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Commentary

The Prevention of Common Respiratory Virus Epidemics in 2020-21 during the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Pandemic: An Unexpected Benefit of the Implementation of Public Health Measures

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Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) has spread globally causing an unprecedented public health crisis. Transmission of SARS-CoV-2 occurs primarily by respiratory droplets expelled by infected persons [1]. In order to curb the transmission of SARS-CoV-2, governments across the globe have resorted to non-pharmaceutical intervention (NPI) strategies. These containment measures include imposing large-scale lockdowns, quarantining infected persons, implementing travel restrictions, and recommending personal protective measures such as hand hygiene, wearing masks and social distancing. These NPIs have helped reduce the SARS-CoV-2 infection rates by 30-70% depending on the region surveyed, the severity of the epidemic and the containment measures used [2, 3], and have the potential to effect the transmission of other common respiratory viruses. In this issue of the Journal, Groves et al present data on the impact of the SARS-CoV-2 pandemic on laboratory confirmed detection of the common respiratory viruses in Canada [4]. These included influenza virus types A and B, respiratory syncytial virus (RSV), parainfluenza virus types 1, 2, 3 and 4 (PIVs), human metapneumovirus (hMPV), the human endemic coronaviruses (hCoV-NL63, hCoV-HKU1, hCoV-229E and hCoV-OC43), adenovirus (AV) and human rhinovirus/enterovirus (hRV/EV). The common respiratory virus detection was collected from the Canada Respiratory Virus Detection Surveillance System during 5 pre-pandemic respiratory virus seasons (2014-2019) and compared to the detection rate during the 2020-2021 season when NPI was implemented in Canada. Similar to recent report by the Centers for Disease Control and Prevention (CDC) National Respiratory and Enteric Virus Surveillance System [5], Groves et al detected a near absence of the common respiratory virus epidemics with the exception of the non-enveloped viruses, hRV/EV.

Respiratory virus outbreaks are often seasonal and the timing of outbreaks can vary depending on region and climate. In temperate regions, the enveloped RNA viruses RSV, influenza virus, hMPV, and hCoV have a peak incidence in the fall and winter months, while PIVs circulate in the fall and spring-summer months. The non-enveloped viruses, AV and HRV/EV, infect year-round. In addition, most respiratory viruses can infect simultaneously or sequentially leading to co-viral infections. During a typical respiratory virus season, co-infections with two or more viruses can occur ranging between 15-51% in children and 5-30% in adults. Studies in the early period of the SARS-CoV-2 pandemic demonstrated that infections with non-SARS-CoV-2 viruses ranged from 10-52% [6]. In all of these studies, the percentage of infections with other viruses substantially decreased as the prevalence of SARS-CoV-2 increased. Few studies have been done in the later part of the SARS-CoV-2 pandemic when NPI strategies for community spread of SARS-CoV-2 were more prevalent, and when there was a surge in COVID-19 cases. Epidemiological data from the U.S. CDC show a near absence of the common respiratory viruses during the 2020-21 respiratory virus season when NPI strategies were in effect, however, after NPI strategies were lifted there has been a summer surge of RSV, and PIV and hCoVs activities are returning to prepandemic levels [5]. In Southampton, U.K. circulation of hRV dropped to near zero levels after nationwide lock downs and school closings, but as the schools and country partially reopened the circulation of hRV re-

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turned to pre-pandemic levels [7]. Studies from Western Australia showed dramatic reductions in RSV and influenza virus circulation during the winter of 2020, but an intense spike of RSV infections in the summer, effectively changing the seasonal epidemiology of RSV [8]. This summer surge was attributed to the opening of schools, removal of restrictions, waning immunity and possibly a larger RSV naïve population.

Viral interference is another factor attributed to the appearance and disappearance of viruses in the community. Different respiratory viruses reach their epidemic peaks at different times, perhaps due to viral interference. During the 1918 pandemic, increased cases of influenza led to a low incidence of measles. Similarly, infection with rhinovirus reduced caseloads for influenza A (H1N1) 2009 during the 2009 H1N1 pandemic [9]. Viruses can induce an overall anti-viral state and outcompete or interfere with other viruses in a concomitant infection [10]. This has been well described for influenza.

It remains to be determined how the current pandemic has affected the incidence of other respiratory viruses and therefore altered the respiratory viral epidemiology in the coming years. There remains many unanswered questions, however, what we have learned is that NPI strategies will be an important component of future respiratory virus pandemic control, and can have an added benefit in the control of common respiratory virus epidemics.

Contributors

Both authors contributed equally.

Declaration of Interest

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