

The Impact of Social Distancing for SARS-CoV-2 on Respiratory Syncytial Virus and
Influenza Burden

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Each year pediatricians dread the annual arrival of respiratory syncytial virus (RSV) and influenza virus because they are both associated with increased respiratory illnesses and resultant hospitalizations. RSV is the major cause of pneumonia in young children and is responsible for yearly global morbidity and mortality (1, 2). Influenza virus also has a major impact, with over 100 pediatric deaths each year attributable to influenza in the United States and with the global burden is even more impactful (3, 4). Thus, three articles appearing in this issue of the journal demonstrate impressive declines in both RSV and influenza associated with mitigation strategies implemented in response to the SARS-CoV-2 pandemic. They occur in three disparate regions of the world, but provide some common perspectives (5, 6, 7).

Infants in the remote Yukon-Kuskokwim Delta (YKD) region of Alaska have the highest rates of RSV hospitalization in the United States, reaching 259 per 1,000 infants during the winter season (8). Since infants in the YKD region are all hospitalized in one hospital and since comprehensive viral surveillance for RSV has been conducted for over 25 years, the impact of mitigation strategies on RSV burden can be comprehensively assessed (9). In late February 2020 infants with RSV were hospitalized in the region, but there were no SARS-CoV-2 isolates detected in the community. However, in March three social distancing mandates were implemented in the region; school closure, travel limitations to the region, and the closure of non-essential businesses and social distancing from non-household members. The rate of RSV hospitalizations in the region precipitously declined with no RSV hospitalizations occurring after the second week in April. Remarkably, among the 25 previous RSV seasons, such an occurrence had never been seen. Overall hospitalizations for other illnesses had not changed and no children were admitted with severe respiratory illness that had resulted from avoidance of care. These observations suggested that social distancing and travel restrictions markedly reduced the contagion.

The second observations are reported from Brazil and, also assessed the impact of mitigation strategies on acute bronchiolitis, largely secondary to RSV. In Brazil acute bronchiolitis is responsible for 6% of the total hospitalizations in children under one year of age, with a peak incidence between the months of February and August (10). Mitigation measures to prevent SARS-CoV-2 infection were implemented in Brazil in the middle of March and included social distancing, restrictions on business and non-essential services., and closure of schools. Data regarding acute bronchiolitis hospitalizations in infants under one year were compared for the past four years. A significant reduction in the number of hospitalizations for acute bronchiolitis in infants younger than one year was noted, with a greater than a 70% decline when comparing the rates from earlier year. These data also highlight the impact of social distancing and business and school closure on reducing the transmission of RSV in young children.

The final manuscript is from Western Australia where mitigation strategies to prevent COVID 19 disease were implemented at the end of March, just prior to the Southern hemisphere winter, the usual period of peak local RSV and influenza infections (11). Since the RSV and influenza samples from all public hospitals and emergency departments in the region are tested at a single laboratory since 2012, data on numbers of isolates detected could be compared over time. The mitigation strategies included border closure to non-residents in March and stay-at-home restrictions with school closure from the end of March until the end of April. Schools were then reopened with no restrictions in attendance. In earlier years, the annual number of RSV cases ranged from 532 to 707 and the annual number of influenza case ranged from 134 to 498. For the first 13 weeks of 2020, prior to the local mitigation restrictions, RSV and influenza detections were comparable to earlier seasons. However, after mitigation strategies were implemented, influenza and RSV quickly declined and remained low, even in the face of school reopening. When compared with previous pre-pandemic years, RSV detections were 98% lower and influenza detections 99 % lower than in earlier years. This seems even more remarkable since the decline persisted when school resumed. It is

widely known that school-aged children are the major transmission vectors to younger children for both influenza and RSV (12, 13). Although social distancing and attention to hygiene are likely contributing factors, the marked reduction in the number of RSV and influenza cases is consistent with reduced transmission from travel restrictions and closure of external borders. Reductions in southern hemisphere influenza detections recently reported from both the WHO and CDC surveillance data reflect these same trends (14, 15).

Although these reports focused on RSV and influenza, additional studies demonstrated that other respiratory illnesses have also decreased with social mitigation strategies. An impressive report from Paris demonstrated the impact of school closure and social distancing on the reduction in pediatric hospitalization for respiratory infections in multiple hospitals in the city (16). The first COVID-19 cases were detected in France in late January 2020 with partial lockdowns initiated early in March and a complete national lockdown by mid-March 2020 (17, 18). An interrupted time series analysis based on multicenter prospective surveillance data for pediatric emergency department visits and hospital admissions in Paris demonstrated that the number of visits and admissions after the lockdown decreased by -68% and -45% , respectively. There was also a $>70\%$ reduction in acute gastroenteritis, the common cold, bronchiolitis, and acute otitis media compared to the expected values from earlier time periods. However, there was no reduction in visits or admissions associated urinary tract infections since they were not associated with person to person transmission. These data strongly support that social mitigation strategies impact transmission of both contagious respiratory and gastrointestinal pathogens.

Further support for the impact of mitigation strategies was recently published from Hong Kong (19). This systematic review highlighted the effectiveness of these strategies in reducing influenza burden, largely based on observational studies and simulation exercises.

Timely implementation and high compliance in the community is needed to ensure optimal success.

In summary, these studies show that social distancing and mitigation strategies including closing borders, can make a remarkable difference in infections due to person to person transmission. When these measures are no longer indicated for the prevention of SARS-CoV-2 infections, they might be retained in some measure to reduce the burden of other infectious pathogens. However, this will need to be carefully monitored to assess the implications on other aspects of society.

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Potential conflicts

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