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## Viral pneumonia in China: from surveillance to response



Community acquired pneumonia and other lower respiratory tract infections are major health issues in China and around the world.<sup>1</sup> Many patients with community acquired pneumonia are treated with empirical antibiotics before pathogen identification and knowledge about the causes of the disease is therefore essential. For a long time, bacteria have been considered as the major pathogen for community acquired pneumonia among immunocompetent adults. Viral causes of pneumonia have received attention in children and immunocompromised adults, but have received insufficient attention in the immunocompetent adult population. In the past 20 years, the outbreaks of severe acute respiratory syndrome (SARS), influenza A H1N1, influenza A H7N9, Middle East respiratory syndrome (MERS), and the ongoing COVID-19 pandemic have highlighted the importance of viral causes of community acquired pneumonia. Monitoring the circulating and emerging viruses that cause community acquired pneumonia and implementing rapid and timely responses are necessary public health tasks.

In 2010, we estimated that viruses could account for about 10% of community acquired pneumonia cases in China,<sup>2</sup> but the data were from a single-centre study. At that time, several multicentre research and surveillance networks for pneumonia had been established globally, such as the Competence Network for Community Acquired Pneumonia and the Community Acquired Pneumonia Organization, which coordinated large-scale longitudinal studies on the epidemiology, diagnosis, and treatment of the disease. These research networks are highly productive and have facilitated further understanding of the disease. In response to the public health challenges of community acquired pneumonia in China, we established the Community Acquired Pneumonia-China (CAP-China) network to mitigate research gaps in surveillance, rapid diagnosis, and optimal treatment. The network was initially established in Beijing with 12 hospitals as the Beijing Network for Adult Community-Acquired Pneumonia, and then expanded to 72 medical institutions (mainly tertiary hospitals) across the country as the CAP-China network.

Through a multicentre registry within the network, data from another cohort in China, and advances in pathogen detection techniques, it is now estimated that

viruses are present in 27.5–39.2% of immunocompetent patients with community acquired pneumonia.<sup>3–5</sup> Although rhinovirus was predominant in patients with community acquired pneumonia in the USA,<sup>6</sup> the most common virus among immunocompetent patients with pneumonia in China was influenza (28.4%), followed by respiratory syncytial virus (3.6%), human adenovirus (3.3%), and human coronavirus (3.0%).<sup>4</sup> Disease severity on hospital admission, the occurrence of severe complications, and 90-day mortality of patients with non-influenza viral pneumonia were similar to those of viral pneumonia caused by influenza.<sup>4</sup> Unlike the previous notion that non-influenza viruses mainly affect children and immunosuppressed populations, non-influenza viral pneumonia also had an important role in community acquired pneumonia in immunocompetent adults.<sup>4</sup> Human adenovirus 55 was also identified as an emerging cause of community acquired pneumonia among immunocompetent individuals in China.<sup>7</sup> The CAP-China network studies emphasised the crucial role of viral causes of community acquired pneumonia in adults and contributed to the latest guidelines on the disease in China.<sup>8</sup>

Surveillance and observational studies are vital for rapid responses to viral pneumonia, including vaccine development, the rational use of antibiotics, and drug development. As shown by the example of annual influenza vaccines, surveillance data provide crucial information for the prediction of circulating viral strains and rational vaccine design. Also, considering the generally limited resources for vaccine development, it is important to prioritise vaccines for viruses with higher incidence and mortality, which again is dependent on information from aetiological surveillance.

Antibiotic resistance and the potential epidemic of multidrug resistant bacteria pose substantial public health threats in China. The use of antibiotics in patients with viral community acquired pneumonia without bacterial co-infection might further exacerbate the current situation. Knowledge about disease characteristics from large-scale, multicentre observational studies and information about common circulating viruses from aetiological surveillance will promote early identification of viral pneumonia. The use of rapid molecular testing for respiratory viruses might also help to reduce intravenous antibiotic use.<sup>9</sup>

For more on the CAP-China network see [www.chinapneumonia.cn](http://www.chinapneumonia.cn)

Aetiological surveillance can guide the allocation of research resources for the development of antiviral therapies. Unlike bacterial infection, the choice of antivirals for respiratory viruses is very limited and drug resistance is emerging, which necessitates the development of more potent therapies to reduce complications and mortality from community acquired viral pneumonia.<sup>10</sup> The repurposing of available antiviral drugs and the development of novel drugs and drug combinations are crucial. Moreover, because immune dysfunction is a key mechanism in the pathogenesis of severe viral pneumonia, the development or repurposing of host-directed therapies is also important.

The surveillance and clinical research coordinated by the CAP-China network and similar networks around the world will continue to benefit the health community. Apart from guiding vaccine development and therapy, the CAP-China network will also aid in identifying novel emerging pathogens and contribute to global understanding of viral respiratory illness.

With the close collaboration of researchers in China, knowledge about community acquired viral pneumonia in immunocompetent adults has progressed rapidly in the past 10 years, and the substantial role of viral pathogens as causes of community acquired pneumonia has been gradually recognised.<sup>2-5</sup> The experience from CAP-China and other networks shows the importance of regional and global collaboration in research. Although confronted with many unknowns and challenges, we believe these difficulties can be addressed if researchers unite as a close community.

BC is one of the cofounders of the CAP-China network. The other authors declare no competing interests.

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