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Case Report

Management of Severe Viral Pneumonia with Type-1 Respiratory Failure and ARDS in a 33-Year-Old Female: A Case Report

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ABSTRACT

Human Metapneumovirus (HMPV) is a significant viral pathogen known to cause severe respiratory infections, including pneumonia, Acute Respiratory Distress Syndrome (ARDS), and type-1 respiratory failure in adults. Early identification and multidisciplinary management are crucial, especially when associated with comorbid conditions like Iron Deficiency Anemia (IDA). To report a rare case of HMPV-induced severe viral pneumonia complicated by type-1 respiratory failure and ARDS in a 33-year-old female, highlighting the clinical pharmacist's role in supportive care. A 33-year-old female presented with shortness of breath, chest pain, fever, and chills. Clinical and radiological evaluations revealed ARDS with type-1 respiratory failure. Laboratory parameters confirmed severe IDA (Hb 6.4 g/dL, ferritin 37.1 ng/mL), elevated CRP (275.84 mg/L), and ESR (86 mm/hr). ECG changes and elevated cardiac biomarkers indicated possible viral myocarditis. The patient tested positive for HMPV. Empirical therapy included antibiotics (piperacillin-tazobactam, azithromycin, cefuroxime), antivirals (oseltamivir), corticosteroids (prednisolone, budesonide), and supportive care including PRBC transfusions, oxygen, and nebulization. Clinical pharmacists supported dose monitoring, ADR prevention, and therapy optimization. The patient responded well to multidisciplinary treatment, with gradual normalization of oxygen saturation, decline in inflammatory markers, and clinical improvement. She was discharged in stable condition after successful resolution of respiratory symptoms. This case underscores the importance of early diagnosis, pharmacist-led multidisciplinary care, and individualized therapy in managing viral pneumonia complicated by ARDS. HMPV should be considered in the differential diagnosis of acute respiratory failure when bacterial causes are excluded.

Keywords: Respiratory Failure, Antibiotics, HMPV.

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INTRODUCTION

Among the various pathogens responsible for viral pneumonia, Human Metapneumovirus (HMPV) has emerged as an important etiological agent, capable of causing severe respiratory infections in both pediatric and adult populations (Azoulay *et al*., 2020). HMPV, first identified in 2001, is a member of the Pneumoviridae family and is closely related to Respiratory Syncytial Virus (RSV) (Falsey *et al*., 2003). It is associated with a wide spectrum of respiratory illnesses, ranging from mild upper respiratory tract infections to severe lower respiratory tract diseases, including pneumonia and Acute Respiratory Distress Syndrome (ARDS) (Villar *et al*., 2020).

The clinical presentation of HMPV infection can be nonspecific, often mimicking other viral respiratory infections, which poses diagnostic challenges. Symptoms typically include fever, cough, shortness of breath, and in severe cases, respiratory failure requiring mechanical ventilation (Weinreich *et al*., 2015). The severity of HMPV infections is often exacerbated in patients with underlying comorbidities such as Chronic Obstructive Pulmonary Disease (COPD), asthma, or immunosuppression, making early recognition and intervention critical (Jain *et al*., 2015).

The management of severe viral pneumonia, particularly when complicated by type-1 respiratory failure and ARDS, requires a multidisciplinary approach. Current guidelines emphasize the importance of early diagnosis, supportive care, and the judicious use of corticosteroids and antiviral therapies (Brochard *et al*., 2017). Additionally, the role of inflammatory markers such as C-Reactive Protein (CRP) and Erythrocyte Sedimentation Rate (ESR) in predicting disease severity and guiding treatment

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decisions has been well-documented. In cases of severe anemia, blood transfusions may be necessary to improve oxygen-carrying capacity and overall clinical stability (Kulkarni *et al.*, 2025).

This case report discusses the clinical presentation, diagnostic challenges, and management strategies of a 33-year-old female with severe viral pneumonia and type-1 respiratory failure secondary to HMPV infection. The case underscores the importance of early recognition, aggressive management, and the need for further research into the optimal treatment of HMPV infections, particularly in adult populations.

CASE PRESENTATION

A case of a 33-year-old female, weighing kg was brought to the hospital with chief complaints of Shortness of breath for 2 days, which was associated with orthopnea, Chest pain on the left side for 1 day, which was sharp, non-radiating, and increased inspiration, fever with chills, with no past and family history of any illness. The patient was a non-smoker, and non-alcoholic. At the time of the general vital study PR- bpm, Temp. 101°, BP-145/100 mmHg, oxygen saturation 101% at the atmospheric air (as mentioned in Figure 1), and cardiac sounds S1, and S2 positive were noted. The doctor had advised the patient to perform routine lab tests (as mentioned in Table 1). On the same day, the Doctor prescribed the following drugs to the patient after examination (as mentioned in Table 2).

The diagnosis of severe viral pneumonia with type-1 respiratory failure and ARDS secondary to Human Metapneumovirus (HMPV) was established based on the patient's acute respiratory symptoms, elevated inflammatory markers (CRP: 275.84 mg/L, ESR: 86 mm/hr), radiological findings (as mentioned in Figure 2), and positive HMPV virology. Laboratory investigations revealed severe iron deficiency anemia (Hb: 6.4 g/dL, low RBC, low ferritin), contributing to reduced oxygen-carrying capacity and exacerbating respiratory distress. Arterial blood gas analysis confirmed type-1 respiratory failure ((hypoxemia without hypercapnia) (as mentioned in Figure 3)), while ECG

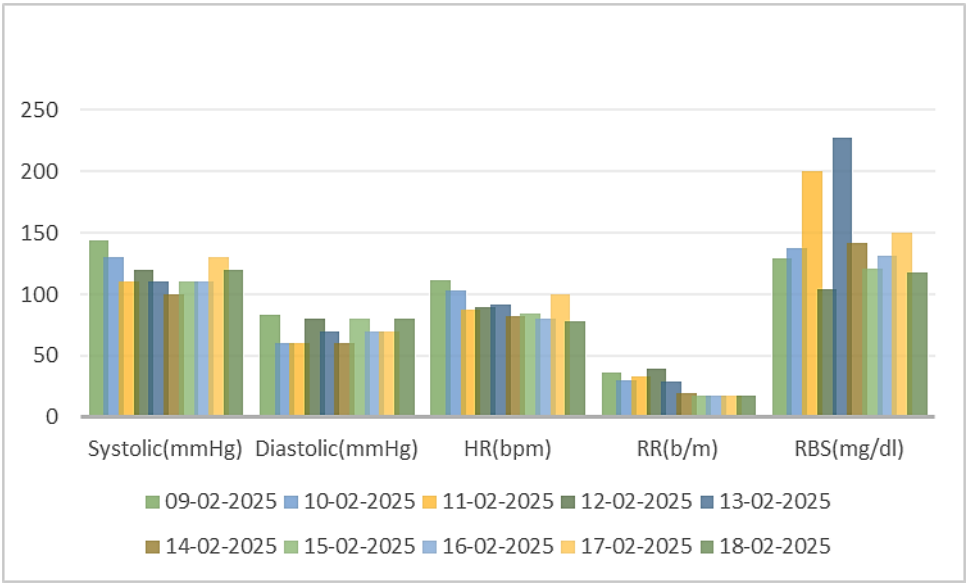

Figure 1: Patient vital analysis on a day-to-day basis.

Table 1: Summary of Laboratory Investigations.

Test Name	Normal Range	Day 1	Day 3	Day 5	Day 8	Day 10	Day 11
Hemoglobin (g/dL)	12-15	6.4	-	7.5	8.3	-	9.6
TLC (/cumm)	4000-11000	4770	-	12110	10030	-	9160
Neutrophils (%)	44-68	85.8	-	66.4	65.2	-	73
Lymphocytes (%)	25-48	9.6	-	21.1	25	-	18
Platelet Count ($\times 10^3$/uL)	150-400	271	-	447	664	-	944
CRP (mg/L)	0-5	275.84	-	93.38	-	-	-
ESR (mm/hr)	0-12	86	-	-	-	-	-
Serum Ferritin (ng/mL)	15-150	37.1	-	-	-	-	-
NT-proBNP (pg/mL)	0-300	446	-	-	-	-	-
Troponin I (pg/mL)	1.5-9	63.5	-	-	-	-	-

Table 2: Patient Medication Chart.

Sl. No.	Brand Name	Generic Name	Dose	Route	Frequency	Start Date
1	INJ. TAZAR	Piperacillin+Tazobactam	4000 mg+500 mg	IV	12 hourly	09/02/25
2	TAB. WYSOLONE	Prednisolone	40 mg	Oral	Once daily	10/02/25
3	INJ. DOXYCYCLINE	Doxycycline	100 mg	IV	8 hourly	08/02/25
4	INJ. PANTOP	Pantoprazole	40 mg	IV	Once daily	08/02/25
5	INJ. PIDIMOL	Acetaminophen	100 mg	IV	SOS	08/02/25
6	INJ. LASIX	Furosemide	10 mg	IV	12 hourly	09/02/25
7	INJ. REJUNEX	Methylcobalamin	500 mcg	IV	Once daily	09/02/25
8	INJ. AZEE	Azithromycin	500 mg	IV	Once daily	10/02/25
9	TAB. TAMIFLU	Oseltamivir	75 mg	Oral	12 hourly	08/02/25
10	TAB. ABPHYLLIN	Acebrophylline	100 mg	Oral	12 hourly	10/02/25
11	NEB. BUDECORT	Budesonide	0.5 mg	Inhalation	12 hourly	08/02/25
12	NEB. DUOLIN	Levosalbutamol+Ipratropium	1.25 mg+500 mcg	Inhalation	8 hourly	08/02/25
13	NEB. TOBRAMYCIN	Tobramycin	300 mg	Inhalation	12 hourly	09/02/25
14	NEB. MUCOMIX	Acetylcysteine	200 mg	Inhalation	12 hourly	14/02/25
15	TAB. LIMCEE	Vitamin C	1000 mg	Oral	Once daily	16/02/25
16	SYP. ALEX	Phenylephrine+Chlorpheniramine+Dextromethorphan	10 mL	Oral	8 hourly	15/02/25
17	INJ. PULMOCEF	Cefuroxime	1500 mg	IV	8 hourly	16/02/25
18	SYP. MAGAKOF-DX	Chlorpheniramine+Dextromethorphan	10 mL	Oral	8 hourly	-

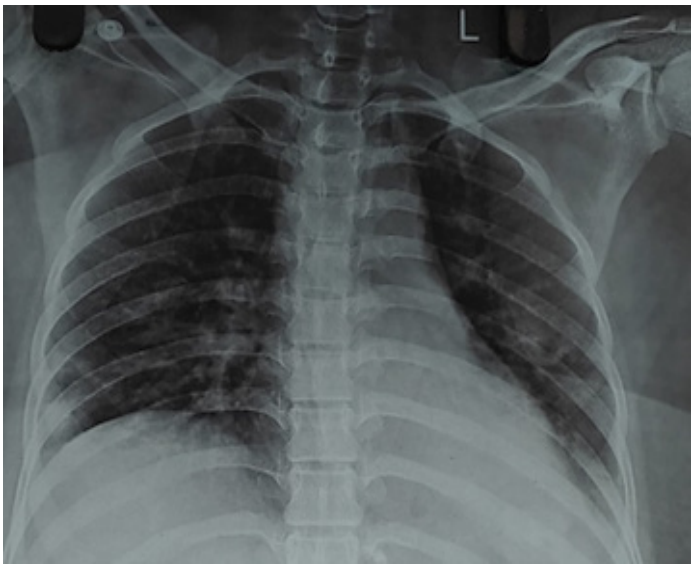

Figure 2: The chest X-ray findings support and reinforce the diagnosis of HMPV-induced pneumonia, ARDS, and type-1 respiratory failure. These radiographic signs correlate well with the ECG abnormalities (prolonged P-wave, ST elevation) and overall clinical picture of systemic inflammation, anemia, and respiratory compromise. Together, they justify the need for multidisciplinary intervention, including respiratory, hematologic, and cardiac support.

changes and mild elevation in troponin and NT-proBNP raised concerns for viral myocarditis (as mentioned in Figure 4), a known complication of HMPV. Differential diagnoses initially considered included community-acquired bacterial pneumonia, influenza, COVID-19, and atypical pneumonia, all of which were ruled out based on microbiological workup and clinical course. The absence of bacterial growth and the patient's favorable response to supportive antiviral and corticosteroid therapy further supported a viral etiology.

The patient was evaluated and investigated according to std, protocols, and diagnosed as a case of viral pneumonia/type-1 Respiratory Failure/Severe IDA/ARDS/HMPV+/PRE- Diabetic. During illness, the patient was transfused 2 units of PRBC (as mentioned in Figure 5) PRBC (aa. Acardiology reference was done given ECG changes and advice was followed. The Patient was discharged in satisfactory condition.

DISCUSSION

Human Metapneumovirus (HMPV), a member of the Pneumoviridae family, has emerged as a notable cause of acute respiratory tract infections in both pediatric and adult populations since its identification in 2001 (Łobacz *et al.*, 2024).

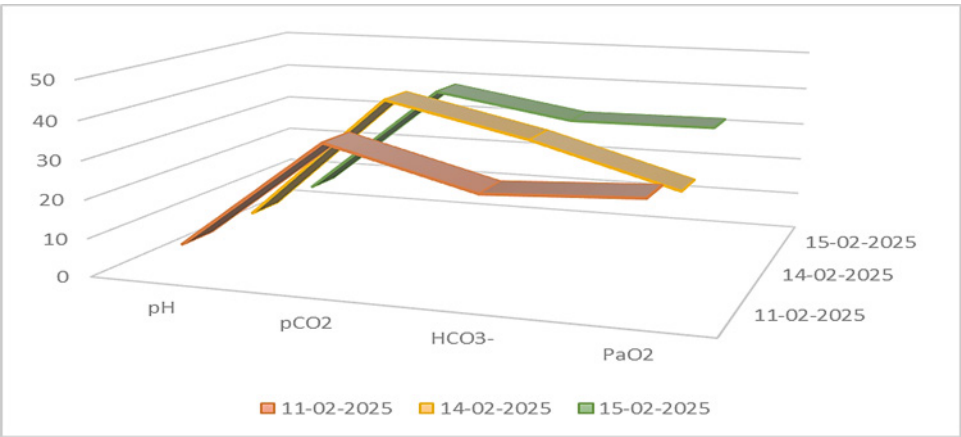

Figure 3: Arterial Blood Gas Interpretation Results Type 1-Respiratory Failure.

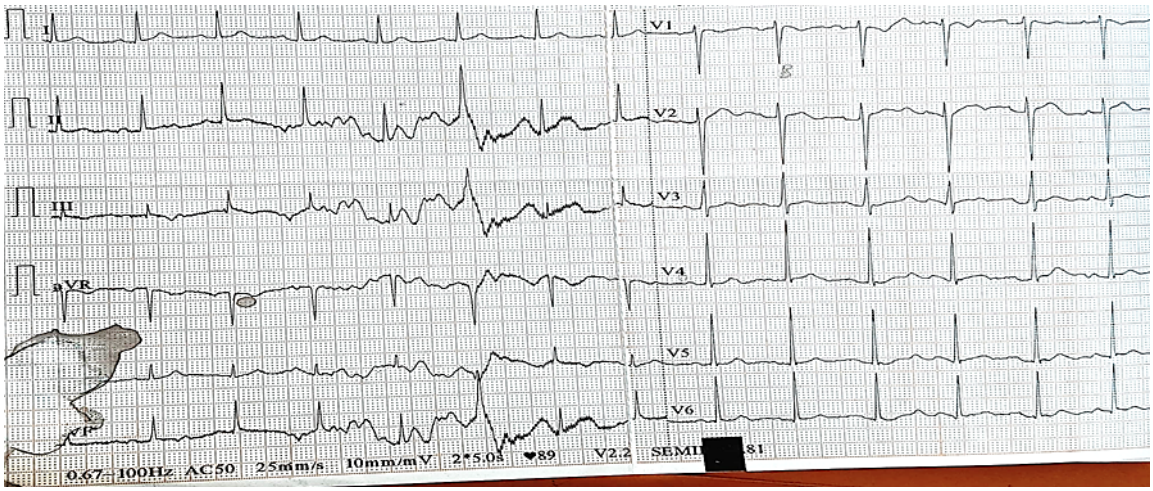

Figure 4: The ECG changes in this patient - particularly ST elevation and prolonged P-wave - correlate with systemic hypoxia, severe anemia, and possible viral myocardial involvement, all of which are plausible in HMPV-induced ARDS. Timely cardiology evaluation helped prevent complications and contributed to the patient's recovery.

Though it is often underdiagnosed, severe cases may lead to viral pneumonia, Acute Respiratory Distress Syndrome (ARDS), and type-1 respiratory failure. In the present case, a 33-year-old female developed HMPV-associated severe viral pneumonia with ARDS and type-1 respiratory failure, further complicated by severe Iron Deficiency Anemia (IDA).

Pharmacological management followed the principles outlined in the IDSA/ATS and ICMR guidelines for community-acquired pneumonia and viral ARDS. Empirical antibiotic therapy, including piperacillin-tazobactam, doxycycline, and cefuroxime, was initiated to prevent or treat secondary bacterial superinfection, which is a recognized complication in viral respiratory infections (Mishra *et al.*, 2025). Although there is no approved antiviral therapy specific to HMPV, oseltamivir was included as part of empirical therapy due to symptom overlap with influenza and to avoid treatment delay (Moon *et al.*, 2025). Systemic corticosteroids such as prednisolone were administered based on their anti-inflammatory effects, supported by studies showing their benefit in severe viral pneumonia and ARDS by modulating cytokine response and preventing progression of lung injury (Saleri and Ryan, 2019). Inhaled therapies, including budesonide, levosalbutamol, ipratropium bromide, and acetylcysteine, were used to address airway inflammation and enhance mucociliary clearance, especially given the presence of respiratory distress and crepitations on auscultation (Satapathy *et al.*, 2025).

Severe IDA, confirmed by markedly low hemoglobin (6.4 g/dL), serum iron (17 µg/dL), and low MCV/MCH, required correction through transfusion of two units of PRBCs. This aligns with the WHO and Surviving Sepsis Campaign recommendations to transfuse symptomatic or critically ill patients with hemoglobin below 7 g/dL (Hoogen *et al.*, 2001). Her inflammatory markers, notably CRP (275.84 mg/L) and ESR (86 mm/hr), showed progressive decline following treatment, reflecting effective infection and inflammation control.

Additionally, Electrocardiogram (ECG) changes and elevated cardiac biomarkers (Troponin I, NT-proBNP) raised concerns

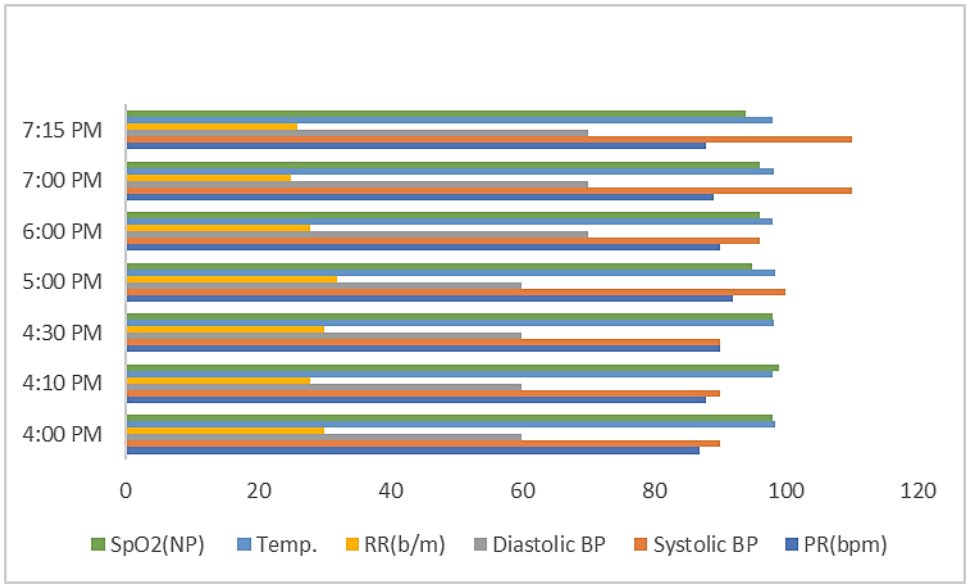

Figure 5: Vitals monitoring during Blood Transfusion (Vitals monitoring starts immediately after starting Blood transfusion, after 10 min. of starting BT, after 30 min of starting BT, after 60 min of starting BT, after 120 min of starting BT, after 180 min of starting BT, 15 min. after completing BT).

for viral myocarditis, a known complication of HMPV infections, justifying a cardiology consultation (World Health Organization, 2011).

This case highlights the crucial role of pharmacists in antimicrobial stewardship, therapeutic drug monitoring, Adverse Drug Reaction (ADR) surveillance, and patient counseling. Pharmacists were instrumental in optimizing dosing regimens and ensuring the safe use of multiple pharmacological agents, particularly during transfusions and while using inhalational therapies.

CONCLUSION

This case underscores the clinical complexity and severity associated with Human Metapneumovirus (HMPV) infections in adults. Early recognition, guideline-driven pharmacotherapy, respiratory support, and management of comorbidities such as iron deficiency anemia contributed to the successful outcome. The multidisciplinary approach-especially involving clinical pharmacists-proved vital in ensuring evidence-based, patient-centric care. HMPV should be considered in the differential diagnosis of acute respiratory failure, especially when standard viral or bacterial causes are excluded. Enhanced diagnostic vigilance, timely intervention, and clinical pharmacy support are key in improving prognosis in such cases.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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ABBREVIATIONS

ABG: Arterial Blood Gas; **ARDS:** Acute Respiratory Distress Syndrome; **CRP:** C-Reactive Protein; **ESR:** Erythrocyte Sedimentation Rate; **HMPV:** Human Metapneumovirus; **IDA:** Iron Deficiency Anemia; **PRBC:** Packed Red Blood Cells; **RSV:** Respiratory Syncytial Virus.

ETHICAL COMPLIANCE

Written informed consent was obtained from the patient for the publication of clinical details, investigations, and treatment outcomes. Permission for publication of this case report was obtained from the attending physician, SMIH.

SUMMARY

This case report presents the successful management of a 33-year-old female diagnosed with severe viral pneumonia, Acute Respiratory Distress Syndrome (ARDS), and type-1 respiratory failure caused by Human Metapneumovirus (HMPV). The patient presented with shortness of breath, chest pain, high-grade fever,

and chills, with no past medical or family history of respiratory illness.

Initial investigations revealed severe iron deficiency anemia (Hb: 6.4 g/dL), elevated inflammatory markers (CRP: 275.84 mg/L, ESR: 86 mm/hr), and abnormal Arterial Blood Gases (ABG) indicating hypoxemia. Imaging and ECG supported the diagnosis, showing sinus rhythm with prolonged P-wave, ST elevation, and chest X-ray abnormalities. She also tested HMPV-positive and had a pre-diabetic status. Treatment included a multidrug regimen comprising antibiotics (Piperacillin-Tazobactam, Azithromycin, Doxycycline), antivirals (Oseltamivir), steroids (Prednisolone, Budesonide), bronchodilators, and supportive care including PRBC transfusion, oxygen therapy, and nebulization. Continuous monitoring of vitals and lab parameters was conducted.

The patient showed gradual clinical improvement, with normalization of oxygen saturation and resolution of symptoms. After multidisciplinary management and cardiology review, she was discharged in stable condition.

This case highlights the importance of early recognition, integrated clinical management, and targeted treatment in HMPV-related respiratory complications, especially in adult populations.

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