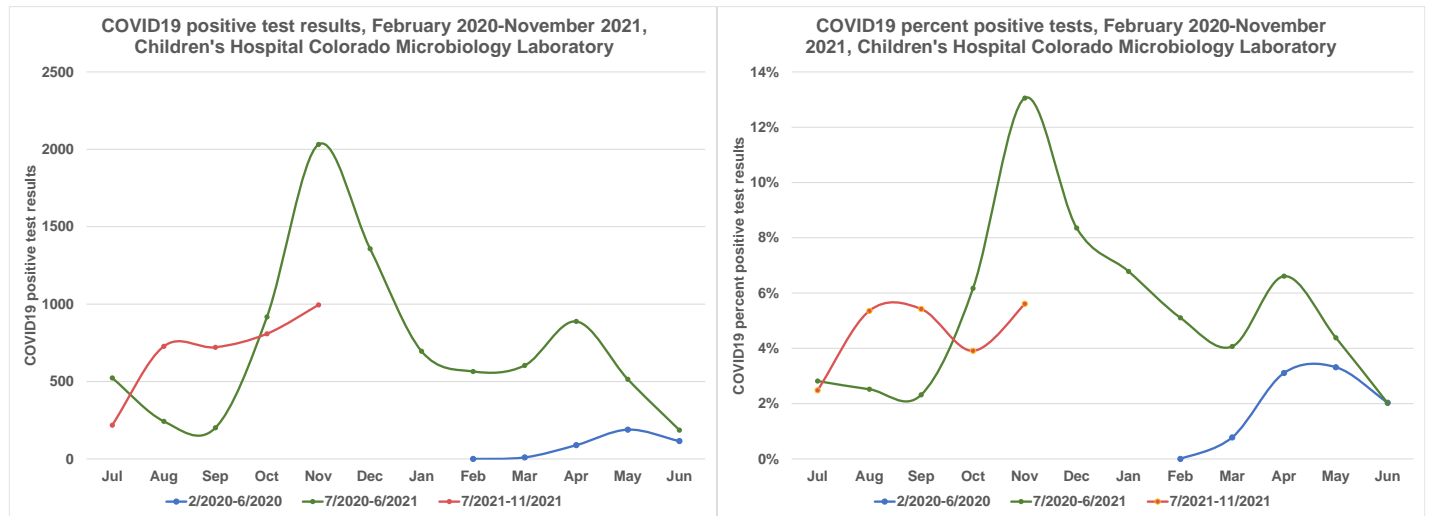




### January 2022: Respiratory Disease Epidemiology During COVID-19

**COVID-19 prevention measures also decreased other respiratory infections:** In early 2020, non-pharmaceutical interventions (NPIs) including decreased travel, social distancing, mask wearing, and hand washing were implemented around the world to prevent the spread of COVID-19. Despite varying levels of success in suppressing the spread of COVID-19 (Figure 1), many countries observed significant declines in non-COVID-19 respiratory infections while NPIs were in place.<sup>1</sup> From Alaska to Brazil, hospitalizations for RSV and bronchiolitis dropped among young children in 2020 compared to prior years.<sup>2,3</sup> In Japan, the US and elsewhere, influenza activity was lower toward the end of the 2019-2020 season and minimal influenza activity was recorded in the Southern hemisphere in 2020.<sup>4,5</sup> RSV and influenza cases as well as the percent of respiratory tests positive for these pathogens decreased dramatically after NPIs began in Australia in early 2020.<sup>6</sup> In China and across the US, there were huge drops in the occurrence of pediatric acute respiratory illnesses in 2020 including those due to RSV, influenza, and other pathogens.<sup>7,8</sup>

**Figure 1: COVID-19 (SARS-CoV-2) positive tests & percent positivity, Children’s Hospital Colorado Microbiology Laboratory**



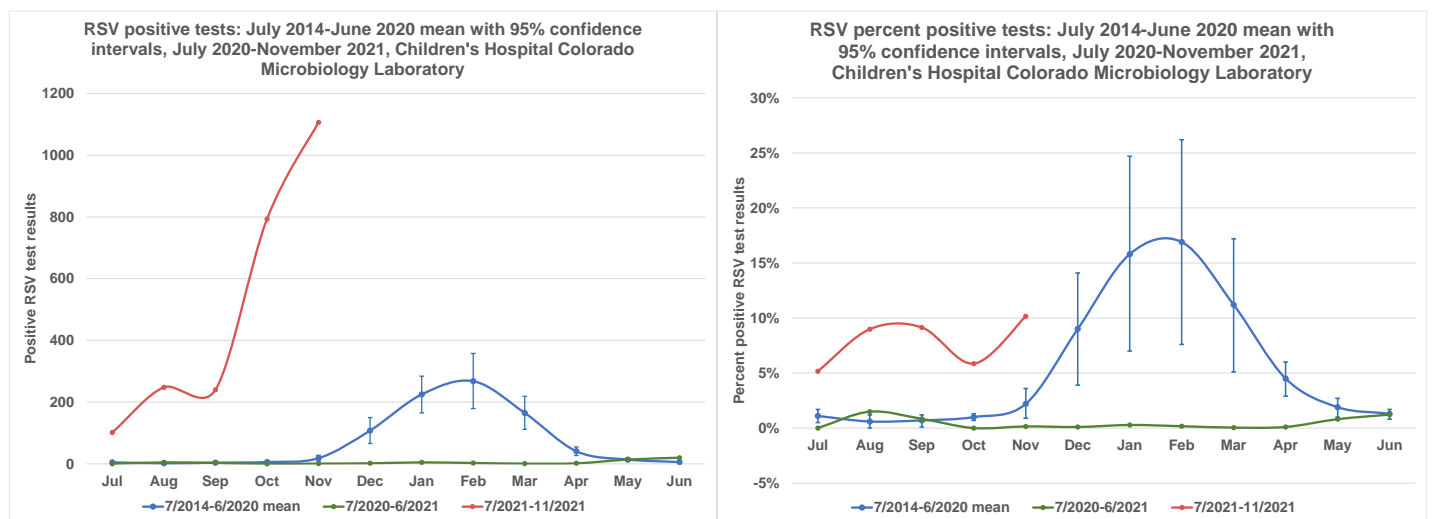
**Relaxation of social distancing and mask strategies have resulted in resurgence of other respiratory viruses including interseasonal RSV circulation:** Researchers predicted that this period of fewer non-COVID-19 viral respiratory infections could be followed by resurgent outbreaks with RSV and influenza as the number of susceptible individuals accumulated over time under the protection of NPIs<sup>9</sup> and indeed this is what has occurred with RSV. After missing their usual winter RSV season in 2020, Australia experienced a 2020-21 summer season of RSV circulation with higher numbers of bronchiolitis hospitalizations. They also observed an older median age of children hospitalized with RSV (16 months vs 8 months in the prior season) reflecting the broader age range of young children susceptible to infection after being previously protected by NPIs.<sup>10</sup> Both Japan and Switzerland also had unusually timed interseasonal RSV surges in 2021 and robust national monitoring allowed Switzerland to adjust RSV prophylaxis recommendations accordingly.<sup>11,12</sup> Recent

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surveillance data from the Pan American Health Organization confirm that most places throughout the region have witnessed the return of RSV while influenza activity remains minimal and sporadic.<sup>13</sup> In Texas and here in Colorado, non-COVID-19 respiratory infections including RSV, parainfluenza, and the endemic human coronaviruses returned among children after relaxation of NPIs.<sup>14</sup>

Data from respiratory pathogen tests performed at Children’s Hospital Colorado confirm we saw minimal activity for RSV, influenza, and most other respiratory pathogens from April 2020 to May 2021 (Figures 2 & 3). Broad use of masks and other NPIs to mitigate the spread of COVID-19 began in March and April 2020.<sup>15,16</sup> Although some measures remain in place, statewide regulations around masks and social distancing were relaxed in April 2021 and in May 2021 the CDC announced that vaccinated individuals no longer needed to wear masks (a recommendation that has since been revised). After seeing a few positive RSV tests in May and June 2021, RSV activity increased greatly in July and has continued at high levels through late 2021. In late 2021, we began to see the return of influenza at low levels in Colorado and across the US.

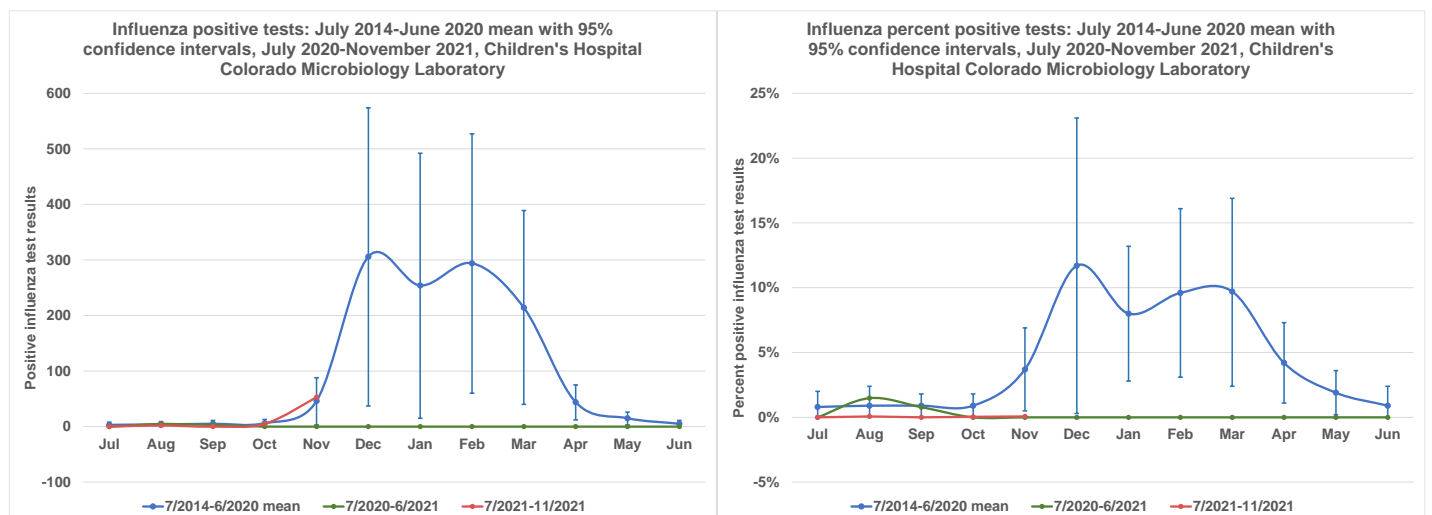
**Figure 2: RSV positive tests & percent positivity, Children’s Hospital Colorado Microbiology Laboratory**



Mean positive RSV tests for July 2014-June 2020 shown with 95% confidence intervals. For November 2020-April 2021, positive RSV tests fall below July 2014-June 2020 lower confidence limits. Positive RSV tests for July 2021-November 2021 are above July 2014-June 2020 upper confidence limits.

Mean percent positive RSV tests for July 2014-June 2020 shown with 95% confidence intervals. For October 2020-May 2021, percent positive RSV test results fall below July 2014-June 2020 lower confidence limits. Percent positive RSV test results for July 2021-November 2021 are above the July 2014-June 2020 upper confidence limits.

**Figure 3: Influenza positive tests & percent positivity, Children’s Hospital Colorado Microbiology Laboratory**



Mean positive influenza tests for July 2014-June 2020 shown with 95% confidence intervals. For December 2020-May 2021, positive influenza test results fall below the July 2014-June 2020 lower confidence limits.

Mean percent positive influenza tests for July 2014-June 2020 shown with 95% confidence intervals. For November 2020-May 2021, percent positive influenza test results fall below the July 2014-June 2020 lower confidence limits.

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**COVID-19 infection and associated prevention measures may change patterns of bacterial respiratory colonization and infection:** COVID-19 and the NPIs implemented in response to the pandemic have also been associated with shifting patterns of bacterial infections and respiratory tract colonization. Children in Turkey with respiratory tract specimens positive for SARS-CoV-2 had higher rates of *Streptococcus pneumoniae* on nasal swab testing when compared to children who tested negative for SARS-CoV-2.<sup>17</sup> In the UK, invasive pneumococcal disease decreased across all ages after introduction of NPIs for COVID-19; co-infections with SARS-CoV-2 and invasive pneumococcal disease were rare among all COVID-19 cases.<sup>18</sup> Among children in Texas, hospitalizations for invasive pneumococcal disease and invasive group A streptococcus were lower during the pandemic whereas hospitalizations for *Staphylococcus aureus* infections were unchanged from prior years.<sup>19</sup> Changing patterns in pneumococcal infections in particular warrant monitoring because pneumococcal disease can be prevented with vaccination. In the US and around the world, delivery of routine childhood immunizations (including pneumococcal immunizations) was disrupted early in the COVID-19 pandemic and recovery remains incomplete.<sup>20</sup> Modeling from Japan predicts that more invasive pneumococcal disease will occur with easing of NPIs and if recovery of routine pneumococcal vaccination is delayed.<sup>21</sup>

**What does this mean for the future?** For primary care providers, several lessons have been learned from the past 2 years of the pandemic. First, simple measures (masks, staying at home when sick, remote activities) implemented in homes, schools, clinics, and workplaces can dramatically reduce the spread of respiratory viruses and reduce their impact on vulnerable people. Second, not all viruses are the same: while strict measures were able to contain the spread of most respiratory viruses, more contagious rhinovirus and SARS-CoV-2 disseminated readily in our communities and RSV has now returned too. Third, vaccines against respiratory infections (COVID-19, influenza, pneumococcus) are of prime importance to reduce the burden of these pathogens on our communities by reducing preventable deaths and hospitalizations and by impacting population transmission. Finally, suppression of most respiratory viruses during the implementation of COVID-19 measures is teaching us more about the interaction that viruses (SARS-CoV-2, RSV, rhinovirus) have with common bacteria (pneumococcus). Keeping individual and community immunity for vaccine-preventable diseases at a high level can prevent emergence of previously controlled and preventable serious infections of childhood.

**Contagious Comments and  
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