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REVIEW ARTICLE

The Impact of the COVID-19 Pandemic on Respiratory Syncytial Virus

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Introduction

See editorial commentary on this article

Respiratory syncytial virus (RSV) is one of many etiologies for acute respiratory tract illness among all age groups. Clinical presentation differs depending on age, health status, and whether the infection is primary or secondary. RSV is the most common cause of lower respiratory tract infection in children under the age of one.[1] Adults, especially those who are older and/or have predisposing conditions, also have high susceptibility. Many viruses cause upper respiratory tract illnesses and induce severe manifestations when affecting the lower respiratory tract.[1] The annual rate of RSV hospitalization is just over 4 per 1,000 among children under the age of five years and is highest among those under six months at 20 per 1,000.[2]

On May 3, 2023, a new RSV-preventative vaccine was approved for immunizations in the United States.[3] It is recommended only for adults over age 60 and/or for those with compromised health status or weakened immunity. The first year of studies indicates that the vaccine is significantly effective in preventing RSV infection and even better at avoiding serious illness; however, investigations regarding its efficacy and safety are ongoing.

Transmission

RSV is primarily transmitted through airborne inoculation of the nasopharynx or ocular mucous membrane contact with virus-containing secretions or fomites. The most common route of transmission is direct contact, but large droplet aerosols can also be infective. Since RSV may survive on hands and fomites for hours; hand washing and contact precautions are suitable measures to mitigate spread.[2]

Coronavirus Impact on RSV

RSV infections peak during the fall season and decline by early spring.[4] Hospital admissions also increase dramatically during this season. The seasonal pattern is likely explained by the impairment of the airway mucosa, ciliary function, and temperature-dependent antiviral responses due to the inhalation of cold and dry air and indoor crowding during this weather. These factors might influence both the transmission and severity of the disease.[4] However, interventions such as isolation precautions, physical distancing, and masking introduced during the coronavirus pandemic markedly reduced the incidence of RSV infection during the 2020–2021 winter; subsequently, with the relaxation of these measures, the incidence of infection rose in spring–summer of 2021.[5]

In a recent study at a New York City hospital, in which all PCR-positive RSV cases from January 2016 to May 2021 were reviewed, the investigators found that the RSV cases followed the expected seasonal pattern from 2016 to 2019, but no cases were observed from September 2020 to January 2021. The first RSV patient for the 2020–2021 fall season was reported in February 2021, and the first RSV infant hospitalized arrived in early March, indicating a delayed start. During the 2020–2021 season, a total of 295 patients tested positive for RSV with a median age of 6 months in contrast to 17 months during the 2019–2020 (pre-pandemic) season. Out of the 66.7% (197) who were admitted to the hospital, 81% (160 of 197) were admitted to the pediatric intensive care unit; six of them required ventilator support, and the average length of stay was four days. In contrast, during the pre-pandemic season, 45% of hospitalized patients were admitted to intensive care, with an average length of stay of three days.[6] Thus, the age of children infected with RSV decreased in the year following the onset of COVID-19. Similarly, the rate of hospitalization, length of stay, and the proportion of patients requiring inten-

sive care and/or respiratory support increased.

A retrospective study surveyed nasopharyngeal samples from all patients (0–18 years old) admitted with respiratory symptoms to an Italian tertiary care hospital during 2018–2021.[7] A 99% reduction in the incidence of all viral respiratory infections was documented in the 2020–2021 season compared to the previous two years. In Spain, records at 38 pediatric hospitals evidenced a dramatic reduction in RSV cases, as well as bronchiolitis admissions, in winter months during the pandemic year 2020, as compared to the previous four years (2016–2019).[8] In Brazil, a 70% reduction in bronchiolitis hospitalizations occurred during the COVID-19 pandemic.[9] Investigators in Belgium documented an over 99% reduction in RSV illness during the pandemic year, in comparison to the previous 23 years. They also reported that 91–98% of all positive RSV tests each year occurred between the months of September and March.[10]

Research at a hospital in Australia compared the clinical burden of RSV infections before and during the COVID-19 pandemic.[11] Prior to the pandemic (2019–early 2020), the typical seasonal pattern occurred predominantly in the winter (June–August in Australia) with 58 hospitalizations. During the precautionary "lockdown" period from March to December 2020, there were no hospitalizations for RSV illnesses. However, 53 people were hospitalized between January and March 2021 following the relaxation of COVID-19 restrictions; this indicates a significant increase in RSV incidence with an unseasonal peak.

Another study examined possible predictors of RSV incidence and rebound, such as population mobility, climate, non-pharmaceutical interventions, and SARS-CoV-2, in 18 countries.[12] Two major determinants of RSV rebound according to this research were the reopening of schools and temperature changes. The full reopening of schools after the pandemic was associated with an increased risk of RSV rebound with a hazard ratio of 23.29 [95% CI, 1.09–495.84].[12] However, the partial reopening of schools was not associated with an increased risk of RSV rebound. Temperature changes also influenced the disease pattern. Every 5 °C increase in temperature was associated with a reduced risk (HR 0.63 [95% CI, 0.40–0.99]) whereas every 5 °C decrease was associated with an increased risk of RSV rebound. An increased risk of RSV rebound was observed over time, regardless of whether schools were closed or fully open, and even at higher temperatures, suggesting that the population's susceptibility to the disease was increasing. This increased susceptibility could be due to the rising number of newborns after the COVID-19 pandemic who remained naïve to the virus.[12]

Conclusion

Many governments responded to the COVID-19 pandemic with non-pharmaceutical interventions, such as face masking and physical distancing, to mitigate infection spread. These restrictions appear to have markedly reduced RSV incidence in its typical winter months in 2020 with delayed out-of-season RSV outbreaks in the summer of 2021 in several countries.[13] Following the relaxation of these measures, many populations experienced a 2–6 month delay in the RSV epidemic, with varying severities.[12] Reasons for this could be schools reopening, lifting of international travel bans, increased social gatherings, and isolation of symptomatic individuals. With a more susceptible population and full reopening of schools, there were increases in the RSV caseloads and seasonality shifts.[12] Generally, seasonal infection peaks seem to occur in the fall, with its cooler temperatures, and possibly because of students returning to school after the summer break.

However, the rising trend of RSV could also be due to increased susceptibility to the disease among the population. This might be attributed to the newborns who remained naïve to the virus and the somewhat older children who were not exposed to infectious agents early in life.[12] Surveillance for RSV continues to aid understanding of its transmission and preparation for potential future rebounds.

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