



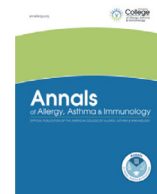
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## Editorial

## Reduced exposure to respiratory viral triggers may explain less health care utilization for children with asthma



It has been known for many decades that viral respiratory infections are a common cause of asthma exacerbations.<sup>1</sup> In fact, more than 80% of asthma exacerbations have been attributed to viral illness in school-aged children, mostly caused by the human rhinovirus (HRV), followed by seasonal coronaviruses, and influenza A and B.<sup>2</sup> Increased morbidity in children with asthma was noted during the 2009 H1N1 influenza pandemic.<sup>3</sup>

It was, therefore, anticipated that patients with asthma might experience asthma-associated morbidity because of the respiratory virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection based on experiences with other respiratory viral infections.<sup>1–3</sup> Unexpectedly, children with asthma have not exhibited SARS-CoV-2 at higher rates than children without asthma,<sup>4</sup> nor have they experienced more asthma exacerbations during the current pandemic even in those considered infected with the SARS-CoV-2 virus.<sup>5</sup> Moreover, several studies have suggested a potential protective effect because of a reduction of the SARS-CoV-2 spike protein receptors on the respiratory epithelial cell membranes in those who are highly allergic or are receiving inhaled corticosteroids.<sup>6</sup>

As previously reported,<sup>7</sup> we have found at our medical center a marked improvement in children with asthma, which occurred with school closure in mid-March 2020.<sup>8</sup> This coincided with improved asthma control, decreased asthma exacerbations requiring oral corticosteroids, and fewer emergency department (ED) visits and hospitalizations compared with pre-coronavirus disease 2019 (COVID-19). This occurred even though many of these children had stopped taking their medication, with decreased adherence to both controller and rescue medication.

Although the reports of the effects of the COVID-19 pandemic on asthma status have been fairly uniform, explanations for this phenomenon have varied a great deal in the few studies that have addressed this issue.<sup>7,8</sup> We have previously reported that, during the pandemic vs the prepandemic period, there was less influenza A and B infection, which coincided with improved asthma status.<sup>8</sup> Aside from the obvious effects of respiratory viral infections on asthma status, exposure to air pollutants per the US Environmental Protection Agency criteria with particulate matter (PM) of less than 2.5 microns (PM<sub>2.5</sub>), less than 10 microns (PM<sub>10</sub>), ozone, and nitrogen dioxide have been found to increase asthma exacerbations.<sup>9</sup> We found that there was a decrease in PM<sub>2.5</sub> during the stay-at-home period compared with pre-COVID-19, which coincided with an improvement in asthma status. Of the previous comprehensive epidemiologic reports, the

study by Taquechel et al<sup>7</sup> compared fairly well with our study in terms of length of the observation period, the number of key observations of both asthma status (such as ED visits, hospitalizations, and oral corticosteroid use), and evaluation of factors that can affect these outcomes and the increased use of virtual telemedicine. In addition, similar to their experience, we found that African American children with asthma had poorer outcomes in terms of ED use during the pandemic. In terms of viral infections, they found that improvement in asthma status coincided with a decrease of HRV, whereas we found this relationship with influenza A and B. In addition, unlike our findings, they did not find any relationship between the air pollutants mentioned above and asthma outcomes, whereas we found that a decrease in PM<sub>2.5</sub> coincided with better outcomes.

In this issue of the *Annals*, Stout et al<sup>10</sup> reported on the effect of COVID-19 on asthma visits at their tertiary pediatric hospital. They compared unscheduled and scheduled visits on a 12-monthly basis in 2020 with those in the previous 10 years during the same months from 2010 to 2019. Their main focus was primarily on the effect of 4 variables on asthma and overall visit outcomes. These included the following: (1) positive viral isolates by polymerase chain reaction (HRV, Influenza A and B, and total viral infections); (2) air pollutants (ozone and PM<sub>2.5</sub>); (3) pollens; and (4) season. The key findings included significantly reduced episodes of hospitalizations, ED visits, and outpatient asthma visits in 2020 vs the previous 10 years, primarily in the spring and fall but not in summer or winter months when all visits were low. These reductions in health care utilization outcomes were sustained when adjusted for air pollutants and pollen counts, whereas a reduced percentage of positive viral isolates correlated with the decrease in asthma visits. It would have been helpful, however, to know the level of air pollutant measured (ie, residential address, zip code region, census blocks, or city level). It was interesting to note that the reduced number of visits during the pandemic months was seen primarily in those less than 5 years of age, whereas we found a marked decrease in morbidity for all age groups 4 to 7, 8 to 11, and 12 years and above during the stay-at-home period. The findings of the study by Stout et al<sup>10</sup> provides increased clarity regarding the importance of reduced respiratory infections on asthma-related health care utilization without the confounding factors of season, pollen, or air pollution in their population. A particular strength of the study design is the 12-month observation period, most during the pandemic, probable stay-at-home management, and the 10-year prepandemic comparison, both of which provide a longer view than other studies we have reviewed.

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In terms of furthering our understanding of the pandemic effect on asthma, future studies should address economic and racial disparity in health care delivery during the pandemic, prescription practices, use of virtual visits, and adherence patterns.<sup>4,7,8</sup> Finally, it will be important to clearly establish the direct effect of the SARS-CoV-2 virus on asthma status, both in the short and long term. A recent study suggests that this virus has very little effect on asthma control or exacerbations.<sup>5</sup> However, this study suffers from a small sample size, inconsistent diagnosis by polymerase chain reaction, and lack of adequate controls.

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