evaluation

**Improved surveillance systems:** Advanced epidemiological models incorporating AI and machine learning could help predict outbreaks and optimize public health responses. Global tracking of HMPV cases is crucial for early containment strategies.<sup>3,4</sup>

**Antiviral drug development:** Pharmaceutical research is exploring antiviral compounds targeting HMPV fusion proteins, aiming to reduce viral replication and disease severity. Monoclonal antibodies are also being studied as a potential therapeutic option.

### **Challenges**

**Lack of specific treatment:** The absence of targeted antiviral therapies limits the management of severe cases, leaving supportive care as the primary treatment option.

**Under diagnosis and misdiagnosis:** HMPV symptoms overlap with those of influenza, RSV, and COVID-19, leading to frequent misdiagnosis or delayed identification. Improved access to molecular testing can help address this issue.

**Limited public awareness:** Despite its impact, HMPV remains relatively unknown compared to other respiratory viruses. Increasing public health communication efforts is essential to encourage preventive behaviors.

**Healthcare system burden:** Seasonal surges in HMPV cases can overwhelm healthcare facilities, particularly pediatric wards and intensive care units. Strengthening healthcare infrastructure and preparedness plans is necessary.<sup>1,5</sup>

### **Conclusion**

The rising incidence of HMPV underscores the need for improved surveillance, better diagnostic methods, and advancements in therapeutic options. While supportive care remains the primary treatment approach, ongoing research in vaccine development and antiviral therapies holds promise for future management. Public health interventions, including hygiene practices, infection control measures, and educational campaigns, are critical in minimizing transmission and reducing disease burden. As global efforts continue, a collaborative approach among researchers, healthcare professionals, and policymakers will be key to mitigating the impact of future HMPV outbreaks.

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## Article: 2

### Human Metapneumovirus (HMPV): An Emerging Respiratory Threat

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#### Abstract

Human Metapneumovirus (HMPV) is a significant yet under recognized respiratory virus affecting individuals of all ages, particularly infants, the elderly and immune compromised individuals. As a member of the Pneumoviridae family, HMPV is closely related to Respiratory Syncytial Virus (RSV) and is a leading cause of acute respiratory infections, including pneumonia and bronchiolitis. The virus spreads primarily through respiratory droplets, direct contact, and contaminated surfaces, peaking in late winter and early spring. Despite its increasing public health impact, HMPV remains under diagnosed due to its symptom similarity with other respiratory viruses such as influenza, RSV, and COVID-19. While most infections present with mild flu-like symptoms, severe cases can lead to respiratory failure, hospitalization, and fatalities in high-risk populations. Currently, no vaccine or specific antiviral treatment exists for HMPV, making prevention strategies such as hand hygiene, respiratory etiquette, and public health awareness is essential. This paper provides a comprehensive review of HMPV, including its epidemiology, transmission mechanisms, clinical manifestations, diagnosis, treatment, and prevention strategies. It highlights the urgent need for increased surveillance, improved diagnostic tools, and vaccine development to mitigate its impact on global health.

**Keywords:** Human Metapneumovirus (HMPV), respiratory infections, pneumonia, bronchiolitis, viral transmission, respiratory droplets, public health, immune compromised individuals, seasonal outbreaks.

#### Introduction

##### Overview of respiratory viruses

Respiratory viruses are major contributors to global morbidity and mortality. Human Metapneumovirus (HMPV) is a significant but under recognized cause of respiratory illness. HMPV was first identified in 2001. Retrospective analyses indicate its presence in human populations for decades.<sup>1</sup>

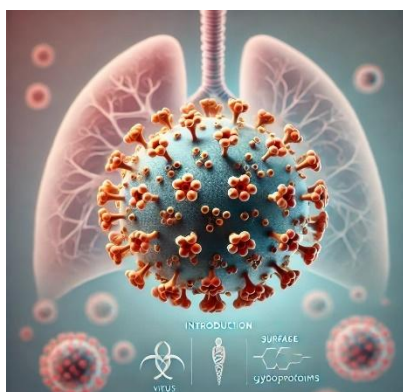


Figure 1: It depicts the virus structure along with a subtle background illustrating respiratory infection<sup>[2]</sup>



## Clinical significance

Comparable in impact to Respiratory Syncytial Virus (RSV) and influenza. Awareness and research on HMPV remain limited despite its widespread effect.

## Disease spectrum

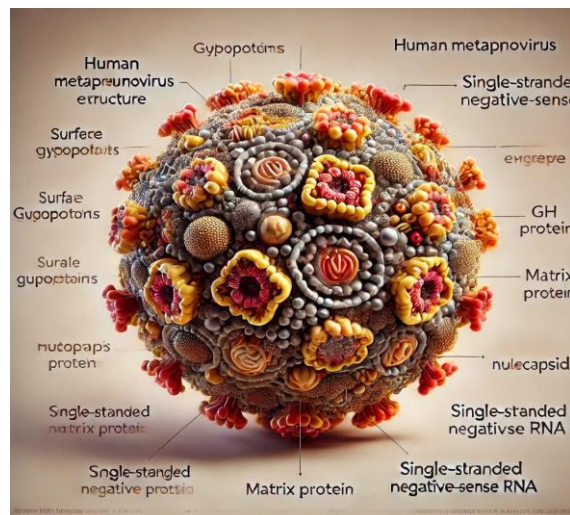
Ranges from mild upper respiratory tract infections to severe lower respiratory tract diseases. High-risk groups include infants, elderly individuals, and immune compromised.

## Challenges in management

No available vaccine or specific antiviral therapy. Early recognition, prevention, and supportive care are essential

## Scope of the paper

This review discusses virology, pathogenesis, epidemiology, clinical features, diagnosis, treatment, and prevention of HMPV. Highlights current challenges and future research directions.



**Figure 2: It highlights key viral components, including surface glycoprotein and the internal RNA genome [3]**

## Virology and pathogenesis

### Virology

**Classification:** HMPV belongs to the Pneumoviridae family and Metapneumovirus genus.

**Genetic structure:** It is an envelope, negative-sense, single-stranded RNA virus.

**Similarity to RSV:** Shares structural and genetic similarities with Respiratory Syncytial Virus (RSV).

**Subgroups:** Classified into two major subgroups (A and B), with further genetic lineages within each. [1,2]

### Pathogenesis

**Target cells:** Primarily infects epithelial cells of the upper and lower respiratory tract.

**Immune response:** Triggers inflammation, mucus production, and airway obstruction.

**Severe complications:** Can lead to bronchiolitis, pneumonia, and exacerbation of chronic lung diseases.

**Host-driven damage:** The host immune response often contributes to lung tissue damage, increasing the risk for immune compromised individuals. [2,3]

## Epidemiology and transmission

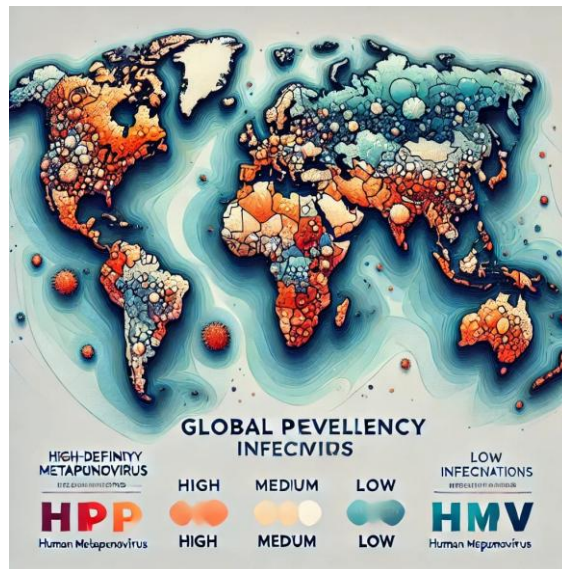
### Global prevalence

**Widespread impact:** HMPV is a major cause of viral respiratory infections worldwide.

**Hospitalization rates:** Affects 5–25% of children hospitalized with respiratory illnesses.

**Adult infections:** Contributes significantly to adult respiratory infections.

**Seasonal trends:** Peaks in late winter and early spring, similar to RSV and influenza.



**Figure 3:** Here is a high-definition global prevalence map of Human Metapneumovirus (HMPV), highlighting regions with high, medium, and low infection rates. [5]

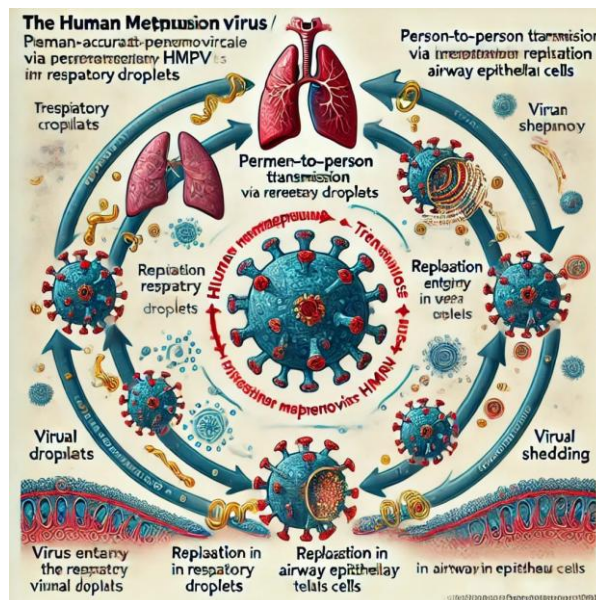
### Transmission Mechanisms

**Respiratory Droplets:** Spread through inhalation of virus-containing droplets from coughs or sneezes.

**Direct Contact:** Transmitted via close personal contact (e.g., shaking hands, touching contaminated skin).

**Fomite Transmission:** Virus persists on surfaces for several hours, leading to indirect transmission.

**Incubation & Contagion:** Incubation period 3–6 days. Contagious period up to 2 weeks, even in asymptomatic individuals.



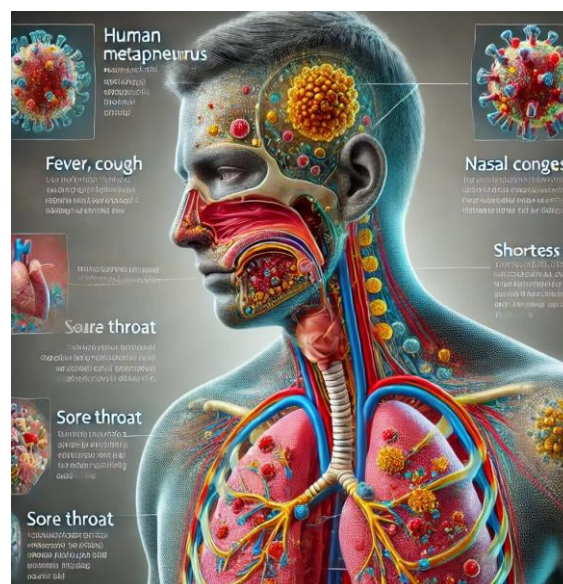
**Figure 4:** It shows how the virus spreads via respiratory droplets, direct contact, and contaminated surfaces [5]

### Clinical Manifestations

**Symptoms:** HMPV symptoms closely resemble those of other respiratory viruses:

**Table 1: Symptoms of HMPV based on severity**

Symptoms	Mild cases (common cold like)	Moderate cases (bronchitis)	Severe cases (pneumonia, respiratory distress)	References
<b>Fever</b>	Low grade (or absent)	Moderate	High fever with chills	
<b>cough</b>	Dry or mild	Persistent, productive	Severe deep cough with wheezing	
<b>Nasal congestion</b>	Common	Moderate	Severe congestion, difficulty breathing	2
<b>Sore throat</b>	Mild irritation	Moderate to pain	Significant difficulty swallowing	
<b>Shortness of breath</b>	None	Mild to moderate	Severe requiring oxygen therapy	
<b>Fatigue</b>	Mild	Moderate	Extreme exhaustion, lethargy	



**Figure 5 & 6: The symptoms of Human Metapneumovirus (HMPV) [7, 8]**

### High-risk populations

Severe illness is more likely in:

- ✓ Infants and young children (under 2 years old)
- ✓ Elderly individuals (over 65 years old)

Immuno compromised patients, including those with:

- ✓ Cancer
- ✓ HIV
- ✓ Organ transplants

Individuals with chronic lung diseases, such as:

- ✓ Asthma
- ✓ Chronic obstructive pulmonary disease (COPD)

### Diagnosis and treatment

**Diagnostic Methods:** Due to symptom overlap with other respiratory infections, laboratory testing is essential for definitive diagnosis:

**Table 2: Diagnostic methods for HMPV**

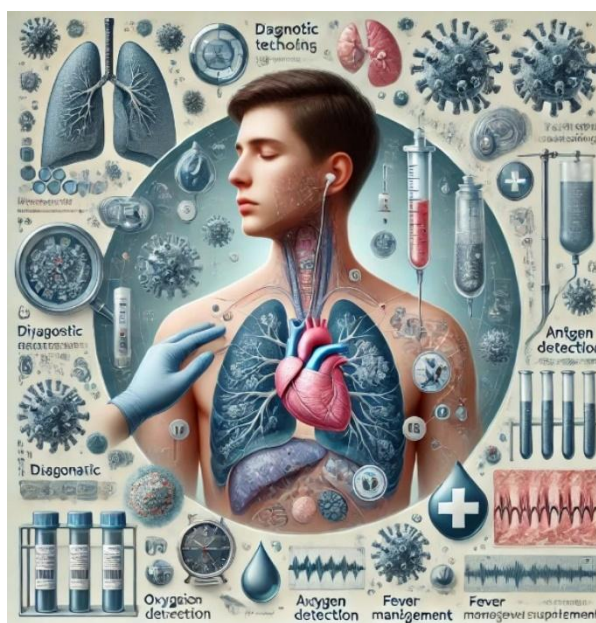
Diagnostic test	Description	Sensitivity	Common usage	References
<b>PCR (polymerase chain reaction)</b>	Detects viral RNA, highly specific	High	Standard clinical & research	
<b>Antigen detection</b>	Identifies viral proteins in respiratory samples	Moderate	Rapid testing in clinics	2
<b>Serology</b>	Detects antibodies in blood post-infection	Low	Retrospective epidemiological studies	
<b>Viral culture</b>	Isolates live virus for research	Low	Used mainly in specialized labs	

### Treatment Approaches

No specific antiviral therapy exists for HMPV; treatment focuses on symptom relief and supportive care:

**Mild cases:** Rest and hydration, fever management (acetaminophen, ibuprofen) and humidifiers for respiratory comfort

**Severe cases:** Oxygen therapy for respiratory distress, intravenous fluids to prevent dehydration and mechanical ventilation in extreme cases



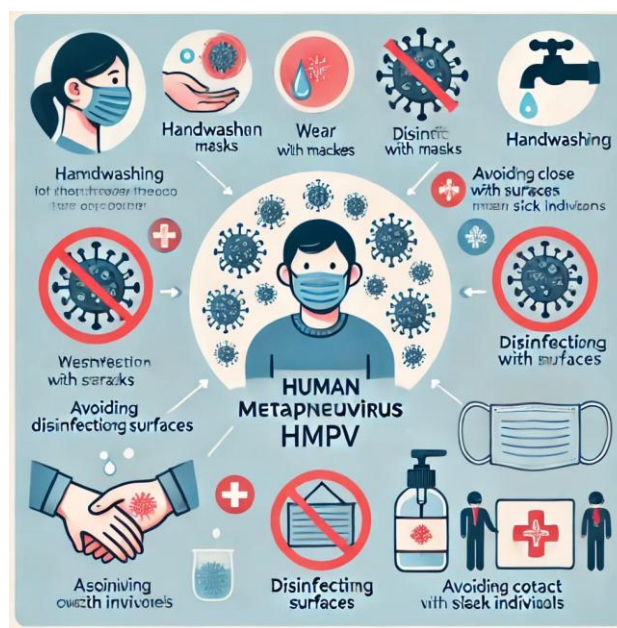
**Figure 7: The diagnosis and treatment of Human Metapneumovirus (HMPV) [5]**

### Prevention Strategies

**Hygiene and public health measures:** Basic preventive measures help reduce HMPV transmission:

**Table 3: Prevention strategies for HMPV**

Prevention method	Effectiveness	Implementation	References
Hand hygiene	High	Regular handwashing with soap for at least 20 second	
Respiratory hygiene	High	Cover mouth/ nose when sneezing or coughing	2
Surface disinfection	Moderate	Cleaning frequently touched surfaces	
Avoiding close contact	Moderate	Avoiding crowded places during outbreaks	



**Figure 8: Here is a simple and clear high-resolution medical illustration of HMPV prevention [6]**

### Vaccine Development

Although no vaccine is currently available, research is ongoing into Live-attenuated vaccines, Recombinant subunit vaccines and Monoclonal antibody therapies as potential treatments.

### Future research directions

Understanding immune responses to HMPV, developing antiviral therapies to manage infections and implementing large-scale vaccine trials to reduce the global burden of HMPV-related illnesses.

### Conclusion

**Public health impact:** HMPV is a growing public health concern, contributing significantly to respiratory morbidity and mortality.

**Need for medical advancements:** The absence of a vaccine and targeted antiviral treatment underscores the need for Increased surveillance, improved diagnostic tools and vaccine development

**Current preventive measures:** Public awareness, hygiene practices, and early medical intervention remain the most effective defense against HMPV.

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## Article: 3

### **Human Metapneumovirus (HMPV): A Significant but Under Recognized Respiratory Pathogen**

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#### **Abstract**

Human metapneumovirus (HMPV) is a respiratory virus that can cause mild cold-like symptoms or severe lower respiratory tract infections. The virus belongs to the Pneumoviridae family of viruses, along with respiratory syncytial virus (RSV). It's a significant but under-recognized pathogen that affects people of all ages, but is particularly dangerous for young children, the elderly, and those with compromised immune systems. HMPV spreads from person to person or surfaces to person. Symptoms include cough, fever, nasal congestion, and shortness of breath. Your health care provider can test, however, there is no treatment.

**Keywords:** Human metapneumovirus, Respiratory syncytial virus, Virus, Pathogen

#### **Introduction**

Human Metapneumovirus (HMPV) is a significant respiratory pathogen that affects the upper and lower respiratory tracts. It was first identified in 2001<sup>1</sup> by researchers in the Netherlands, although subsequent genetic studies suggest that the virus has been circulating for decades,

possibly originating from avian species. HMPV belongs to the Paramyxoviridae family and is closely related to respiratory syncytial virus (RSV), sharing many clinical and epidemiological characteristics. Despite its relatively recent discovery, HMPV is now recognized as a common cause of respiratory infections worldwide, with an impact comparable to that of RSV and influenza.<sup>2</sup>

### **Transmission and epidemiology**

HMPV is primarily transmitted through respiratory droplets that are expelled when an infected person coughs, sneezes, or talks. These droplets can travel short distances and infect nearby individuals. The virus can also spread via direct contact with contaminated surfaces, as it can survive on objects such as doorknobs, countertops, and electronic devices for several hours. Touching one's face after coming into contact with such contaminated surfaces increases the risk of infection.<sup>1</sup>

HMPV infections occur globally and can affect individuals of all ages. However, certain populations are more susceptible to severe illness, including young children, older adults, and individuals with weakened immune systems. The virus exhibits a seasonal pattern, with infections peaking in late winter and early spring, often coinciding with influenza and RSV outbreaks. High-risk environments, such as schools, daycare centers, nursing homes, and hospitals, facilitate the rapid spread of HMPV, leading to localized outbreaks.

### **Clinical manifestations**

The clinical presentation of HMPV infection varies widely, ranging from mild cold-like symptoms to severe respiratory complications. In most cases, symptoms appear within 3 to 6 days of exposure and typically last for a week. Common symptoms include runny nose, sore throat, cough, fever, nasal congestion and fatigue.

For most healthy individuals, HMPV causes mild to moderate upper respiratory symptoms. However, in high-risk groups, the infection can progress to serious lower respiratory illnesses such as:<sup>3</sup>

**Bronchiolitis:** Common in infants and young children, this condition involves inflammation and obstruction of the small airways, leading to wheezing and difficulty breathing.

**Pneumonia:** Inflammation of the lungs that can cause fever, cough, chest pain, and difficulty breathing.

**Acute respiratory distress syndrome (ARDS):** A severe and life-threatening condition that results in rapid-onset respiratory failure.

**Exacerbation of chronic conditions:** Individuals with preexisting respiratory diseases such as asthma, chronic obstructive pulmonary disease (COPD), or cystic fibrosis may experience worsened symptoms due to HMPV infection.

Severe cases may require hospitalization, particularly in infants, the elderly, or immunocompromised individuals who are at increased risk of complications.

### **Diagnosis and Treatment**

Diagnosing HMPV can be challenging due to its clinical similarity to other respiratory viruses, including influenza and RSV. Therefore, laboratory testing is essential for accurate diagnosis. Common diagnostic methods include<sup>4,5</sup>:

**Reverse transcription polymerase chain reaction (RT-PCR):** This molecular test detects viral RNA from respiratory secretions, making it the most reliable diagnostic tool.

**Direct fluorescent antibody (DFA) testing:** Detects viral antigens in respiratory samples but is less sensitive than RT-PCR.

**Serological tests:** Measure antibodies against HMPV but are rarely used for acute diagnosis. Currently, there is no specific antiviral treatment for HMPV. Management is primarily supportive and focuses on alleviating symptoms and preventing complications.

### **Recommended supportive care measures**

**Hydration:** Drinking fluids to prevent dehydration.

**Antipyretics and analgesics:** Medications such as acetaminophen or ibuprofen to reduce fever and relieve discomfort.

**Oxygen therapy:** For patients with severe respiratory distress, supplemental oxygen may be necessary.

**Mechanical ventilation:** In cases of respiratory failure, intensive care support and ventilator assistance may be required.

Since HMPV is a viral infection, antibiotics are ineffective unless there is a secondary bacterial infection present.

### **Prevention strategies**

As there is no vaccine available for HMPV, prevention efforts focus on reducing transmission through good hygiene and infection control measures. Recommended strategies include:

**Hand hygiene:** Frequent hand washing with soap and water for at least 20 seconds. If soap is unavailable, alcohol-based hand sanitizers are an effective alternative.

**Respiratory etiquette:** Covering the mouth and nose with a tissue or elbow when coughing or sneezing to minimize the spread of droplets.

**Disinfection:** Regularly cleaning frequently touched surfaces, including doorknobs, tables, and electronic devices.

**Avoiding close contact:** Staying home when sick and avoiding close interactions with high-risk individuals.

**Use of masks:** Wearing masks in crowded or healthcare settings can help reduce transmission.<sup>3</sup>

### **Public health impact and future directions**

HMPV represents a significant public health concern, particularly among vulnerable populations. Its burden on healthcare systems is substantial, often leading to increased hospital admissions and healthcare resource utilization during peak seasons. Despite its similarity to RSV and influenza in terms of clinical impact, HMPV remains relatively under recognized, underscoring the need for heightened awareness and surveillance.

Research efforts are ongoing to develop vaccines and antiviral treatments for HMPV. Advances in immunology and virology may lead to the development of effective preventive measures in the future. Improved diagnostic capabilities and public health initiatives will also play a crucial role in managing HMPV outbreaks and minimizing their impact on global health.<sup>3</sup>

### **Conclusion**

Human Metapneumovirus is a widely circulating respiratory virus that poses a significant risk to children, older adults, and immune compromised individuals. Although there is no specific antiviral treatment or vaccine available, preventive measures such as good hygiene, respiratory etiquette, and infection control practices can help reduce transmission. Ongoing research and surveillance efforts will be crucial in improving our understanding of HMPV and developing targeted interventions to combat this important respiratory pathogen.

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## Article: 4

### A New Outbreak: HMPV

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#### **Abstract**

Human metapneumovirus (HMPV) is one of the viruses that causes the common cold (upper respiratory infection). If the body is infected with the HMPV virus through the respiratory system, the virus will multiply in the respiratory tract cells, causing inflammation and tissue damage, leading to abnormalities and severe pneumonia. It usually makes people only mildly sick, but it can make some people very sick. The virus belongs to the Pneumoviridae family of viruses, along with respiratory syncytial virus (RSV). There are no specific treatments for HMPV. If symptoms get worse or are concerning, contact a healthcare provider. Individuals that are at high-risk should talk to a healthcare provider when experiencing symptoms of a respiratory virus, even if they are mild, to determine next steps.

**Keywords:** Respiratory disease, Human metapneumovirus, Pneumoviridae, Virus, RNA, RSV, HMPV, Pathogen.

#### **Introduction**

HMPV is a single-stranded RNA virus that affects humans, causing upper and lower respiratory infections. It is similar to the respiratory syncytial virus (RSV), another common viral pathogen that affects the respiratory tract. Both viruses share similar clinical features and are most prevalent in young children, older adults, and those with weakened immune systems. The virus can cause a spectrum of illnesses, including bronchiolitis, pneumonia, and croup.<sup>1</sup> Mild cases of human metapneumovirus usually last a few days to a week. If you're very sick, it'll probably take longer to feel better. You might also have lingering symptoms, like a cough, that take longer to go away.

Whereas COVID-19 tends to appear suddenly with more severe symptoms and a higher mortality rate compared to HMPV. "Actually, this (HMPV; red) is a safe limited disease or an illness that can heal on its own depending on our immune system." But if COVID comes, it is very acute and sudden with more severe symptoms.

#### **Transmission**

HMPV is primarily spread through respiratory droplets when an infected person coughs, sneezes, or talks. It can also be transmitted by touching surfaces contaminated with the virus and then touching the face, particularly the eyes, nose, or mouth. The virus tends to circulate more frequently in the colder months, with peak incidences in late winter and early spring, although it can occur year-round.<sup>2</sup>

#### **Symptoms of HMPV infection**

The symptoms of HMPV infection are similar to those of other respiratory viruses, ranging from mild to severe. In mild cases, symptoms may resemble a common cold, including<sup>1</sup> runny nose, cough, sore throat, fever, fatigue and headache.

In more severe cases, especially in infants, older adults, and immune compromised individuals, the infection can lead to more serious respiratory problems, such as wheezing, shortness of breath, difficulty in breathing, severe cough and cyanosis (bluish discoloration of the skin due to low oxygen levels).

#### **Risk factors**

While anyone can contract HMPV, certain populations are at a higher risk for developing severe illness, including:

**Infants and young children:** These individuals, especially those under 2 years old, are particularly vulnerable to respiratory distress from viral infections like HMPV.

**Older adults:** Adults aged 65 and older are at greater risk due to age-related changes in the immune system and the potential for underlying health conditions such as COPD or heart disease.

**Immuno compromised individuals:** People with weakened immune systems, including those undergoing chemotherapy or with HIV, are more susceptible to severe outcomes from HMPV infection.<sup>2,3</sup>

### **Diagnosis**

HMPV infection is diagnosed based on clinical symptoms and can be confirmed through laboratory tests. These tests may include:

**PCR (Polymerase Chain Reaction):** This test detects the virus's genetic material and is highly sensitive.

**Antigen detection tests:** These are less commonly used but can provide rapid results.

**Serology:** Blood tests may be used to detect antibodies to HMPV, especially in the case of retrospective diagnosis or to understand previous exposure.

Given that HMPV symptoms overlap with those of other respiratory viruses like RSV and influenza, accurate testing is crucial for determining the cause of the illness.<sup>2</sup>

### **Treatment**

Currently, there are no specific antiviral treatments for HMPV. Management primarily involves supportive care, which may include:

**Hydration:** Ensuring the patient stays well-hydrated, particularly in children and the elderly.

**Fever control:** Using antipyretics like acetaminophen or ibuprofen to manage fever.

**Oxygen therapy:** For those with severe respiratory distress or hypoxia, oxygen therapy may be necessary.

**Ventilator support:** In extreme cases, mechanical ventilation may be required if the individual is unable to breathe on their own.

Because there is no specific antiviral treatment, prevention remains the key strategy in managing HMPV infections.

### **Prevention**

Preventing HMPV transmission relies on general respiratory hygiene practices:

**Hand hygiene:** Regular hand washing with soap and water, especially after coughing, sneezing, or touching potentially contaminated surfaces.

**Covering the mouth and nose:** Coughing and sneezing into tissues or the elbow to prevent the spread of droplets.

**Avoiding close contact:** Staying away from individuals who show signs of respiratory illness, particularly in high-risk populations.

**Cleaning surfaces:** Disinfecting frequently touched surfaces in homes, schools, and hospitals.

As of now, there is no vaccine for HMPV, though research is ongoing to develop one. For high-risk individuals, managing underlying health conditions and keeping up with vaccinations for other respiratory viruses, such as the flu and RSV, may help reduce the burden of respiratory illnesses.<sup>4</sup>

### **Conclusion**

Human Metapneumovirus (HMPV) is an important yet often under-recognized cause of respiratory illness, particularly in vulnerable populations like young children, the elderly, and immuno compromised individuals. While most cases are mild and self-limiting, some individuals may develop more severe conditions that require medical intervention. Given the lack of specific antiviral treatments and vaccines, public health efforts should continue to focus on prevention, early detection, and supportive care to reduce the impact of HMPV infections on at-risk populations. As with many viral diseases, ongoing research is essential to improve our understanding of HMPV, develop effective vaccines, and enhance treatment strategies for those most affected by this virus.

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## Article: 5

### **Urgent Attention for Health Care Services to Rising Human Metapneumovirus**

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## **Abstract**

Human metapneumovirus or HMPV is a respiratory virus that was first identified in 2001 by Dutch researchers. Despite its relatively recent discovery, the virus has likely been circulating in human populations for decades. Primarily, the virus affects the respiratory system, causing infections that range from mild cold-like symptoms to severe respiratory distress. While it can infect individuals of all ages, HMPV poses a particular threat to young children and older adults, including those with compromised immune systems. HMPV can cause serious complications, especially for vulnerable populations, so it's important to seek medical care if symptoms worsen or persist. The presence of HMPV as a significant health concern underlines the importance of staying informed and adopting preventive measures. While the virus poses the greatest risk to vulnerable populations, understanding its transmission and symptoms empowers us to protect ourselves and others effectively. Stay vigilant, prioritize hygiene, and consult healthcare professionals for any severe or prolonged symptoms.

**Keywords:** Human metapneumovirus, HMPV, Virus, Respiratory disease

## **Introduction**

Human Metapneumovirus (HMPV), a respiratory pathogen first identified in 2001, has increasingly been recognized as a significant cause of acute respiratory infections. These infections primarily affect young children, the elderly, and immune compromised individuals, with the virus contributing to a notable burden on the global health system.<sup>1</sup> Recent reports indicate a sharp surge in HMPV cases in China, exacerbating the pressure on already strained healthcare. The current outbreak, which occurred five years after the initial onset of the COVID-19 pandemic, has seen HMPV spread alongside other respiratory pathogens, recent data from the World Health Organization (WHO) Disease Outbreak News (7 January 2025) indicate that many temperate Northern Hemisphere countries experience seasonally elevated activity of respiratory viruses (including influenza, RSV, *Mycoplasma pneumoniae*, SARS-CoV-2, and HMPV) in late autumn and winter.

## **Epidemiology and transmission**

HMPV is a member of the *Pneumoviridae* family, a group of viruses that also includes respiratory syncytial virus (RSV). HMPV circulate globally, with seasonal peaks in temperate climates typically observed during the late winter to early spring months. In China, HMPV was first documented in 2003, with an increasing number of cases in subsequent years. The

virus, characterized by its single-stranded RNA genome, spreads primarily through respiratory droplets when an infected person coughs, sneezes, or through direct contact with contaminated surfaces. While HMPV is most active in temperate regions during colder months, its transmission patterns are not restricted to these areas, with some evidence of transmission in tropical climates. The current outbreak in China, which began in late 2024, has been characterized by a rapid increase in HMPV cases. This surge in cases has overwhelmed healthcare facilities, particularly in the Northern provinces, which are now experiencing an influx of patients suffering from severe respiratory distress. According to WHO Disease Outbreak News (DON) reports (7 January 2025) and updates from the China CDC, the observed increase in HMPV positivity in China remains within the expected range for the winter season. While exact incidence figures (for example, case counts per 100,000 populations) are not routinely published, virological surveillance confirms concurrent circulation of influenza, RSV, SARS-CoV-2, *Mycoplasma pneumoniae*, and HMPV. The simultaneous circulation of multiple respiratory viruses exacerbates the strain on healthcare systems, which is already taxed by the ongoing burden of COVID-19 cases.<sup>2,3</sup>

### **Global and regional patterns of HMPV**

Outside of China, other Northern Hemisphere countries are also reporting increases in HMPV consistent with typical winter peaks. In the United Kingdom, weekly bulletins from the UK Health Security Agency (UKHSA) in late December 2024 show that HMPV positivity rose slightly to around 4.5 % among respiratory samples tested (UK, 2025). Despite this uptick, UKHSA officials note that such levels are expected for this time of year, and overall impact on healthcare services is within normal seasonal limits.<sup>1</sup>

### **Clinical features and diagnosis**

The clinical presentation of HMPV infection often resembles that of other respiratory infections such as influenza and respiratory syncytial virus (RSV). Infected individuals typically present with upper respiratory tract symptoms including fever, cough, nasal congestion, sore throat, and shortness of breath. In more severe cases, particularly in young children, the elderly, and immune compromised patients, HMPV can cause bronchiolitis and pneumonia. These complications may progress rapidly, particularly in individuals with underlying respiratory conditions such as asthma or chronic obstructive pulmonary disease (COPD). The diagnostic challenge of HMPV arises from the overlap of clinical manifestations with other respiratory pathogens. Conventional diagnostic methods, such as viral culture and antigen-based assays, are less effective in differentiating HMPV from other respiratory viruses. Therefore, molecular diagnostic techniques, including reverse transcription-polymerase chain reaction (RT-PCR) and multiplex PCR, are essential for accurate detection. These methods offer high sensitivity and specificity, allowing for rapid identification of HMPV and other respiratory viruses, thereby enabling timely clinical interventions. Despite the effectiveness of PCR-based testing, the diagnosis of HMPV remains challenging owing to its clinical overlap with other common respiratory viruses. Given the increasing prevalence of HMPV, influenza, *Mycoplasma pneumoniae*, healthcare providers must maintain a high level of suspicion when managing patients with acute respiratory illnesses, particularly in the winter months when respiratory infections peak.<sup>4</sup>

### **Impact on healthcare systems**

The surge in HMPV cases in China has had a profound impact on the healthcare system. Pediatric hospitals, which typically manage a significant number of respiratory cases, are now reporting severe overcrowding and extended wait times for emergency care. The demand for pediatric intensive care units (PICUs) has risen sharply as children with severe pneumonia and respiratory failure require hospitalization. The burden on adult healthcare facilities has also increased, as the elderly, particularly those with co-morbid conditions, such as cardiovascular disease and diabetes, are at a heightened risk of severe complications and death.<sup>3,4</sup>

Recent social media discussions highlighted concerns about potential surges in hospital

admissions. However, according to official reports from Chinese health authorities (WHO DON, 7 January 2025), the current seasonal increase in HMPV and other respiratory pathogens has not exceeded the country's routine winter healthcare capacity. Hospital utilization trends remain comparable to previous years. While anecdotal accounts suggest an uptick in patient volumes, particularly pediatric cases, the official stance from national and international health agencies is that these patterns are consistent with typical seasonal peaks. With no specific antiviral treatment for HMPV, management is primarily supportive, focusing on hydration, fever control, and respiratory support, including the use of oxygen therapy and mechanical ventilation for severe cases. The healthcare system is also facing challenges in the form of staff shortages and increased workloads for medical professionals. Concurrent circulation of multiple pathogens has made it increasingly difficult for healthcare providers to provide timely care, highlighting the need for robust healthcare infrastructure and preparedness measures. <sup>[2]</sup>

### **Government response and preparedness**

In response to the escalating HMPV outbreak, Chinese health authorities implemented a range of measures aimed at controlling the spread of the virus. The National Disease Control and Prevention Administration (CDC) has established a pilot monitoring system for pneumonia of unknown origin designed to track the spread of respiratory pathogens and identify novel threats. This initiative is particularly crucial, given the simultaneous circulation of multiple respiratory viruses, including HMPV, influenza, and COVID-19, which necessitates a coordinated public health response. The Chinese government has also ramped up efforts to promote preventive measures, including widespread vaccination campaigns for influenza and other respiratory pathogens as well as public health campaigns emphasizing the importance of good hygiene, mask-wearing, and social distancing. Likewise, in the United Kingdom, routine sentinel surveillance systems (managed by the UKHSA and Royal College of General Practitioners) track HMPV and other respiratory pathogens. The alignment of data across multiple nations emphasizes the importance of robust, integrated surveillance in detecting seasonal trends, informing public health guidance, and coordinating response measures. Despite these efforts, the ongoing outbreak highlights the limitations of the current preparedness strategies. The absence of a vaccine or specific antiviral therapy for HMPV reinforces the pressing need for ongoing research on effective treatments and preventive interventions. Moreover, the rapid spread of the virus coupled with the concurrent circulation of multiple pathogens reinforces the importance of a robust surveillance system and rapid response capabilities. <sup>[2]</sup>

### **Conclusion**

The virus serves as a reminder of the gaps in healthcare systems and the need for constant vigilance. Strengthening public health infrastructure, improving access to diagnostic tools, and fostering international collaboration are critical steps toward safeguarding public health. While the current outbreak may not be a pandemic threat, but its emergence is a wake-up call to priorities resilience and preparedness in India's healthcare strategy.

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## Chhalang 3.0



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