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Delayed Seasonal RSV Surge Observed During the COVID-19 Pandemic

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Abbreviations: Respiratory syncytial virus (RSV), Intensive care unit (ICU), Polymerase chain reaction (PCR)

Contributors' Statements

Drs. Agha and Avner conceptualized and designed the study, drafted the initial manuscript, and reviewed and revised the manuscript.

Both authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

INTRODUCTION:

An unexpected positive outcome of the COVID-19 pandemic has been the marked decline in illness associated with other respiratory viruses, likely due to the widespread use of masks and social distancing. Respiratory syncytial virus (RSV) is a seasonal virus that typically peaks in the fall and declines by early spring. In the United States, RSV is responsible for annually 57,000 hospitalizations and 500,000 emergency department visits among children <5 years old.(1) Reports from around the world have shown up to a 98% reduction in RSV cases during the pandemic.(2,3) The initial studies came from the Southern Hemisphere countries that were at the beginning of their fall season in March 2020, when the pandemic started.(3) It was unclear whether the 2020-2021 RSV season would continue to be markedly reduced or just be delayed.(4)

A recent study from Australia described an RSV surge as physical distancing restrictions were relaxed. The number of RSV cases began to increase during their spring months and peaked in their summer, instead of the typical fall and winter months. Their data also show a higher than expected peak and infection in older children.(5)

METHODS:

We reviewed all positive polymerase chain reaction (PCR) tests for RSV in patients 0-18 years old, reported by the laboratory at our New York City (NYC) hospital, from January 2016 until May 8, 2021. For the 2019-2021 RSV seasons, we reviewed de-identified data on the ages of the patients who were seen at our hospital and had a positive RSV PCR test. We also noted whether the patient was hospitalized to either the regular pediatric inpatient care area or the pediatric intensive care unit (ICU) as well as the length of hospital stay.

Since the data was de-identified, an IRB approval was not required for the study.

RESULTS:

From 2016 until 2019, RSV cases at our hospital followed the expected seasonal pattern (Figure 1). There were no cases from September 2020 through January 2021. Our first patient with RSV for the 2020-21 fall season had a delayed start in February 2021 and the first hospitalized infant with RSV was in early March. Weekly reports show a continuing surge in cases through April (Figure 2). A total of 295 patients tested positive for RSV. The median age of our cohort was 6 months (range 12 days to 9 years). Of the 197 (66.7%) children who were admitted to the hospital, the majority (160 of 197; 81%) were admitted to the pediatric ICU; 6 required ventilator support and the rest received either non-invasive ventilation (NIV) or high flow nasal oxygen. The median length of hospital stay was 4 days. In contrast, during the 2019-2020 season, the median age of admitted patients was 17 months (range 11 days to 18 years), only 45% were admitted to the ICU and the median length of stay was 3 days.

Influenza activity in NYC has remained minimal during the pandemic;(6) we have seen a total of 5 influenza cases in our hospital during this season. SARS-CoV-2 activity at our institution has followed the NYC pattern as well, with a steady, consistent positivity rate, a slight upsurge in the numbers for the month of March 2021 followed by a progressive decline.(7)

DISCUSSION:

Our results reflect similar findings to that seen in Western Australia. NYC Department of Health surveillance data is beginning to show the same trend in RSV cases.(6) Our data indicates more severe disease in younger infants possibly due to diminished immunity from lack of exposure to RSV in the previous season. Continuing closures of day care centers and virtual schooling may have resulted in less spread of the disease to older children.

This seasonal shift and delayed peak of RSV in young children could be encountered in other parts of the country, especially as control measures are relaxed and schools re-open. Although our early findings cannot predict the height of the RSV surge or how long it may last, it does suggest that institutions should

plan ahead for an increase in pediatric emergency visits and potentially a need for increased pediatric ICU capacity in the coming weeks. Additionally, efforts should be made to extend monthly preventive palivizumab for infants at risk for severe RSV disease, in order to ensure continued protection during this unexpected surge.

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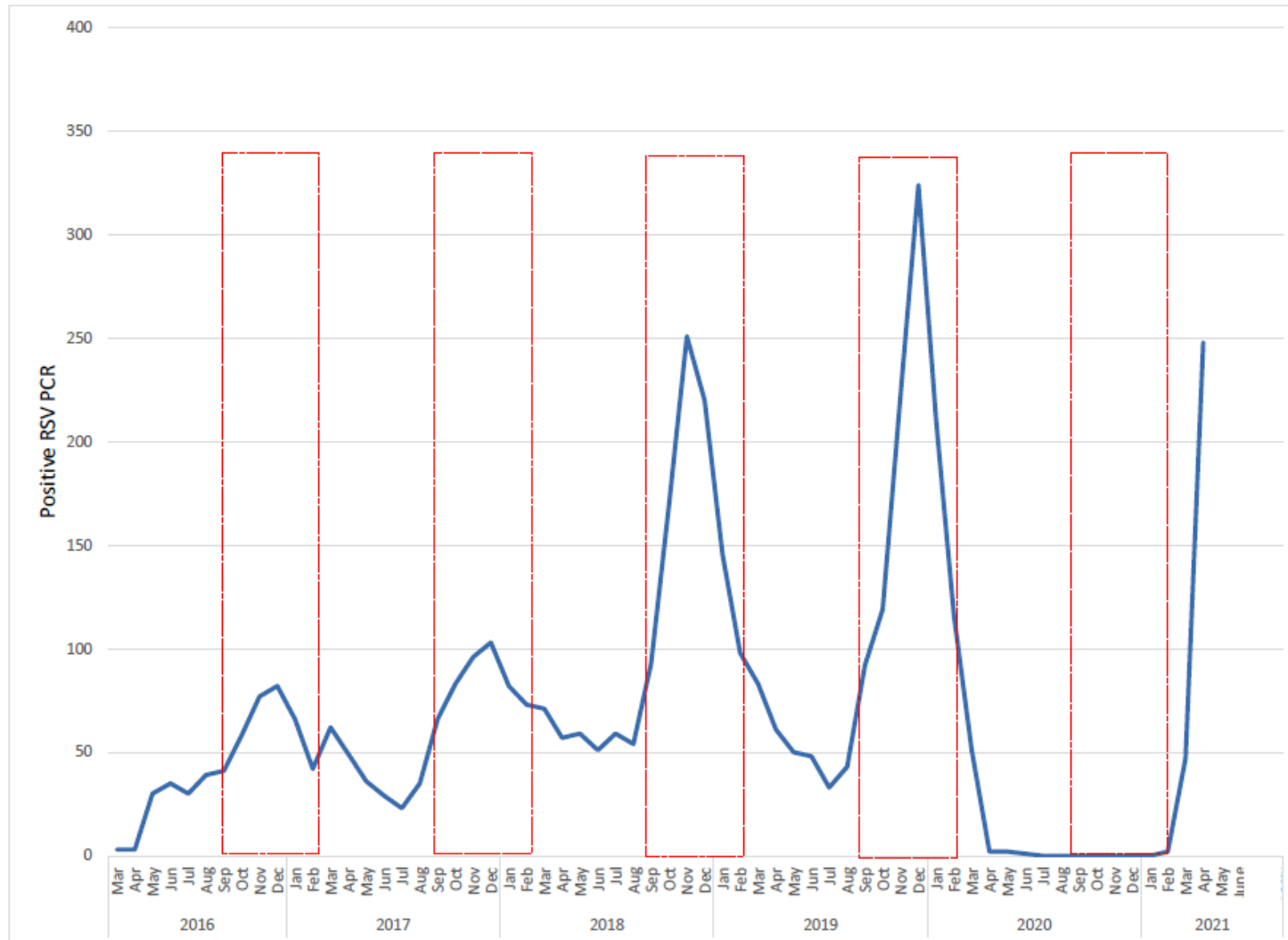


Figure 1 – Annual RSV trends at our hospital from 2016 - April 30, 2021. The dashed red boxes represent the typical RSV season. No RSV cases recorded for the 2020 fall or winter season.

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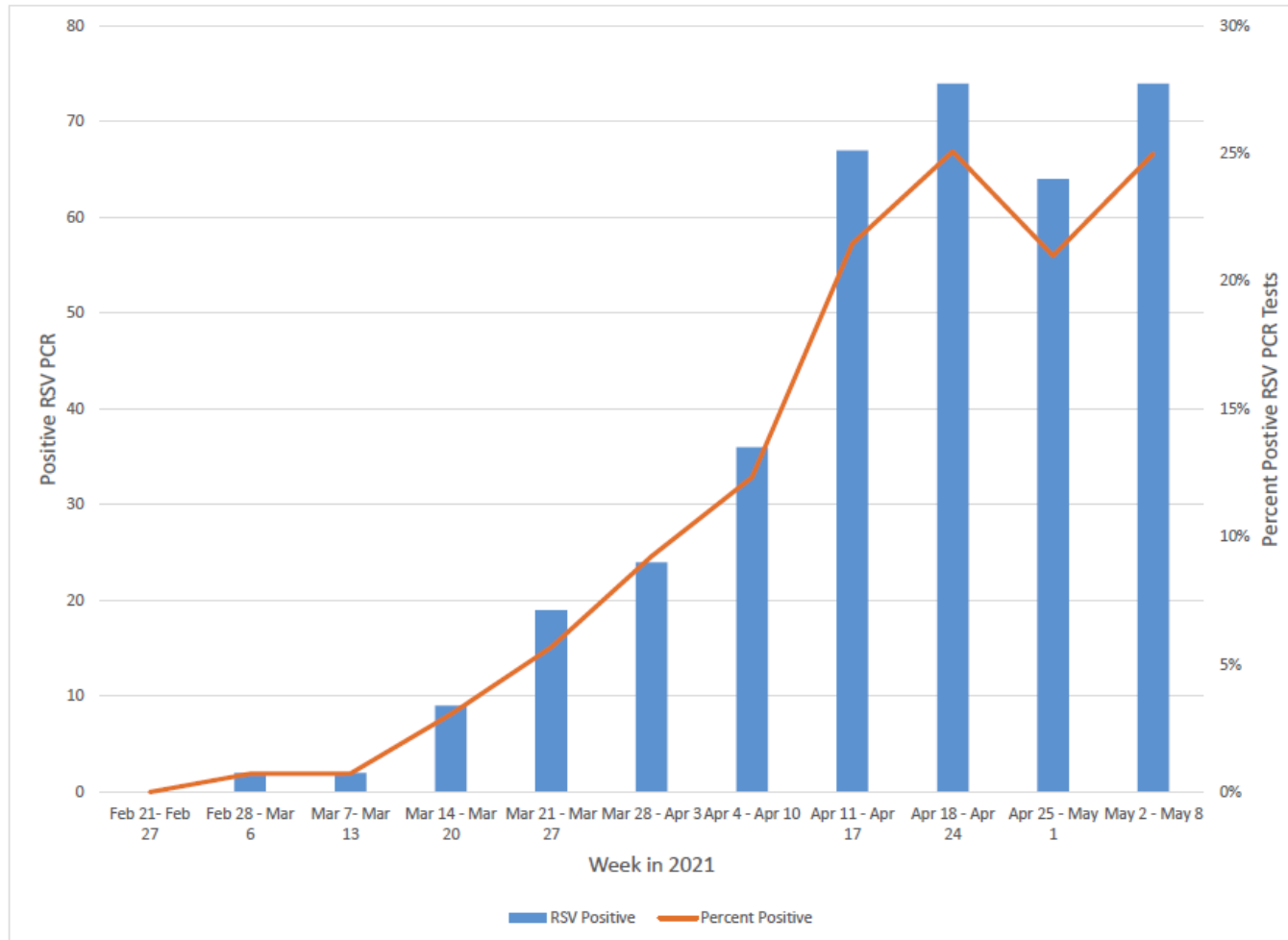


Figure 2 – Weekly RSV positive cases in numbers from March 1 - May 8, 2021. The red line represents the percent positivity of RSV of all tested.

Abbreviation: Respiratory Syncytial Virus (RSV)

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