

Respiratory infections: From influenza to tuberculosis - pulmonology perspectives.

Geng Wangfi*

Department of Building Environment and Energy Engineering, The Hong Kong Polytechnic University, China

Introduction

Respiratory infections represent a significant global health burden, ranging from common viral infections like influenza to more severe bacterial infections such as Tuberculosis (TB). Pulmonology, the branch of medicine specializing in respiratory diseases, plays a crucial role in the diagnosis, management, and prevention of these infections. Understanding the epidemiology, pathogenesis, clinical presentation, and treatment of respiratory infections is essential for pulmonologists to provide optimal care to patients. This article provides an overview of respiratory infections from a pulmonology perspective, focusing on influenza and tuberculosis, two prominent examples with distinct characteristics and public health implications [1].

Influenza, commonly known as the flu, is a contagious respiratory illness caused by influenza viruses. It presents as a sudden onset of fever, cough, sore throat, muscle aches, and fatigue. While most cases of influenza are mild and self-limiting, severe complications can occur, especially in high-risk populations such as the elderly, young children, pregnant women, and individuals with underlying medical conditions [2,3].

Influenza viruses are classified into types A, B, and C, with type A viruses posing the greatest public health threat due to their ability to cause pandemics. Seasonal influenza epidemics occur annually, resulting in significant morbidity, mortality, and economic costs worldwide. Vaccination is the most effective strategy for preventing influenza and its complications. Each year, the composition of the influenza vaccine is updated to match the circulating strains, highlighting the importance of ongoing surveillance and strain selection [4,5].

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis* bacteria, primarily affecting the lungs but can also involve other organs. TB presents with symptoms such as cough, fever, night sweats, weight loss, and hemoptysis. It can manifest as either active TB disease or latent TB infection, with the latter being asymptomatic but carrying the risk of progression to active disease [6].

TB remains a major global health concern, with approximately 10 million new cases and 1.4 million deaths annually. Factors contributing to the persistence of TB include poverty, overcrowding, HIV/AIDS, drug resistance, and inadequate

healthcare infrastructure. Diagnosis of TB relies on a combination of clinical evaluation, imaging studies (such as chest X-rays), microbiological tests (such as sputum smear microscopy and culture), and molecular assays (such as nucleic acid amplification tests) [7].

Treatment of TB involves a multidrug regimen consisting of antibiotics such as isoniazid, rifampicin, pyrazinamide, and ethambutol. Adherence to treatment is crucial to prevent the development of drug resistance and ensure successful outcomes. In recent years, efforts to combat TB have intensified, with initiatives such as the End TB Strategy and the development of new drugs, diagnostics, and vaccines [8].

Pulmonologists play a central role in the management of respiratory infections, encompassing diagnosis, treatment, prevention, and research. They collaborate with infectious disease specialists, epidemiologists, microbiologists, and public health authorities to address the complex challenges posed by respiratory pathogens. Advancing the development of vaccines against influenza and tuberculosis, including novel vaccine platforms and strategies to enhance vaccine efficacy and coverage. Studying the emergence and spread of antimicrobial-resistant strains of respiratory pathogens and developing strategies to mitigate resistance through antimicrobial stewardship and infection control measures [9].

Investigating the immunological mechanisms underlying respiratory infections and host responses to pathogens, with a focus on identifying targets for therapeutic intervention. Developing rapid, accurate, and point-of-care diagnostic tests for respiratory infections, including novel molecular assays, biomarkers, and imaging modalities. Evaluating the impact of public health interventions, such as vaccination campaigns, infection control measures, and surveillance systems, on the epidemiology and burden of respiratory infections [10].

Conclusion

Respiratory infections, including influenza and tuberculosis, pose significant challenges to global public health and require a multidisciplinary approach for effective prevention and control. Pulmonologists play a crucial role in understanding the epidemiology, pathogenesis, clinical presentation, and treatment of these infections, as well as conducting research to advance our knowledge and improve patient outcomes. Collaboration between pulmonologists, infectious disease

*Correspondence to: Geng Wangfi, Department of Building Environment and Energy Engineering, The Hong Kong Polytechnic University, China. E-mail: gwangfi34@polyu.edu.cn

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specialists, epidemiologists, and other stakeholders is essential to address the complex challenges posed by respiratory pathogens and reduce the burden of respiratory infections worldwide.

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