

Waning antibody immunity against Respiratory Syncytial Virus during the COVID-19 pandemic and subsequent resurgence of RSV cases in children

Marina Viñeta Paramo, Lilian Ngo, Frederic Reicherz, Bahaa Abu-Raya, Rui Yang Xu, Alexanne Lavoie, Jeffrey N. Bone, Jocelyn A. Srigley, Alfonso Solimano, David M. Goldfarb, Danuta M. Skowronski, Pascal M. Lavoie

¹Department of Pediatrics, UBC, Canada; ²Women+ and Children's Health, Faculty of Medicine, UBC, Canada; ³British Columbia Children's Hospital Research Institute, Vancouver, Canada; ⁴Department of Pathology and Laboratory Medicine, British Columbia Children's & Women's Health Centres, Canada; ⁵British Columbia Centre for Disease Control, Canada

Introduction

RSV is the leading cause of acute respiratory tract infections. Newborns are immunologically naïve and depend on maternal antibodies transferred during pregnancy to provide protection against respiratory viruses. In context of mitigation strategies to reduce transmission of SARS-CoV-2, many countries reported a near disappearance of RSV infections during the 2020-2021 winter viral season.

Objective

To describe immunological and public health consequences associated with the lack of exposure to RSV in British Columbia (BC) during the COVID-19 pandemic

Methods

RSV detections in children ≤18 years old at BC Children's Hospital between September 1, 2017 and August 31, 2023.

RSV seroprevalence analyses of women of childbearing age and healthy infants at the end of usual RSV seasons for 2018, 2019, 2020 and 2021.

Results

Figure 1. RSV cases reported in children 0 to <18-years old over 5 seasons (2017-2023)

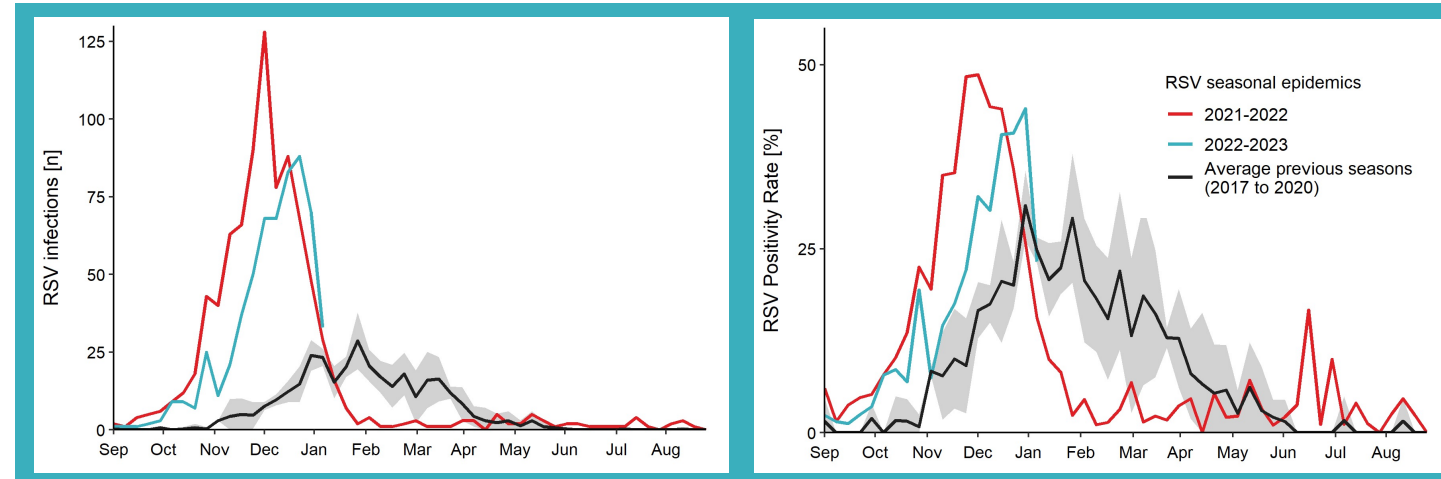
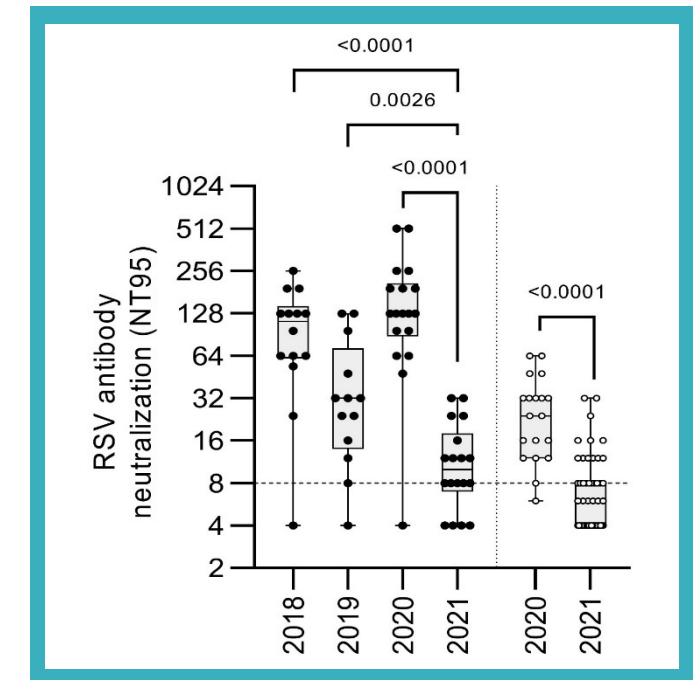


Table 1. Severity outcomes for children (0 to <18 years old) with RSV at BCCH, 2017-2023.

	2017-18 (N = 315)	2018-19 (N = 334)	2019-20 (N = 277)	2021-22 (N = 880)	2022-23* (n=587)
Age at diagnosis in months, median (IQR)	8.7 (2.0 – 26.0)	10.5 (2.5 - 26.9)	12.4 (3.3 - 29.2)	17.8 (5.3 - 33.5)	20.3 (4.3 – 44.2)
RSV cases in <6 months old, n (%)	135 (42.9)	133 (39.8)	103 (37.2)	241 (27.4)	172 (29.3)
Hospitalized, n (% age group)	74 (54.8)	57 (42.9)	53 (51.5)	64 (26.6)	90 (52.3)
Supplemental O ₂ , n (% hospitalized)	49 (66.2)	39 (68.4)	39 (73.6)	46 (71.9)	72 (80.0)
ICU admission, n (% hospitalized)	18 (24.3)	10 (17.5)	13 (24.5)	16 (25.0)	29 (32.2)
RSV cases in 6 to <12 months old, n (%)	41 (13.0)	41 (12.3)	33 (11.9)	105 (11.9)	54 (9.2)
Hospitalized, n (% age group)	25 (61.0)	16 (39.0)	20 (60.6)	14 (13.3)	21 (38.9)
Supplemental O ₂ , n (% hospitalized)	18 (72.0)	11 (68.8)	13 (65)	10 (71.4)	16 (76.2)
ICU admission, n (% hospitalized)	4 (16.0)	4 (25)	1 (5)	3 (21.4)	1 (4.8)
RSV cases in 12 to <24 months old, n (%)	53 (16.8)	69 (20.7)	57 (20.6)	190 (21.6)	97 (16.5)
Hospitalized, n (% age group)	32 (60.4)	49 (71.0)	33 (57.9)	26 (13.7)	42 (43.3)
Supplemental O ₂ , n (% hospitalized)	22 (68.8)	31 (63.3)	18 (54.5)	18 (69.2)	31 (73.8)
ICU admission, n (% hospitalized)	7 (21.9)	7 (14.3)	7 (21.2)	4 (15.4)	6 (14.3)
RSV cases in 2 to <4 years old, n (%)	46 (14.6)	46 (13.8)	51 (18.4)	254 (28.9)	140 (23.9)
Hospitalized, n (% age group)	34 (73.9)	28 (60.9)	19 (37.3)	46 (18.1)	71 (50.7)
Supplemental O ₂ , n (% hospitalized)	22 (64.7)	20 (71.4)	8 (42.1)	25 (54.3)	52 (73.2)
ICU admission, n (% hospitalized)	10 (29.4)	6 (21.4)	1 (5.3)	5 (10.9)	7 (9.9)
RSV cases in 4 to <10 years old, n (%)	35 (11.1)	31 (9.3)	25 (9)	79 (9.0)	104 (17.7)
Hospitalized, n (% age group)	21 (60)	17 (54.8)	12 (48.0)	17 (21.5)	39 (37.5)
Supplemental O ₂ , n (% hospitalized)	10 (47.6)	10 (58.8)	9 (75.0)	8 (47.1)	27 (69.2)
ICU admission, n (% hospitalized)	1 (4.8)	6 (35.3)	3 (25.0)	4 (23.5)	10 (25.6)

* Data up to January 7th 2023, on going analysis

Figure 2. Live RSV antibody neutralization in women (black dots, n = 64) and infants (open circles, n = 52)



Conclusions

- ▶ With lifting of social distancing measures, BC experienced a belated resurgence of RSV cases over two seasons
 - ▶ Gradual increase in symptomatic infections among **older children**
 - ▶ **Severity outcomes** delayed to 2022-23
- ▶ Possible cohort effect related to infants who lack maternal RSV antibodies and waning of RSV immunity in older children, in absence of RSV exposure for a prolonged period.

References

Yeoh DK, et al. (2020) Clin Infect Dis.; van Summeren (2021) EuroSurv; Reicherz F, et al. (2022) J Infect Dis; Bardsley MJ, et al. (2022) Lancet Infect Dis.