RESPIRATORY SYNCYTIAL VIRUS PNEUMONIA IN AN ELDERLY PATIENT

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ABSTRACT

Background: Respiratory syncytial virus (RSV) is a major cause of acute lower respiratory tract infection and is increasingly recognized as a clinically significant cause of pneumonia in older adults. However, RSV remains underdiagnosed in adult pneumonia because clinical and radiologic features overlap with bacterial pneumonia and other viral infections, and RSV testing is not routinely performed.
Case: A 91-year-old man presented with one day of cough, low-grade fever, reduced appetite, generalized weakness, and acute delirium. On admission, he was hemodynamically stable with oxygen saturation 97–98% on room air. Initial laboratory tests showed elevated C-reactive protein (20.7 mg/L), mild lymphopenia, microcytic anemia (hemoglobin 10.0 g/dL), and mild hyponatremia (sodium 132 mEq/L). Chest radiography revealed bilateral pulmonary infiltrates. A multiplex acute respiratory infection PCR panel detected RSV type A, while other respiratory viruses and atypical bacterial pathogens were negative. On day 3 of hospitalization, he developed acute hypoxemia (SpO 86–88% on room air) accompanied by a marked rise in inflammatory markers (CRP peak 148 mg/L; procalcitonin 0.44 ng/mL). He improved with supplemental oxygen, intravenous methylprednisolone, and a macrolide antibiotic, and was discharged in stable condition on day 7.
Discussion: This case highlights RSV as an important and often overlooked etiology of community-acquired pneumonia in very old patients, including atypical presentations such as delirium and late clinical deterioration after an initially stable course. Molecular diagnostics (PCR-based panels) can provide timely etiologic confirmation, support infection control measures, and guide antimicrobial stewardship, particularly when bacterial co-infection is uncertain.
Conclusion: RSV should be considered in elderly patients with pneumonia, especially during periods of respiratory virus circulation. Early molecular testing may improve diagnostic accuracy and optimize clinical management and prevention strategies in high-risk older adults.
Keyword: respiratory syncytial virus; pneumonia; elderly; multiplex PCR; case report

ABSTRAK

Latar belakang: Respiratory syncytial virus (RSV) merupakan penyebab penting infeksi saluran napas bawah akut dan makin diakui sebagai etiologi pneumonia pada lanjut usia. Namun, RSV pada dewasa sering tidak terdiagnosis karena manifestasi klinis dan radiologi tumpang tindih dengan pneumonia bakteri maupun virus lain, serta pemeriksaan RSV belum dilakukan secara rutin.
Kasus: Laki-laki 91 tahun datang dengan keluhan batuk satu hari, demam rendah, nafsu makan menurun, lemah umum, dan delirium akut. Saat masuk, kondisi hemodinamik stabil dengan saturasi oksigen 97–98% tanpa oksigen tambahan. Pemeriksaan laboratorium menunjukkan CRP meningkat (20,7 mg/L), limfopenia ringan, anemia mikrositik (Hb 10,0 g/dL), dan hiponatremia ringan (Na 132 mEq/L). Foto toraks menunjukkan infiltrat bilateral. Panel PCR multiplex infeksi saluran napas akut mendeteksi RSV tipe A, sedangkan virus pernapasan lain dan patogen bakteri atipikal tidak terdeteksi. Pada hari rawat ke-3 terjadi perburukan berupa hipoksemia (SpO 86–88% tanpa oksigen) disertai lonjakan marker inflamasi (CRP puncak 148 mg/L; prokalsitonin 0,44 ng/mL). Pasien membaik dengan oksigen nasal, metilprednisolon intravena, dan antibiotik makrolida, lalu pulang stabil pada hari rawat ke-7.
Diskusi: Kasus ini menegaskan RSV sebagai etiologi pneumonia komunitas pada usia sangat lanjut yang kerap luput dikenali, termasuk presentasi atipikal seperti delirium serta perburukan klinis yang terlambat setelah fase awal tampak stabil. Diagnosis molekuler berbasis PCR membantu konfirmasi etiologi, mendukung pengendalian infeksi, dan memperkuat stewardship antibiotik saat koinfeksi bakteri masih dipertimbangkan.
Kesimpulan: RSV perlu dipertimbangkan pada lansia dengan pneumonia, terutama saat periode sirkulasi virus respiratori meningkat. Pemeriksaan molekuler dini dapat meningkatkan akurasi diagnosis dan mengoptimalkan tata laksana serta strategi pencegahan pada kelompok berisiko tinggi.
Kata kunci: respiratory syncytial virus; pneumonia; lanjut usia; PCR multiplex; laporan kasus

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INTRODUCTION

Respiratory syncytial virus (RSV) is a major cause of acute lower respiratory tract infection worldwide. Although traditionally recognized as a leading pediatric pathogen, RSV also contributes substantially to severe respiratory disease in older adults.[1] According to the World Health Organization (WHO), RSV is associated with an estimated 3.6 million RSV-related hospitalizations annually[1]. In adults, RSV remains underrecognized despite clinically significant morbidity, particularly among elderly individuals and those with chronic comorbidities, and global estimates of adult RSV burden are still not well defined[1]. In Asia, available country-level data suggest a meaningful burden; for example, in Jakarta (Indonesia), a hospital-based study reported RSV as the cause of approximately 5–10% of hospitalized adult acute respiratory infection cases, with higher proportions observed during the rainy season.[2]

Clinically, RSV infection in adults can be difficult to distinguish from other viral respiratory illnesses. Typical features may include cough, wheezing, and dyspnea, and fever may be less prominent compared with influenza. Severe disease is more likely in the presence of advanced age and comorbidities—particularly COPD, cardiovascular disease, diabetes, frailty/functional impairment, and immunocompromising conditions—often necessitating hospitalization and increasing the risk of complications.[3] In real-world settings, severe RSV pneumonia may be complicated by bacterial co-infection and can be associated with high mortality in selected cohorts of severe pneumonia.[4] Despite increasing recognition, RSV is still not routinely evaluated in many adult pneumonia pathways, which may lead to underestimation of its contribution to community-acquired and healthcare-associated pneumonia, especially in the elderly.[5] Treatment for RSV in adults remains largely supportive in most clinical scenarios, highlighting the importance of timely diagnosis, appropriate supportive management, and prevention strategies—including emerging vaccination programs targeting older adults and high-risk groups.[5,6]

In this report, we describe a case of RSV-associated pneumonia in an elderly patient, emphasizing key diagnostic considerations, clinical course, and management challenges. We also provide a focused clinical review to contextualize the burden of RSV in older adults, discuss pitfalls in diagnosis (including co-infections), and summarize current prevention and treatment perspectives relevant to adult practice.

CASE REPORT

A 91-year-old man with no significant comorbidities presented with 1 day of persistent cough, low-grade fever, and reduced appetite that progressed to generalized weakness and acute confusion/delirium. On admission (Day of hospitalization [DOH] 1), he was hemodynamically stable. Lung auscultation revealed minimal crackles, and oxygen saturation (SpO_2) was 97–98% on room air, although delirium was evident clinically. Initial laboratory evaluation on DOH 1 showed elevated inflammatory markers (CRP 20.7 mg/L) with mild lymphopenia. Complete blood count demonstrated microcytic anemia (hemoglobin 10.0 g/dL, MCV 76.1 fL) with leukocytes 5.88 $\times 10^3/\mu L$ and platelets 157 $\times 10^3/\mu L$. Serum chemistry showed mild hyponatremia (Na 132 mEq/L) with preserved renal and hepatic function (creatinine 1.10 mg/dL, AST 27 U/L, ALT 17 U/L, urea 42.8 mg/dL). Chest radiography obtained on DOH 1 demonstrated bilateral pulmonary infiltrates (mid–left and lower lung fields), with additional suspected infiltrates and basal fibrosis; cardiomegaly with elongation and calcification was also reported.

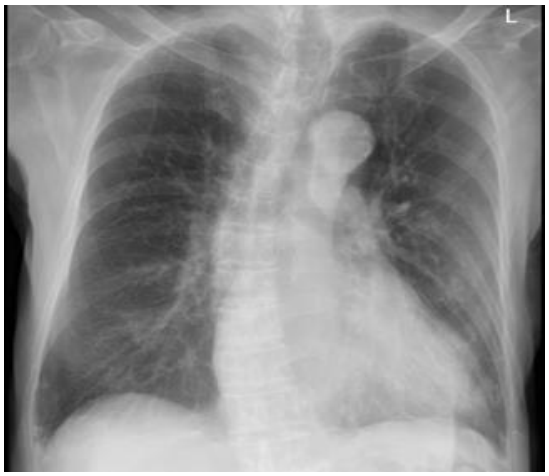

Figure 1. Chest radiograph on admission

Chest radiograph obtained on admission revealing bilateral air-space opacities in the left mid-lung and bilateral lower lung fields, compatible with pneumonia.

Given concern for viral pneumonia, a multiplex acute respiratory infection (ARI) PCR panel (nasopharyngeal/oropharyngeal swab) and sputum culture were obtained on DOH 2. The ARI panel detected RSV type A (positive), while other tested viral pathogens (including influenza A/B and human metapneumovirus) were negative.

Viruses	**Result**
Influenza virus type A	Negative
Influenza A H1N1 2009	Negative
Influenza A H3	Negative
Influenza virus type B	Negative
Respiratory syncytial virus (RSV) type A	Positive (Ct/EP: 33.2 / 79,180)
Respiratory syncytial virus (RSV) type B	Negative
Human metapneumovirus	Negative
Human parainfluenza virus type 1	Negative
Bacteria	
Bordetella pertussis	Negative
Chlamydophila pneumoniae	Negative
Legionella pneumophila	Negative
Mycoplasma pneumoniae	Negative

Table 1. Molecular Respiratory Panel Results

Summarizes the multiplex molecular respiratory panel results. RSV type A was detected, while other tested respiratory viruses and atypical bacterial pathogens were not detected. These findings support RSV as the primary etiologic agent in this episode of pneumonia.

The patient initially received supportive care (hydration and symptomatic therapy) with close monitoring. On DOH 3, he developed clinical deterioration with increased posterior crackles and intermittent desaturation (SpO_2 92–93%), followed by an abrupt drop to 86–88% on room air. This was accompanied by a marked inflammatory surge (CRP peak 148 mg/L) and elevated procalcitonin (0.44 ng/mL), raising concern for severe viral pneumonia with possible bacterial co-infection. He was treated with supplemental oxygen via nasal cannula (SpO_2 improving to 94–96%), intravenous methylprednisolone, and a macrolide antibiotic. On DOH 4, intermittent desaturation persisted and CRP remained elevated (approximately 140 mg/L). From DOH 5–6, his clinical condition gradually improved. By DOH 7, he maintained SpO_2 94–98% on room air, pulmonary findings improved, and inflammatory markers decreased (CRP 30 mg/L, PCT 0.23 ng/mL). He was discharged in stable condition with outpatient follow-up.

DISCUSSION

Respiratory Syncytial Virus manifests as a spectrum of disease affecting both the

upper and lower respiratory tracts. In its initial phase, the infection presents as an upper respiratory tract infection with symptoms indistinguishable from other common viral etiologies. Patients typically report acute onset of fever, cough, fatigue, rhinorrhea, pharyngitis, and nasal congestion. While healthy adults generally experience a self-limiting course with recovery within a few days, the clinical trajectory in the elderly is frequently more complex. Even after the resolution of acute symptoms, lingering fatigue, and a persistent cough lasting several weeks are common sequelae in this demographic. Because many patients do not seek medical attention during this undifferentiated prodromal stage, the specific viral etiology often remains unidentified without targeted testing.[7,8]

In high-risk patients—particularly the very old, those with frailty, and individuals with chronic cardiopulmonary disease—viral respiratory infections should be managed with heightened vigilance because clinical deterioration may occur abruptly despite an initially mild or stable presentation. Immunosenescence and limited physiologic reserve can blunt classic signs such as fever and shift the presentation toward nonspecific features (e.g., anorexia, generalized weakness, or delirium), potentially delaying recognition and escalation of care. Therefore, early and repeated assessment of oxygenation and work of breathing, close monitoring for changes in mental status, and a low threshold for timely molecular testing (when available) are essential to detect impending decompensation and to guide infection control and antimicrobial stewardship while concurrently evaluating possible bacterial co-infection or decompensation of underlying disease.[8,9]

In the elderly, the infection frequently progresses to involve the lower respiratory tract, resulting in a clinical presentation that mimics viral pneumonia. Symptomatic lower tract involvement (wheezing, dyspnea, productive cough, and congestion) is observed in anywhere from 70-93% of cases. In severe presentations, this can rapidly deteriorate into respiratory failure requiring advanced respiratory support.[8] The impact of RSV in the elderly extends beyond the respiratory system. Older adults, particularly those with underlying comorbidities, face a heightened risk of severe systemic complications. Effective management relies on accurate diagnosis, yet approaches vary based on resource availability and setting. Currently, four principal diagnostic methods exist: viral culture, antigen detection (IFA/EIA), serology, and molecular RNA detection.[8]

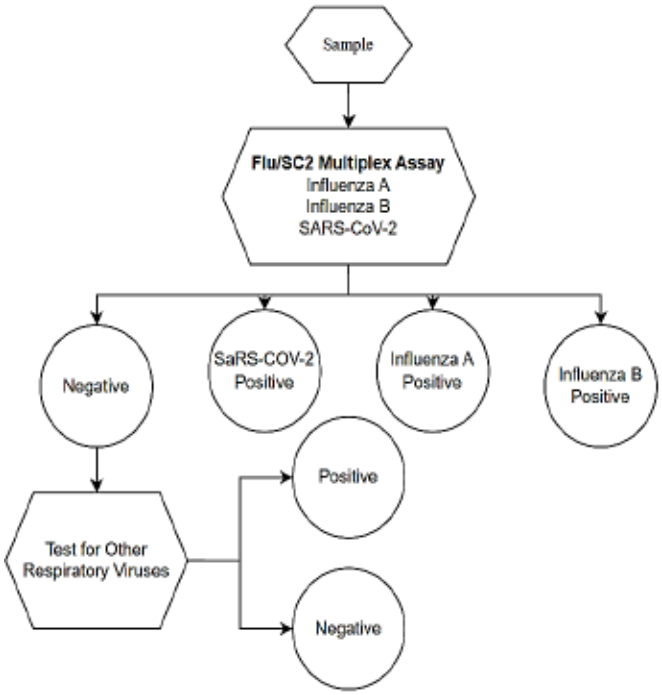

Figure 2. Testing Algorithm Recommended by Pan American Health Organization.[10]

Serological assessment (IgM or rising IgG) is largely retrospective and clinically impractical for acute decision-making. Similarly, viral cultures are labor-intensive and slow, while antigen tests, though cheaper and available in resource-limited settings, lack the sensitivity required for reliable diagnosis

in adults. Over the last five years, Reverse Transcription-PCR (RT-PCR) and other Nucleic Acid Amplification Tests (NAATs) have become the reference standard with clear algorithms (Figure 2). Their ability to detect very low viral titers ensures high diagnostic accuracy and rapid results with dependability interpretation protocol (Table 2). The COVID-19 pandemic has normalized the use of nasopharyngeal (NP) swabs, simplifying the logistics of obtaining epidemiological data. The use of NP swabs for multiplex testing (identifying multiple pathogens simultaneously) is now strongly encouraged in nursing homes and long-term care facilities. Early detection in these settings is critical for containing viral spread and preventing outbreaks among vulnerable residents.[7,8]

RSV	Control	Interpretation	Report
+	+ or -	RSV RNA detected	Positive for RSV
+	+	RSV RNA not detected	Negative
-	-	Invalid result	Invalid

Table 2. RSV Molecular Detection Interpretation.[11]

While imaging is standard for hospitalized elderly patients, findings are generally nonspecific and used primarily for differential diagnosis. Observational studies indicate that chest X-rays are abnormal in approximately 50% of hospitalized adults with confirmed RSV. The most frequent findings are consolidation (48%) and ground-glass opacities (40%), typically presenting in a single unilateral lower zone. Notably, bilateral lung involvement is less frequently reported in RSV compared to other viral pneumonias. Computed tomography may reveal pulmonary nodules, GGOs, and signs of organizing pneumonia, particularly in immunocompromised patients. Imaging helps distinguish RSV from other pathogens; for instance, "tree-in-bud" opacities are frequently reported in influenza infections but are distinctively rare in RSV (Table 3).[7,8]

Figure 3. CT scan of a 76-year-old man with RSV infection. (A) Initial scan showing bilateral peribronchial opacities and consolidations. (B) Marked regression of pulmonary findings after 2 months of methylprednisolone treatment. (C) Worsening of bilateral consolidations observed upon cessation of therapy after 3 months.[12]

Viral pathogen	Centrilobular nodules, micronodules, tree-in-bud	Ground-glass opacification	Consolidation	Reticular interstial
Influenza	+++	+++	+	+
Parainfluenza	+++	+++	+	+
RSV	+++	+++	+	-
Rhinovirus	++	++	+	+
hMPV	+++	+++	++	+
Coronavirus	-	+++	++	++
CMC	++	++	++	-
Varicella-zoster	+++	+	+	-

Table 3. Frequency of CT findings in viral lower respiratory tract infections. Plus signs (+) denote the relative frequency of observed findings, scaling from least common (+) to most common (+++).[13]

The standard of care for RSV in adults remains supportive, focusing on hydration, antipyretics, and supplemental oxygen when necessary. Unlike influenza or COVID-19, no specific antiviral drugs are currently approved for the routine treatment of acute RSV infection in adults. Consequently, there is an urgent need for effective therapeutic and preventive strategies, particularly for elderly individuals who face a higher risk of severe outcomes, hospitalization, and mortality.[7,8]

While several molecules have been investigated, options remain limited. Ribavirin is a nucleoside analog and is the only antiviral with a historical role in RSV treatment. Although primarily approved for infants (in aerosolized form), it is occasionally used off-label for life-threatening RSV lower respiratory tract infections in severely immunocompromised adults, such as lung transplant recipients. However, its efficacy in adults is controversial, and its use is generally restricted to specialized centers due to toxicity risks (e.g., hemolytic anemia) and logistical challenges. Investigational Agents: Several small-molecule inhibitors targeting viral fusion or replication (e.g., sisunatovir, ziresovir) have shown promise in early-phase trials or healthy volunteer challenge studies. However, none have yet received regulatory approval for widespread use in the elderly population.[7,8]

Non-pharmaceutical interventions remain a cornerstone of prevention, particularly in long-term care facilities where outbreaks can be devastating. Effective strategies include hand hygiene, surface disinfection, and the isolation of symptomatic individuals. The COVID-19 pandemic demonstrated that broad implementation of these measures (masking, social distancing) significantly suppressed RSV circulation, reducing hospitalization incidence from >27 cases per 100,000 to <0.3 cases per 100,000 during the 2020–2021 season. Sustaining these hygiene protocols is critical for protecting frail older adults.[7,8]

Passive immunization using monoclonal antibodies (such as palivizumab and the recently approved nirsevimab) is standard for high-risk infants. However, no such option is currently available or approved for adults. While nirsevimab has revolutionized infant protection with a single dose lasting an entire season, elderly adults must rely on active immunization (vaccines) for protection.[7,8]

Active Immunization (Vaccines) Since 2023, the landscape of RSV prevention for the elderly has changed dramatically with the approval of effective vaccines. As of late 2024/2025, three major vaccines are authorized for use in older adults.[8]

- Protein Subunit Vaccines (GSK and Pfizer)
    - Arexvy (GSK): In the ongoing AReSVi-006 trial involving adults ≥60 years, this adjuvanted vaccine demonstrated an efficacy of 82.6% against RSV-Lower Respiratory Tract Disease in the first season. Efficacy was particularly high (94.6%) in patients with comorbidities. Long-term follow-up data indicates durable protection over two full RSV seasons, with efficacy maintained at approximately 67% against Lower Respiratory Tract Disease and 78.8% against severe disease without the need for a second dose.
    - Abrysvo (Pfizer): The RENOIR trial evaluated this bivalent prefusion F vaccine in adults ≥60 years. First-season efficacy was 66.7% for RSV-Lower Respiratory Tract Disease with

≥2 symptoms and 85.7% for more severe disease (≥3 symptoms). Efficacy proved durable through a second season, reported at approximately 77.8% against severe disease.

- mRNA Vaccine (Moderna)
  - mResvia (mRNA-1345): Approved by the FDA in May 2024, this mRNA-based vaccine encodes the stabilized prefusion F glycoprotein. In the ConquerRSV trial (adults ≥60), it demonstrated a vaccine efficacy of 83.7% against RSV-Lower Respiratory Tract Disease (≥2 symptoms) and 82.4% against severe disease (≥3 symptoms). Safety profiles were favorable, with no cases of Guillain-Barré syndrome reported in the pivotal trials, differentiating it from the protein subunit platform where a rare potential risk for Guillain-Barré syndrome has been noted.

Regulatory bodies have refined vaccination strategies based on age and frailty. United States (CDC/ACIP) in late 2024, the CDC recommends a single dose of any approved RSV vaccine for: (1) All adults aged ≥75 years. (2) Adults aged 60–74 years only if they are at increased risk of severe RSV (e.g., chronic heart/lung disease, residence in nursing homes), (Note: Revaccination is not currently recommended). In Europe (ECDC/National Bodies), the UK (JCVI) and Spain (NEP), have adopted similar risk-stratified guidelines, generally prioritizing adults ≥75 years and those with severe comorbidities for vaccination programs.[8]

While treatment options for established RSV infection in the elderly remain stagnant (supportive care), prevention has made a quantum leap. The availability of three highly effective vaccines offers the first real opportunity to reduce the significant burden of RSV-related hospitalization and mortality in the aging population. Future research will focus on the durability of protection beyond two seasons and the potential need for booster doses.[8]

CONCLUSION

Respiratory syncytial virus (RSV) should be routinely considered in the differential diagnosis of pneumonia in older adults, as adult RSV remains frequently underrecognized and is often missed when testing is not performed.[3,9] This case highlights that severe RSV infection in high-risk elderly patients may deteriorate rapidly and can require advanced respiratory support.[3] Because rapid antigen testing may be used in practice, PCR-based respiratory testing (when feasible) is essential to improve case detection and guide clinical decisions—an approach strongly emphasized for Asia, where limited surveillance and underdiagnosis obscure the true burden.[14] The availability of additional preventive options supports integrating evidence-based RSV vaccination into adult immunization programs for older populations to reduce severe outcomes and overall disease burden.[3,14]

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