

Legionnaire's Disease and Influenza



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KEYWORDS

- Legionellosis • Influenza • Coinfection • Secondary infection
- Immunopathogenesis • Host

KEY POINTS

- *Legionella pneumophila* (LP) can be detected in all seasons worldwide.
- In cases of community-acquired pneumonia (CAP), physicians should frequently consider multiple-pathogen infections.
- The impact of dual pulmonary infection usually correlates negatively with the host survival.
- Influenza types A and B viruses pulmonary infection may precede or overlap with legionnaire's disease.

INTRODUCTION

Two significantly important highly pathogenic infection diseases, namely legionellosis and influenza, remain a threat to global health. They can cause severe CAP with respiratory failure but they can also generate hospital-acquired infections.¹ Moreover *Legionella* infection could attribute to influenza infection.²

The cause of influenza was definitively resolved back in 1930s with the isolation of swine influenza, a virus which when administered intranasally to susceptible swine induced a mild illness of short duration.³ The physician Richard Pfeiffer had created the hypothesis that *Bacillus influenzae* (now *Haemophilus influenzae*) was the cause of influenza during the pandemic in 1892.⁴ The bacterial origin of influenza was the most prevailing scientific thought. But immunologists failed to consistently isolate *Bacillus influenzae* from patient samples and finally doubted the theory that Pfeiffer's bacillus was the absolute cause of influenza. Bacteria like streptococci and pneumococci were also present among the specimens from cases of clinical influenza.

Disclosures: None.

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Nevertheless, the theory that the presence of secondary bacterial invaders in influenza cases contributes negatively in the prognosis of the influenza infection is still relevant today.

The bacterium LD, a fastidious intracellular gram-negative bacillus, was first identified in 1977 as the cause of an outbreak of severe pneumonia in a convention center in Philadelphia in the United States.⁵ Although several other species (more than 50) of the genus *Legionella* were subsequently identified, LD is the best-characterized member of the genus *Legionella* and the most frequent cause of human legionellosis.⁶

The exact incidence of legionellosis worldwide is unknown, but in studies involving hospitalized patients with CAP in the United States, Europe, Israel, and Australia, 0.5% to 10% had legionnaire's disease, with an average level of approximately 2%.⁷⁻⁹ A changing trend in the incidence of legionellosis in the United States was reported to the Centers for Disease Control and Prevention (CDC) over the 2000 to 2009 decade.¹⁰ A recent prospective, population-based study of CAP in hospitalized adults in the United States estimated the annual incidence rates of pathogen detected among 2320 adults with radiographic evidence of pneumonia. The incidence of legionellosis was high among adults 50 to 64 years of age and in those above 80 years old than among younger adults, and the annual incidence of *Legionella* pneumonia-related hospitalization was 0.4 (0.2–0.5) (95% CI).¹¹

Statistics from the same study are more comprehensive regarding the influenza incidence. The annual incidence of community-acquired influenza pneumonia requiring hospitalization is 1.5 (1.3–1.8) (95% CI).¹¹

VIRULENCE FACTORS OF LEGIONELLA AND INFLUENZA

Influenza viral infection has an extremely highly contagious nature. This remarkable feature results from the capability of the external layer of the influenza virus to be subjected to frequent antigenic changes. The influenza virus structure (Fig. 1) is

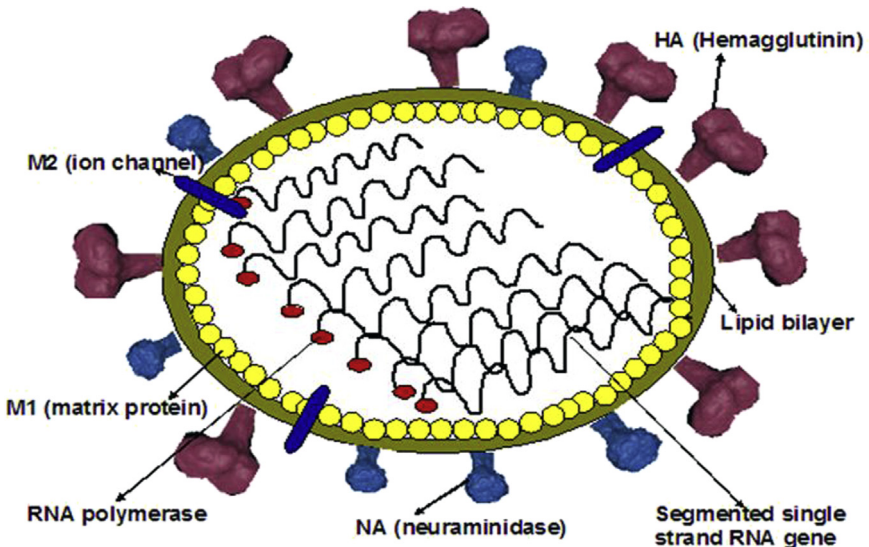


Fig. 1. Structure of influenza: the envelope consists of 3 membrane proteins: (HA glycoprotein, NA neuraminidase, and M2) and a matrix protein (M1) just below the lipid bilayer. The virus contains 8 viral RNA single segments (ribonucleoprotein core).

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