

Influenza and Endemic Viral Pneumonia

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KEYWORDS

- 2009 H1N1 • Viral pneumonitis • Viral pneumonia • Influenza
- Acute respiratory distress syndrome • Acute lung injury

KEY POINTS

- Viruses are an important cause of community-acquired pneumonia in both pediatric and adult populations.
- Disease surveillance systems are important in detecting outbreaks and particularly the emergence of novel viral pathogens capable of human transmission.
- Several common viral pathogens can lead to severe respiratory disease, including the most common virus, influenza A.
- Treatment of viral pneumonia is generally supportive; however, diagnostic testing to isolate the causative virus is important because some pathogens, such as influenza virus, have effective antiviral therapies.
- In the case of 2009 H1N1, early treatment with antiviral therapy appeared to be associated with improved outcomes.

EPIDEMIOLOGY OF VIRAL PNEUMONIA

Pneumonia is a common illness with estimates of approximately 450 million cases per year. According to the World Health Organization, lower respiratory tract infections account for approximately 7% of deaths per year worldwide.¹ Viruses are a common cause of community-acquired pneumonia, particularly among children. Among pediatric community-acquired pneumonia studies, where viral causes were specifically sought, the incidence of viral etiology of infection was 49%. The most common viruses isolated were respiratory syncytial virus (RSV) (11%), influenza virus (10%), parainfluenza virus (8%), and adenovirus (3%).² A Canadian study found that among adults

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hospitalized with community-acquired pneumonia with an identifiable pathogen, 15% were viral and 20% bacterial, with 4% being mixed. The most common viral pathogens were influenza, human metapneumovirus, and RSV. Patients with viral infections were older, more likely to have cardiac disease, and in general more frail compared with adults with bacterial pneumonia. Furthermore, all cases of viral pneumonia occurred between October and May, whereas bacterial pathogens had no seasonal predilection. In this study, there were no differences in outcomes between viral or bacterial causes of pneumonia.³ In a retrospective cohort analysis of adults admitted to an intensive care unit (ICU) with either severe community-acquired or health care-associated pneumonia, 115 of 198 patients had bronchoalveolar lavage and 159 of 198 had nasopharyngeal swabs for real-time polymerase chain reaction (RT-PCR). Of those with samples, 36.4% had a viral pathogen isolated and 35.9% had a bacterial pathogen isolated. Viral pathogens isolated in order of highest to lowest frequency were rhinovirus, parainfluenza virus, human metapneumovirus, influenza, and RSV. Again in this study, mortality was not different between bacterial and viral causes of pneumonia.⁴

This article focuses on viruses most commonly associated with severe community-acquired pneumonia, including those associated with recent epidemics.

INFLUENZA VIRUS

Influenza virus kills hundreds of thousands of people worldwide each year. In most cases, influenza infections are self-limited, mild illnesses lasting 4 to 5 days with predominantly upper airway symptoms. Among the most common severe complications and causes of death from influenza are viral pneumonia and/or secondary bacterial pneumonia.⁵ In the absence of a pandemic, 11% to 19% of patients hospitalized with laboratory-confirmed influenza require treatment in the ICU.^{6–10} Complications and death from influenza occur most commonly among the elderly, the very young, and those with chronic medical conditions. Chronic lung disease is the most common comorbidity associated with influenza infection, followed by neurologic disease, hemato-oncologic disease, and cardiac disease.⁶ Risk factors for severe influenza complications are summarized in **Table 1**. A younger age of patients with critical illness is seen during pandemics, including the 2009 H1N1. In the historic 1918 pandemic, there was unexplained excess mortality in persons aged 20 to 40 years, with most deaths attributable to secondary bronchopneumonia, influenza-related lung disease, and associated cyanosis and cardiac collapse.¹¹ In the 1918 epidemic it was estimated that one-third of the world's population were infected with influenza, and the case-fatality rate was exceptionally high at greater than 2.5% in comparison with other pandemics. The number of deaths has been estimated to be at least 50 million.¹²

Pulmonary syndromes associated with the 1957 to 1958 influenza pandemic include an acute rapidly progressive pneumonia caused by the influenza virus alone, or concomitant viral and bacterial pneumonia.^{13,14} The clinical course of patients with severe viral pneumonia was that of a rapid onset of severe progressive shortness of breath, tachypnea, cyanosis, and agitation caused by respiratory distress. A classic prodromal illness of high fever, chills, sore throat, aches, and dry nonproductive cough preceded the development of respiratory distress. Physical examination showed evidence of fever, respiratory distress, diffuse inspiratory crackles bilaterally, and occasional wheezes. Chest radiography (CXR) showed bilateral infiltrates similar to those in congestive heart failure (CHF) but without other clinical signs of volume overload. Although values of partial pressure of oxygen (PaO_2) are not provided, the low oxygen

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