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A Comprehensive Overview on Corona Virus (COVID-19), Human Metapneumovirus (HMPV) & Respiratory Syncytial Virus (RSV)

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A B S T R A C T :

This comprehensive overview examines the respiratory viruses COVID-19, Human Metapneumovirus (HMPV), and Respiratory Syncytial Virus (RSV), highlighting their transmission modes, symptoms, treatment options, and recurrence rates. COVID-19, caused by the SARS-CoV-2 virus, emerged in January 2020, leading to a global pandemic characterized by mild to severe respiratory illness, particularly in vulnerable populations. HMPV, discovered in 2001, is a significant cause of respiratory infections in children and older adults, often presenting with cold-like symptoms but can lead to severe conditions such as pneumonia. RSV, a common respiratory pathogen, primarily affects infants and the elderly, causing bronchiolitis and pneumonia. The transmission of these viruses occurs through respiratory droplets, close contact, and surface contamination, necessitating public health measures to mitigate spread. Treatment strategies vary, with COVID-19 involving antiviral and immune-based therapies, while HMPV and RSV management focuses on supportive care. Understanding the dynamics of these viruses is crucial for public health preparedness and response, emphasizing the need for continued research and health education to protect vulnerable populations.

Keywords: Corona Virus Disease 2019 (COVID-19), Human Metapneumovirus (HMPV), Respiratory Syncytial Virus (RSV).

Introduction:

Corona Virus Disease 2019 (COVID- 19) is a contagious illness caused by the SARS- CoV- 2 coronavirus. In January 2020, the illness spread across the globe, leading to the COVID- 19 epidemic. utmost individualities infected with the contagion will have mild to moderate respiratory symptoms and recover without demanding special care. nevertheless, some individualities will come severely ill and need medical backing. Elderly individualities and those with being health issues analogous as cardiovascular complaint, diabetes, habitual respiratory complaint, or cancer are at an advanced trouble of developing severe illness. The contagion can be transmitted from the mouth or nose of an infected person in bitty liquid patches produced when they cough, sneeze, talk, sing, or breathe. These patches can range from larger respiratory droplets to lower aerosols.

It's vital to follow respiratory form, analogous as coughing into a fraudulent elbow, and to remain at home and tone- isolate until you feel better if you are bad. The trouble is topmost when individualities are in close diggings, but small airborne patches carrying the contagion can crawl in the air and trip lower distances, especially outside. Testing ways for COVID- 19 that identify the contagion's nucleic acid include real- time hinder recap polymerase chain response(RT PCR), recap- interceded revision, and hinder recap circle- interceded isothermal revision(RT Beacon) from a nasopharyngeal navigator.

The original linked case was reported in Wuhan, China, in December 2019, utmost researchers believe that the SARS- CoV- 2 contagion made its way into mortal populations through natural zoonosis, akin to the outbreaks of SARS- CoV- 1 and MERS- CoV, and in line with other afflictions throughout mortal history. Social and environmental factors including climate change, destruction of natural ecosystems, and wildlife trade have heightened the chances of analogous zoonotic spillover. During the early outbreak in Wuhan, the contagion and the complaint were constantly appertained to as" coronavirus" and" Wuhan coronavirus," with the complaint sometimes being nominated" Wuhan pneumonia."

Historically, several conditions have been named after specific geographic areas, analogous as the Spanish flu, Middle East respiratory pattern, and Zika contagion. In January 2020, the World Health Organization(WHO) suggested 2019- nCoV and 2019- nCoV acute respiratory complaint as temporary names for the contagion and health condition predicated on 2015 recommendations and international morals against using geographic locales or demographic groups in the selecting of conditions and contagions to avoid social stigma. The formal names COVID- 19 and SARS- CoV- 2 were announced by the WHO on 11 February 2020, with COVID- 19 serving as a short form for" coronavirus complaint 2019." The WHO also refers to" the COVID- 19 contagion" and" the contagion responsible for COVID- 19" in its public dispatches.[1]

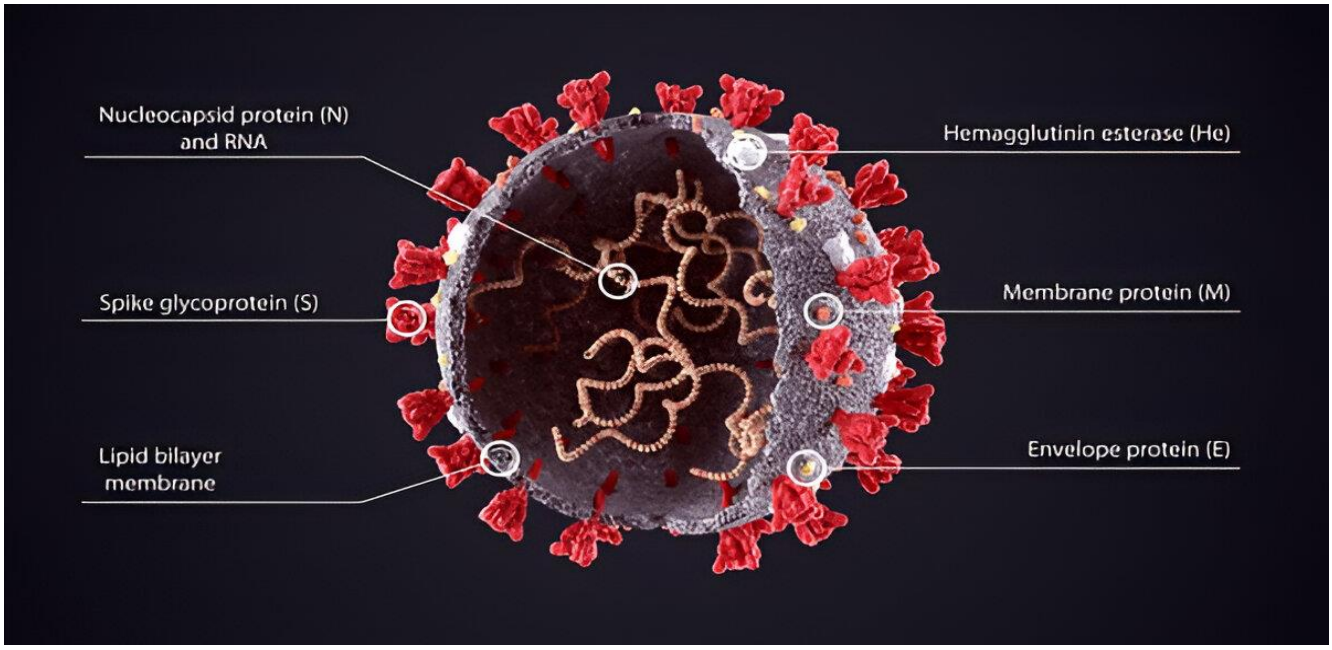


Figure 1: Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2).

Human MetaPneumoVirus (HMPV or hMPV) is a negative-sense single-stranded RNA virus that belongs to the Pneumoviridae family and is closely related to the avian metapneumovirus (AMPV) group C. It was first isolated in 2001 in the Netherlands using the RAP-PCR (RNA arbitrarily primed PCR) method for identifying unknown viruses in cultured cells. As of 2016, it was the second most frequent cause — after respiratory syncytial virus (RSV) — of acute respiratory tract illness in otherwise healthy children under five in a large US hospital. The highest hospitalization rates for infants with HMPV occur between six and twelve months, which is slightly older than the peak for RSV, occurring around two to three months. The clinical symptoms and severity of HMPV are comparable to those caused by RSV.

HMPV also significantly contributes to illness in older adults and infants. Human metapneumovirus (HMPV) was initially identified in 2001 in the Netherlands by Bernadette G. van den Hoogen and her team. HMPV was first recognized in the respiratory samples of 28 infants in the Netherlands and had initially distinguished itself from other common respiratory viruses because the testing methods van den Hoogen and her team had employed — immunological assays using virus-specific antibodies and PCR-based methods utilizing virus genome-specific primers — were able to analyse only known respiratory viruses and were thus unfit for identifying the new virus. When scientists began employing molecular biology techniques, the genetic characteristics and portions of the viral genomic sequences could be analysed. These methods included the randomly primed PCR technique, which provided the limited sequence data necessary to establish a clear relationship between this novel virus and the avian pneumovirus.[2] The newly identified virus, human metapneumovirus, is named for its close relationship to AMPV, indicating its classification as a metapneumovirus and its human host. Human metapneumovirus (HMPV) is a virus that typically causes symptoms similar to a cold, though some individuals can become quite ill.

You are more likely to experience severe illness upon your first HMPV infection, which is why young children have a lower risk for serious disease. You gain some immunity from your first infection and are also more prone to exhibit mild, cold-like symptoms if you contract HMPV again. You may experience coughing or sneezing, have a runny nose, or develop a sore throat. Most cases are mild, but young children, adults over 65, and individuals with weakened immune systems are at a higher risk for severe illness. It belongs to the same category — or scientific classification — as RSV (Pneumovirus) and can produce comparable symptoms. The highest risk for severe illness from HMPV occurs between the ages of 6 and 12 months, whereas RSV is more likely to cause severe illness in infants younger than 6 months.

Retrospective serological studies have shown the presence of HMPV antibodies in humans more than 50 years ago. Although the virus was initially recognized as the cause of respiratory tract infections in children, HMPV is also a significant cause of respiratory infections in adults. Almost all children are infected with HMPV by the age of five; the repeated infections throughout life indicate transient immunity. Recently, there has been concern regarding hMPV cases in China, including reports of hospitals being overwhelmed.

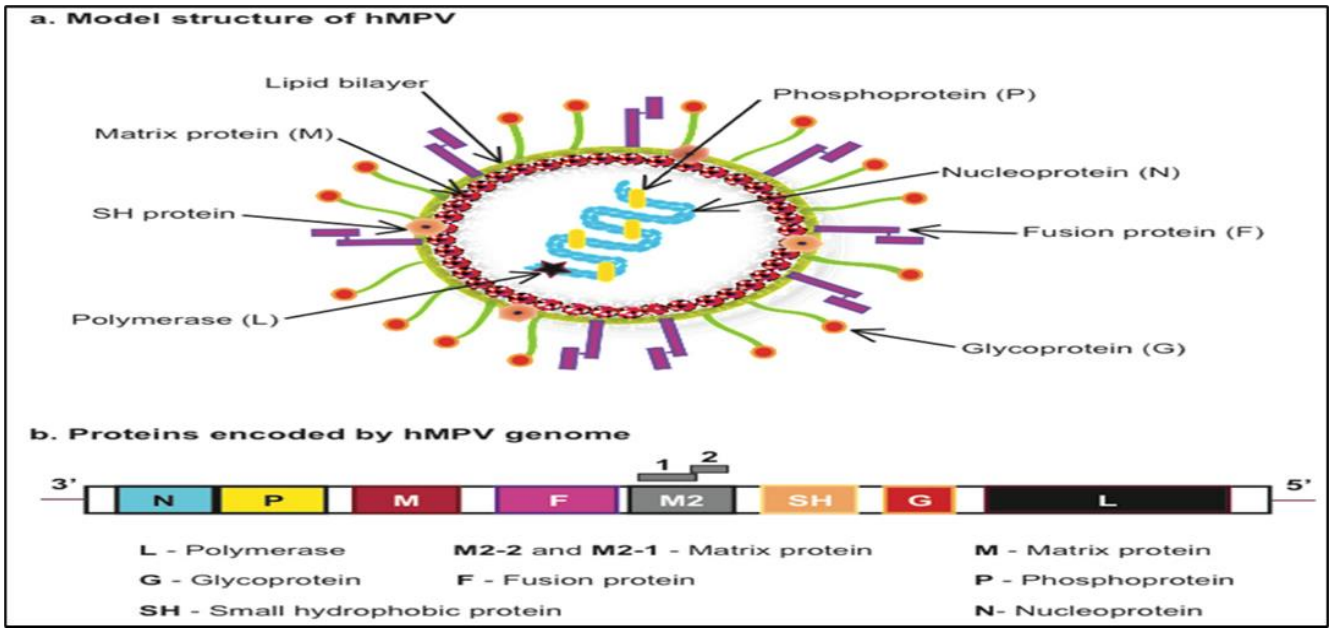


Figure 2: Model structure and proteins encoded by Human Metapneumovirus (hMPV).

Respiratory Syncytial Virus (RSV), also known as human respiratory syncytial virus (h-RSV) and mortal orthopneumovirus, is a contagion responsible for respiratory tract infections. It's characterized as a negative- sense, single- stranded RNA contagion. The contagion gets its name from the large conformations called syncytia that arise when cells come infected and fuse together. RSV is a leading cause of respiratory- related hospitalizations in babies, and reinfection remains frequent in after life, though generally less severe. It's recognized as a significant pathogen across all age demographics. Infection rates tend to peak during the cold time-out months, leading to bronchiolitis in babies, common snap in grown- ups, and more severe respiratory conditions, like pneumonia, among aged grown- ups and those with compromised vulnerable systems.

RSV is suitable of causing outbreaks in both community and sanitorium surroundings. After original exposure through the eyes or nose, the contagion invades the epithelial cells of both the upper and lower airways, performing in inflammation, cellular damage, and airway blockage. various ways live for detecting the contagion and diagnosing RSV, including antigen testing, molecular testing, and viral culture. Besides vaccination, precautionary strategies include hand hygiene and minimizing close contact with infected individualities. The identification of RSV in respiratory aerosols on with the generation of fine and ultrafine aerosols during regular breathing, talking, and coughing, as well as the growing scientific agreement regarding the transmission of respiratory infections — may bear airborne precautions for effective protection.[3] In May 2023, the US Food and Drug Administration(FDA) sanctioned the first RSV vaccines, Arexvy(developed by GSK plc) and Abrysvo(Pfizer). The precautionary administration of palivizumab or nirsevimab(both monoclonal antibody antidotes) can avert RSV infection in high- trouble babies. Treatment of severe cases primarily involves supportive measures, including oxygen remedy and advanced breathing backing, analogous as continuous positive airway pressure(CPAP) or nasal high- flux oxygen, as demanded. In cases of severe respiratory failure, intubation and mechanical ventilation might be necessary.

Ribavirin is an antiviral medicine approved for treating RSV in children. Generally, RSV infection isn't severe, but it can lead to considerable morbidity and mortality in babies and grown- ups, especially among the elderly and individualities with pre- being heart or lung conditions. RSV was first linked in 1956 when scientists isolated a contagion from a group of chimpanzees passing respiratory issues. They firstly appertained to it as the chimpanzee coryza agent(CCA). In 1957, Robert M. Chanock linked the same contagion in children suffering from respiratory ails. disquisition on mortal antibodies in babies and children demonstrated that the contagion was current in early nonage. The contagion was subsequently renamed mortal orthopneumovirus, or mortal respiratory syncytial contagion(h-RSV). Other pneumoviruses have shown considerable similarity to h-RSV. Bovine RSV(b-RSV) possesses roughly 80 of its heritable material in common with h-RSV.

It also exhibits h-RSV's tendency to affect the immature, performing in more severe complaint in legs under six months of age. Since b-RSV- infected legs cortege nearly identical symptoms to those set up in h-RSV- infected children, they serve as a precious beast model in RSV disquisition. RSV can lead to acute infections in certain individualities, particularly babies under 12 months old, especially those born preterm, aged individualities, those with heart and lung affections, or anyone with a weakened vulnerable system(immunocompromised).[4] RSV(respiratory syncytial contagion) is a contagion that may affect in respiratory infections among babies, children, and grown- ups of every age. An RSV infection generally leads to a mild, cold- suchlike illness that resolves in one to two weeks. still, RSV can occasionally affect in severe symptoms and complications, especially in children under five, aged grown- ups over 65, and individualities with vulnerable deficiencies. The contagion spreads through droplets emitted by an infected person while coughing, sneezing, or kissing. Roughly 80 of children under the age of two who are rehabilitated due to RSV don't have any trouble factors.[5]

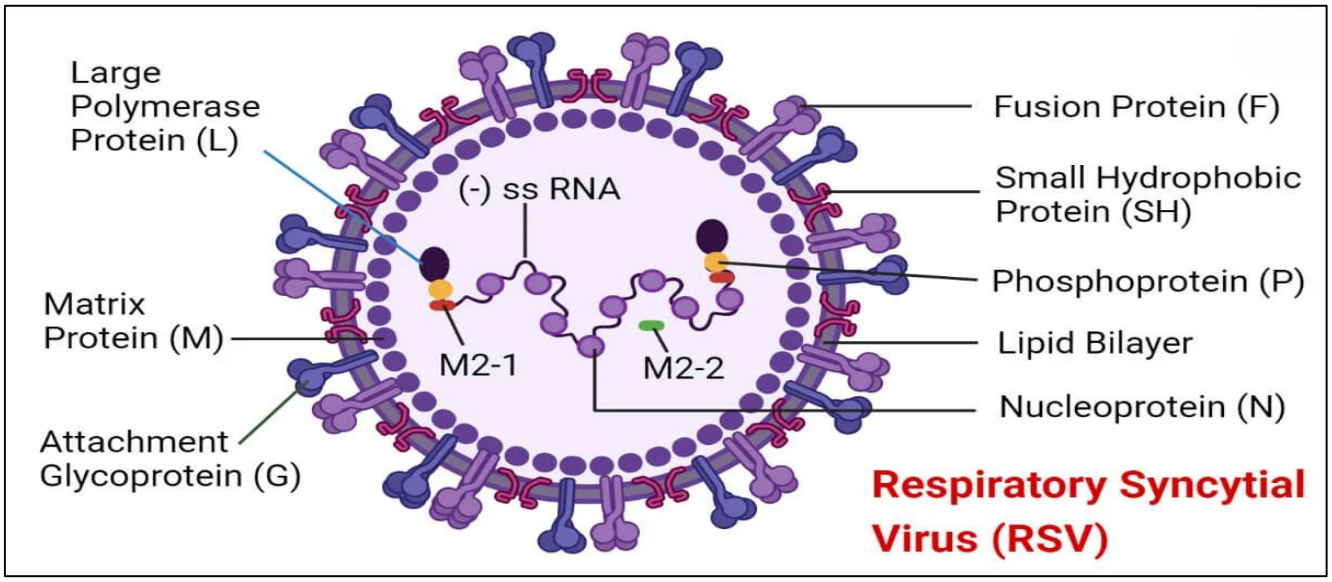
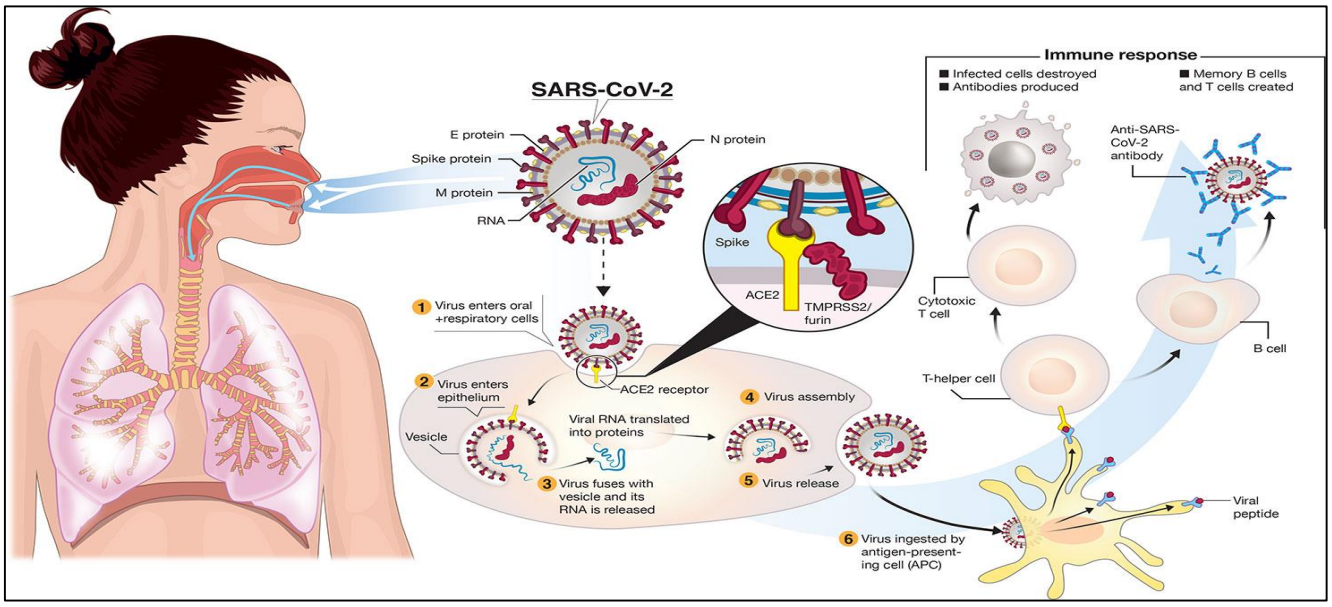


Figure 3: Structure of Respiratory Syncytial Virus (RSV).

Mode of Transmission:

Covid 19's Mode of Transmission: -

The spread of COVID- 19 involves the transfer of coronavirus complaint 2019 from one existent to another. COVID- 19 primarily spreads when individualities ingurgitate air that is tainted by droplets aerosols and small airborne patches that harbour the contagion. Infected individualities release those patches as they breathe, converse, cough, sneeze, or sing. The trouble of transmission increases with contiguity between individualities. still, infection can also take place over lower distances, especially in inner settings. The contagion is transmitted through fluid patches laden with the contagion, or droplets, which appear in the respiratory tract, and are expelled from the mouth and nose. There are three distinct modes of transmission" drop" and" contact," which relate to larger droplets, and" airborne," linked to lower droplets. However, they fall to the ground more swiftly than they evaporate, thus contaminating the shells around them, If the droplets exceed a specific critical size. droplets that are lower than a specific critical size, generally considered to be 5- 10 µm in fringe, are nominated respiratory droplets, and when they are patches lower than 5µm in fringe are nominated as airborne droplets.[10][11]



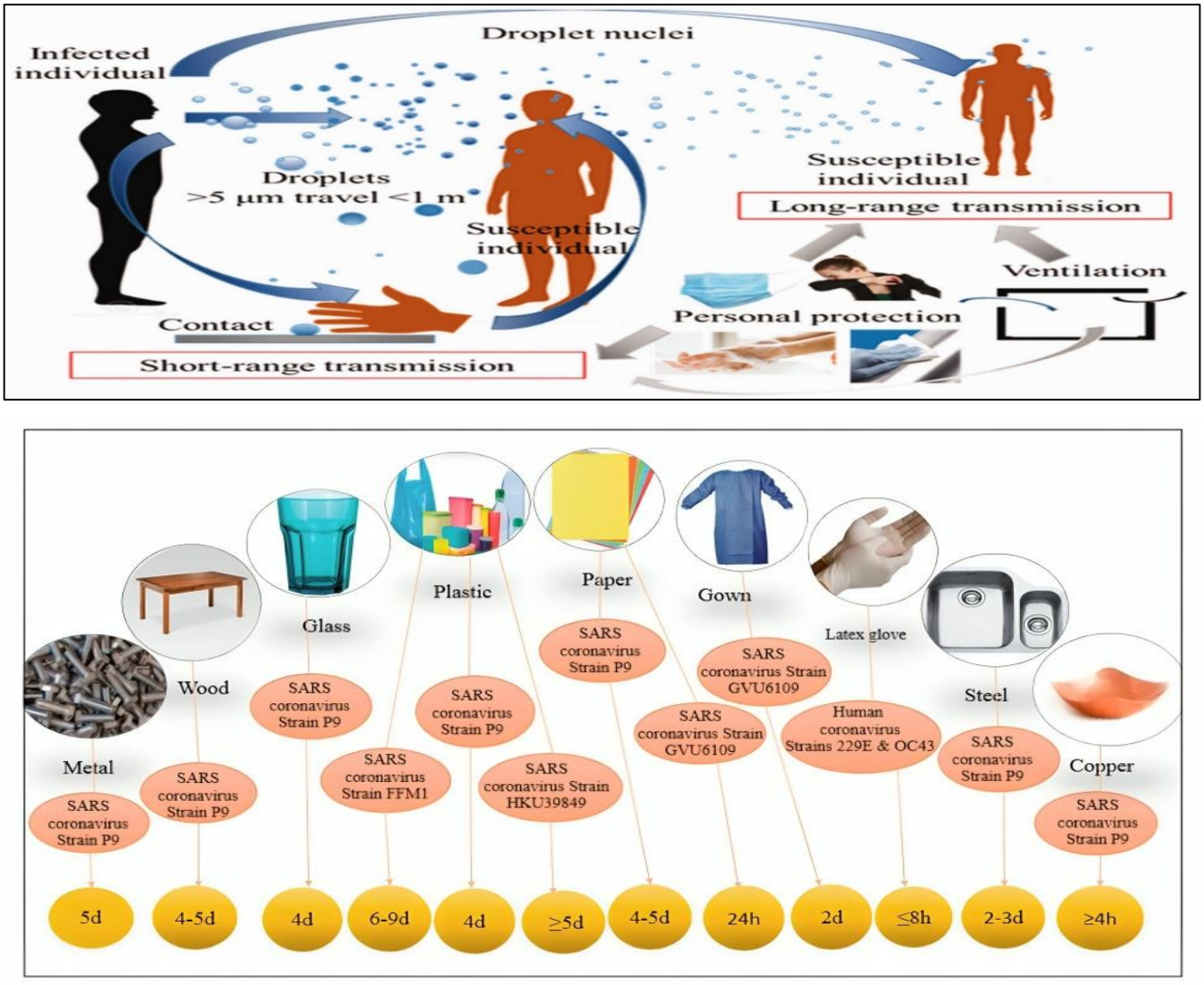


Figure 4: Modes of Transmission of Severe Acute Respiratory Syndrome-Coronavirus-2 (SARS-CoV-2)

/ Corona Virus Disease 2019 (COVID-19)

Human Metapneumovirus's (HMPV) Mode of Transmission: -

HMPV is primarily transmitted through respiratory driblets, akin to other respiratory contagions. Feting the colourful transmission styles can help in minimizing the infection threat. Below are the primary transmission pathways for HMPV:

1. Airborne patches produced from Coughing and Sneezing

When a person whose infected coughs or sneezes, respiratory driblets that contain the contagion are expelled into the air. individualities hard can also gobble these driblets, making this a crucial mode of transmission.

2. Near Communicate with Infected individualities

Having close contact with an infected person, whether through hugging, shaking hands, or participating implements, raises the liability of transmission. The contagion disperses more readily in crowded or confined areas where people are near bone another.

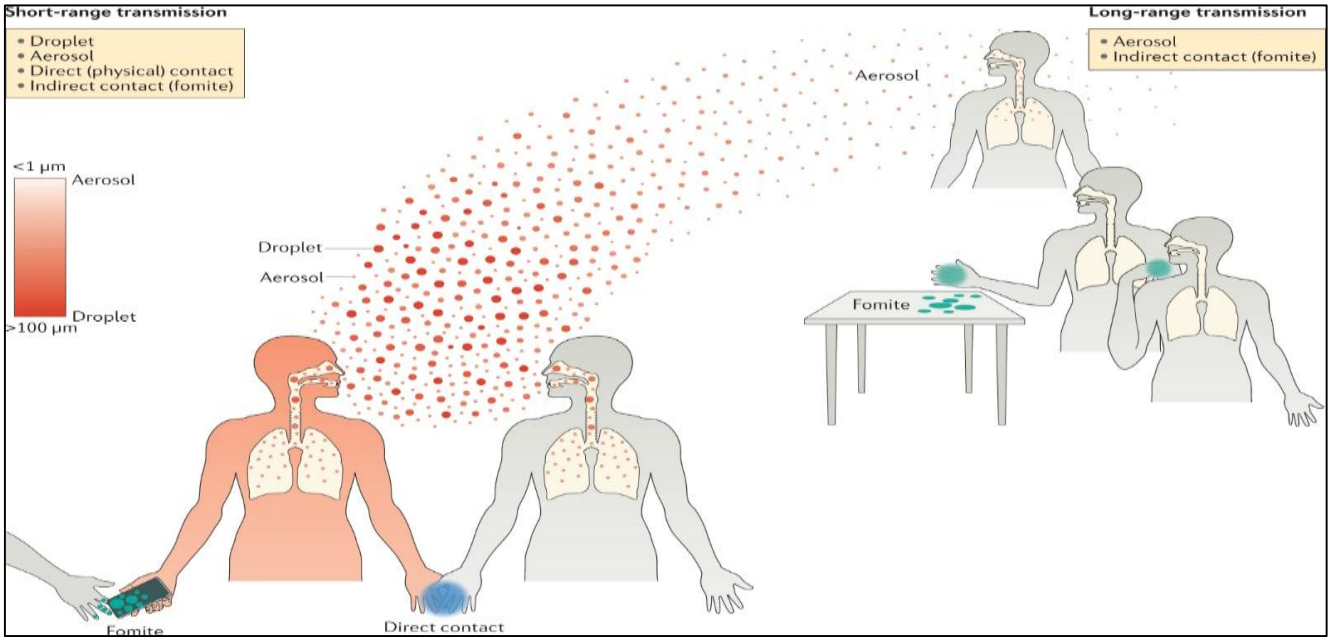
3. Direct Contact

HMPV can be transmitted via direct physical commerce with an infected person, similar as shaking hands or touching shells that harbour the contagion. Once the contagion is on the hands, touching the face, particularly the eyes, nose, or mouth, elevates the chance of infection.

4. Face Impurity

The contagion can persist on shells like doorknobs, light switches, or toys for several hours. reaching defiled shells followed by touching the face can promote the contagion's spread, especially in crowded settings like seminaries and hospitals.[6]

Figure 5: Modes of Transmission of Human Metapneumovirus (HMPV)



Respiratory Syncytial Virus's (RSV) Mode of Transmission: -

As with multitudinous other respiratory contagions, RSV spreads through large droplets that can enter the eyes, nose, or mouth, challenging close contact with a person infected with RSV or tone- inoculation to the face(nose, mouth, or eyes) through defiled shells or skin. Large droplets may be released from the nose and mouth of an infected person while they cough or sneeze. It's estimated that a single cough can induce as numerous as 3,000 driblets. These droplets not only have the eventuality to directly infect another person, but they can also settle on various shells.

Depending on the type of face, the contagion may remain active and contagious for differing lengths of time. disquisition indicates that the continuance of RSV is longest on pervious shells, lasting for over to six hours. pervious shells encompass hard shells like countertops, glass, plastics, and substance. On porous shells, analogous as paper, cardboard, and fabrics, RSV can remain doable for over to two hours. On gloves, the contagion can be present for as long as five hours, which explains how RSV can be transmitted within sanitorium wards and other healthcare settings as a nosocomial infection. RSV survives for the shortest duration on skin, lasting roughly only 30 beats.

Similar to all respiratory contagions, RSV can also be transmitted through airborne droplets. nonetheless, according to the World Health Organization(WHO) and the Centre for Disease Control and Prevention(CDC), transmission of the complaint occurs through drop transmission involving patches larger than 5 mm, as well as aerosol transmission involving patches measuring 5 mm or lower. When RSV is gobbled through mucous membranes like the nose or mouth, it infects airway epithelial cells(AECs) positioned in the upper respiratory system.[9]

Signs and Symptoms:

Covid 19's Symptoms		
Most common	**Less common**	**Serious**
fever	**sore throat**	**trouble breathing or feeling short of breath**
cough	**headache**	**inability to speak or move, or disorientation**
fatigue	**discomfort**	**soreness chest discomfort[10]**
loss of flavour or scent	**diarrhoea**	

Human Metapneumovirus's (HMPV) Symptoms		
Healthy Adults	**Older Adults**	**Children**
Runny or congested nose	**High temperature fever**	**Cough/ Trouble breathing**
Sore throat	**Wheezing**	**Watery Runny nose**
Cough	**Trouble breathing**	**High temperature Fever**
Slight fever/Head pain	**Pneumonia**	**Emesis / Vomiting**

Note: In severe cases, HMPV can lead to bronchiolitis (inflammation of the small airways) or pneumonia in children, sometimes requiring hospitalisation. Seek prompt medical care if your child has trouble breathing, a high fever, or worsening symptoms.[7]

Respiratory Syncytial Virus's (RSV) Symptoms			
Babies	**Toddlers**	**Severe symptoms (Babies & Toddlers)**	**Children and Adults**
Fussiness or Annoyance	**Nasal discharge, Coughing and Sneezing**	**Loud breathing**	**Nasal discharge**
Reduced appetite and difficulty eating	**Challenges with eating or drinking**	**Nostrils widening while breathing**	**Cough and Mucus**
Limited interest in activities	**Minimal interest in play**	**Bluish or greyish tint to their lips, mouth, and nails**	**Mild headache.**
Alterations in their breathing pattern	**Difficulty swallowing**	**Abdominal breathing or a sinking of the casket along with the expansion of the tummy when breathing**	**Sore throat.**
Elevated body temperature	**Breathing either faster or slower than usual**	**Brief, quick, shallow breaths**	**Tiredness**
Cough.	**Elevated body temperature**	**Interruptions during breathing**	**Elevated body temperature[9]**

Line of Treatment:

Lines of Treatment for Covid-19	
1.Antiviral medications (remdesivir, lopinavir/ritonavir combination, umifenovir, and favipiravir)	**7. Host-directed treatment**
2. Antibacterial medications	**a. Metformin**
3. Antimalarial medications	**b. Statins**
	c. Pioglitazones
4. Antiparasitic	
5. Anticoagulants	
6. Immune-based treatment	**8. Other therapeutic agents**
a. Immunomodulatory treatment	**a. Angiotensin-converting enzyme inhibitors**
i. Steroids	**b. Nonsteroidal anti-inflammatory drugs**
ii. Interleukin inhibitors	**c. Vitamin C**
iii. Interferons	**d. Vitamin D**
b. Human blood-derived therapies	**e. Zinc**
i. Convalescent plasma	**f. Lactoferrin**
ii. Immunoglobulins	**g. Melatonin**
iii. Mesenchymal stem cells	
	9. Oxygen treatment[10]

Lines of Treatment for Human Metapneumovirus (HMPV)
Over-the-counter medications: Utilizing fever reducers and pain relievers such as acetaminophen or ibuprofen to control fever and alleviate discomfort.
Nasal decongestants and saline sprays: Using these to ease nasal congestion and enhance breathing.
Oxygen therapy: In critical situations, supplying supplemental oxygen to patients experiencing breathing challenges.
Bronchodilators: Giving these medications to expand airways in patients experiencing wheezing or breathlessness.
Antibiotics: Administering these only when a secondary bacterial infection arises, as antibiotics do not work against viruses.

Note: It is important to recognize that antiviral medications are not typically advised for HMPV infections.[12]

Note: There's no specific remedy for RSV in either children or grown-ups. Antibiotics don't affect RSV.

Lines of Treatment for Respiratory Syncytial Virus (RSV)	
Drugs listed below have been researched for the management of RSV:	**Non-Specific RSV Treatments:**
Ribavirin	**Dornase alfa**
Palivizumab	**N-acetylcysteine (NAC)**
Motavizumab	**Nebulized hypertonic saline**
Respiratory syncytial virus immune globulin intravenous (RSV-IGIV)	**Bronchodilators, Epinephrine, Glucocorticoids, Leukotriene receptor antagonists[8]**

Mechanism of Action:

Covid 19:

Antiviral Drugs: An examination of the mechanisms of action of known antiviral medications determined that they can enhance the cell's defence against a virus (interferons), inhibit the virus's attachment to the cell or its entry into the cell, and interrupt its deproteinization process within the cell, along with antimetabolites that lead to the blockage of nucleic acids synthesis.
Immune-based Therapy: Based on the antiviral immune reaction to the virus, antibody-based immunotherapies for COVID-19 encompass the injection of convalescent plasma from individuals who have recovered, high-dose intravenous immunoglobulins (IVIG), monoclonal antibodies, and polyclonal antibodies. Additionally, cell-based therapies, vaccine-related strategies, cytokine-based immunotherapy, immune checkpoint inhibitors, JAK inhibitors, decoy receptors, and immunosuppressive medications are also included.[10]

Human Metapneumovirus (HMPV):

Nasal Decongestants: The way in which decongestants ply their goods is through the activation of postjunctional nascence- adrenergic receptors located on precapillary and postcapillary blood vessels within the nasal mucosa. Nasal decongestants can palliate this inhibition by dwindling the swelling in the nasal passages, thereby allowing a person to breathe further comfortably. nonetheless, these agents can only offer temporary relief from traffic and do n't address the root cause of the issue. These decongestants serve by boosting the goods of adrenaline and noradrenalin via the stimulation of the α-adrenergic receptors. This results in the condensation of blood vessels in the nose, throat, and paranasal sinuses. The specifics also block the release of seditious intercessors and dwindle mucus product in these regions.
Bronchodilators: Bronchodilators represent a class of specifics that grease easier breathing by relaxing the muscles within the lungs and expanding the airways(bronchi). They're generally employed to manage habitual conditions in which the airways may come constricted and lit . The three most constantly specified bronchodilators are

- beta- 2 agonists, including salbutamol, salmeterol, formoterol, and vilanterol
- anticholinergics, similar as ipratropium and tiotropium
- theophylline[12]

Respiratory Syncytial Virus (RSV):

Ribavirin: Ribavirin triphosphate (RTP) is the main metabolite that directly blocks viral mRNA polymerase by attaching to the nucleotide binding site of the enzyme. This hinders the attachment of the appropriate nucleotides, resulting in a decrease in viral replication or the creation of defective virions.
RSV-IGIV: Respiratory syncytial virus immune globulin intravenous (RSV-IGIV) is part of a category of medications referred to as immunizing agents. RSV-IGIV is utilized to prevent infection caused by the respiratory syncytial virus (RSV). RSV-IGIV functions by supplying your body with the antibodies required to safeguard it against RSV infection.[14]

Side Effects & Adverse Effects:

Side Effects & Adverse Effects of Covid 19	
Diarrhoea.	**Nausea and Emesis/Vomiting**
Light-headedness.	**Joint inflammation**
Tiredness.	**Irregular bowel movements**
Migraine.	**Reduced appetite**
Sleeplessness.	**Reaction related to Infusion**
Muscle ache.	**Pain at injection site[10]**

Side Effects & Adverse Effects of Human Metapneumovirus (HMPV)	
feeling drowsy (search for non-sedative medications)	**a skin eruption**
inflammation of the nasal lining	**shaking, especially in the hands**
migraines	**abruptly perceptible heartbeats (palpitations)**
feeling nauseous or experiencing sickness	**coughing**
a dry oral cavity	**nausea and emesis/vomiting**
feeling uneasy or restless	**loose stools[13]**

Side Effects & Adverse Effects of Respiratory Syncytial Virus (RSV)	
nausea	**difficulty in sleeping**
loose stools	**fluctuations in weight**
stomach unease	**alterations in taste/hearing may happen**
migraine	**dry skin**
light-headedness	**decreased appetite**
fuzzy eyesight	**cough[15]**

Recurrence Chances:

Recurrence Chances of Covid 19	
Grounded on the findings, the Overall Reinfection rate (not counting for the timing of circumstance) was calculated as 122. 64(per 1000 person- times). This value was noted as 139. 22 for ladies and 105. 94 for males. The loftiest reinfection rate was noted in the 19 – 44 age group(156 per 1000 person- times) and the 45 – 64 age group(135. 97 per 1000 person- times). The smallest overall reinfection rate was assessed for the 5 – 18 age group(69. 77 per 1000 person- times), children youngish than 5 times old (76. 09 per 1000 person- times), and grown-ups over 80 times old(76. 24 per 1000 person- times).	**Recurrence rate (passed within 90 days from discharge) Total recurrence rate has been approached as 8. 55 per 1000 person-time(n = 12). These statistics were computed as 11. 36 for ladies and 5. 72 per 1000 person- time for males. The biggest and smallest recurrence rate were observed in grown-ups over 65 times old(10. 88 per 1000 person- time) and children under 18 times old(none).[10]**

Recurrence Chances of Human metapneumovirus (HMPV)	
Human metapneumovirus (HMPV) is a primary contributor to respiratory Infections in adults over 65 years old. Almost all children globally are seropositive for HMPV by the age of 5 years.	**Reinfections happen at various stages of life, and there is currently no approved vaccine. Intermittent HMPV infections are generally mild and resolve on their own in individualities with a competent vulnerable system.[12]**

Recurrence Chances of Respiratory Syncytial Virus (RSV)	
Annual rates of infections were 0.14% and 1.29%, respectively. For children experiencing a first infection, the annual reinfection rates were 0.25% (95% confidence interval (CI) = 0.22–0.28) and 3.44% (95% CI = 3.33–3.56), respectively.	**The Annual rates of Reinfection for every 1,000 children progressed 0 to 4 times who endured an original RSV occasion in the same time were 2.5 and 34.4, independently. The monthly reinfection rates dropped from 3.2 to 0.9 from periods 0 to 3 but rose again to 2.7 for children progressed 4, while the monthly reinfection rates showed an analogous pattern, with a low point of 23.6 infections per 1,000 children progressed 2.[15]**

Conclusion:

In conclusion, the ongoing challenges posed by respiratory viruses such as COVID-19, HMPV, and RSV highlight the importance of public health measures, ongoing research, and awareness. While COVID-19 has significantly impacted global health since its emergence in late 2019, understanding the transmission dynamics of these viruses can help communities better prepare and respond to future outbreaks. As we continue to navigate the complexities of respiratory illnesses, it is crucial to remain vigilant by practicing good respiratory hygiene, staying informed about vaccination opportunities, and supporting ongoing research efforts aimed at understanding these viruses better. The efforts made today are vital for safeguarding public health and mitigating the impact of respiratory infections on vulnerable populations, such as infants, the elderly, and those with underlying health conditions. By prioritizing health education and preventive measures, we can collectively work towards a healthier future and minimize the burden of respiratory illnesses in our communities. Let us remain committed to fostering a culture of awareness and proactive health practices as we strive to enhance our resilience against lethal diseases.

REFERENCES:

1. Jin X.; Ren J.; Li R.; Gao Y.; Zhang H.; Li J.; Zhang J.; Wang X.; Wang G. Global Burden of Upper Respiratory Infections in 204 Countries and Territories, from 1990 to 2019 eClinicalMedicine 2021, 37, 100986. 10.1016/j.eclinm.2021.100986.
2. Olsen S. J.; Winn A. K.; Budd A. P.; Prill M. M.; Steel J.; Midgley C. M.; Kniss K.; Burns E.; Rowe T.; Foust A.; Jasso G.; Merced-Morales A.; Davis C. T.; Jang Y.; Jones J.; Daly P.; Gubareva L.; Barnes J.; Kondor R.; Sessions W.; Smith C.; Wentworth D. E.; Garg S.; Havers F. P.; Fry A. M.; Hall A. J.; Brammer L.; Silk B. J. Changes in Influenza and Other Respiratory Virus Activity During the COVID-19 Pandemic - United States, 2020–2021. MMWR Morb Mortal Wkly Rep 2021, 70 (29), 1013–1019. 10.15585/mmwr.mm7029a1.
3. Chow E. J.; Uyeki T. M.; Chu H. Y. The Effects of the COVID-19 Pandemic on Community Respiratory Virus Activity. Nature Reviews Microbiology 2022, 21 (3), 195–210. 10.1038/s41579-022-00807-9.
4. Boehm A. B.; Hughes B.; Duong D.; Chan-Herur V.; Buchman A.; Wolfe M. K.; White B. J. Wastewater Concentrations of Human Influenza, Metapneumovirus, Parainfluenza, Respiratory Syncytial Virus, Rhinovirus, and Seasonal Coronavirus Nucleic-Acids during the COVID-19 Pandemic: A Surveillance Study. Lancet Microbe 2023, 4 (5), e340–e348. 10.1016/S2666-5247(22)00386-X.
5. Li Y.; Reeves R. M.; Wang X.; Bassat Q.; Brooks W. A.; Cohen C.; Moore D. P.; Nunes M.; Rath B.; Campbell H.; Nair H.; Acacio S.; Alonso W. J.; Antonio M.; Ayora Talavera G.; Badarch D.; Baillie V. L.; Barrera-Badillo G.; Bigogo G.; Broor S.; et al. Global Patterns in Monthly Activity of Influenza Virus, Respiratory Syncytial Virus, Parainfluenza Virus, and Metapneumovirus: A Systematic Analysis. Lancet Global Health 2019, 7 (8), e1031–e1045. 10.1016/S2214-109X(19)30264-5.
6. Edwards K. M.; Zhu Y.; Griffin M. R.; Weinberg G. A.; Hall C. B.; Szilagyi P. G.; Staat M. A.; Iwane M.; Prill M. M.; Williams J. V. Burden of Human Metapneumovirus Infection in Young Children. N Engl J. Med. 2013, 368 (7), 633–643. 10.1056/NEJMoa1204630.
7. van den Hoogen B. G.; Osterhaus D. M. E.; Fouchier R. A. M. Clinical Impact and Diagnosis of Human Metapneumovirus Infection. Pediatric Infectious Disease Journal 2004, 23 (1), S25. 10.1097/01.inf.0000108190.09824.e8.
8. US FDA. FDA Approves First Respiratory Syncytial Virus (RSV) Vaccine.
9. Stein R.T., Bont L.J., Zar H., Polack F.P., Park C., Claxton A., Borok G., Butylkova Y., Wegzyn C. Respiratory Syncytial Virus Hospitalization and Mortality: Systematic Review and Meta-analysis. Pediatr. Pulmonol. 2017;52:556–569. doi: 10.1002/ppul.23570.
10. Sharma A, Ahmad Farouk I, Lal SK. COVID-19: A Review on the Novel Coronavirus Disease Evolution, Transmission, Detection, Control and Prevention. Viruses. 2021 Jan 29;13(2)
11. Challen R, Brooks-Pollock E, Read JM, Dyson L, Tsaneva-Atanasova K, Danon L. Risk of mortality in patients infected with SARS-CoV-2 variant of concern 202012/1: matched cohort study. BMJ. 2021 Mar 09;372:n579.
12. Panda S, Mohakud NK, Pena L, Kumar S. Human metapneumovirus: review of an important respiratory pathogen. Int J Infect Dis. 2014 Aug;25:45-52.
13. Shahda S, Carlos WG, Kiel PJ, Khan BA, Hage CA. The human metapneumovirus: a case series and review of the literature. Transpl Infect Dis. 2011 Jun;13(3):324-8.
14. Respiratory syncytial virus: virology, reverse genetics, and pathogenesis of disease. Collins PL, Fearns R, Graham BS. Curr Top Microbiol Immunol. 2013;372:3–38. doi: 10.1007/978-3-642-38919-1_1.
15. Respiratory syncytial virus (RSV) disease. [Feb; 2023]. 2022. https://www.who.int/teams/health-product-policy-and-standards/standards-and-specifications/vaccine-standardization/respiratory-syncytial-virus-disease https://www.who.int/teams/health-product-policy-and-standards/standards-and-specifications/vaccine-standardization/respiratory-syncytial-virus-disease.