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EDITORIAL

The changing landscape of acute respiratory infections in the post-pandemic era

El panorama cambiante de las infecciones respiratorias agudas en la era post pandemia

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Acute respiratory infections (ARIs) remain a major cause of morbidity and mortality worldwide, particularly in children. Pneumonia—both viral and bacterial—is among the leading causes of death in children under five years old, especially in low- and middle-income countries. Globally, ARIs contribute significantly to the burden of disease, accounting for approximately 4% of disability-adjusted life-years (DALYs) and resulting in millions of deaths annually[1]. The estimated mortality rate due to ARIs in infants is 5.02 deaths per 1,000 live births[2]. Prior to the COVID-19 pandemic, South America alone reported 1.4 billion new respiratory infections and 177,000 deaths annually due to ARIs. Beyond the human toll, ARIs impose a substantial economic burden on healthcare systems and society. In this region, the total cost of permanent productivity loss was estimated at **US$ 835 million** based on annual minimum wage calculations and **US$ 2 billion** in purchasing power parity, representing **0.024% of the region's gross domestic product[3].**

The COVID-19 pandemic marked a turning point in the epidemiology of respiratory infections. Public health measures implemented to curb the spread of SARS-CoV-2—including social distancing, mask-wearing, hand hygiene, and restrictions on gatherings—had an unintended but notable impact on the circulation of other respiratory viruses. Multiple studies have reported a significant decline in the incidence of major ARI-related viruses, such as **influenza A and B, respiratory syncytial virus (RSV), human metapneumovirus (HMPV), parainfluenza, and adenovirus** between 2020 and 2022. This decline provided clear evidence that **non-pharmacological interventions (NPIs) are highly effective in reducing the transmission of respiratory pathogens.**

However, the relaxation of these measures in the latter half of 2021 and 2022 led to a striking resurgence of respiratory infections[4]. Many countries experienced **unexpected outbreaks** as previously suppressed viruses re-emerged at different times, likely influenced by climatic factors and social behaviors[5,6]. Furthermore, the **cyclical patterns of viral circulation appear to have shifted,** raising concerns about long-term changes in epidemiological trends[7].

Several hypotheses have been proposed to explain the resurgence and altered seasonality of respiratory viruses:

1. **Immune Debt:** Extended periods of reduced exposure to common respiratory pathogens during lockdowns may have led to lower population immunity, particularly in young children who missed early encounters with these viruses. This could have increased their susceptibility upon re-exposure[8].
2. **Suboptimal Immunization Rates**: The focus on COVID-19 vaccination may have inadvertently resulted in lower immunization rates against other respiratory viruses, such as influenza and pneumococcus[9,10].
3. **Viral Evolution and Adaptation**: Changes in viral surface proteins due to genetic mutations may have altered the antigenic properties of certain viruses, potentially affecting their transmissibility or immune escape mechanisms[11].

In present issue of **Infectio**, **Pacheco and colleagues**[12] analyze respiratory virus trends before and after the COVID-19 pandemic in Chile. Their study highlights a **notable increase in influenza cases in the spring of 2022**, coinciding with the removal of mandatory mask mandates. Similar

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outbreaks were observed for **RSV, adenovirus, and HMPV,** further underscoring the broader impact of lifting non-pharmacological measures.

Understanding the evolving epidemiology of respiratory viruses post-pandemic is critical for public health planning and outbreak preparedness. The observed rebound effect in viral circulation highlights the need for:

- Sustained surveillance systems to monitor shifts in viral epidemiology.
- Targeted vaccination campaigns to address gaps in immunization coverage, particularly for influenza and RSV.
- Strategic withdrawal of NPIs at the end of the pandemic, coupled with proactive resource allocation to manage potential outbreaks. A carefully planned and gradual lifting of non-pharmacological measures is essential to minimize abrupt surges in respiratory infections. Simultaneously, health systems should be prepared to handle post-pandemic outbreaks by ensuring adequate surveillance, hospital capacity, and timely access to vaccines and treatments.
- Further research on viral evolution and host immunity to anticipate future trends.

The COVID-19 pandemic has reshaped our understanding of ARI dynamics. Moving forward, a balanced approach integrating vaccination, surveillance, and evidence-based public health strategies will be crucial in mitigating the burden of ARIs and preparing for potential future pandemics.

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