**ID Week 2022 Abstract**

**Authors**: Zheyi Teoh[1], Shannon Conrey[1,2], Allison Burrell[1,2], Claire P. Mattison[3,4], Daniel C. Payne[5], Monica McNeal[1,6], Rachel M. Burke[3], Ardythe Morrow[1, 2], Mary Allen Staat[1,6]

**Institution:**

[1] Division of Infectious Diseases, Cincinnati Children's Hospital Medical Center, Cincinnati, OH
[2] Department of Environmental and Public Health, University of Cincinnati College of Medicine, Cincinnati, OH
[3] Division of Viral Diseases, Centers for Disease Control and Prevention, Atlanta, GA
[4] Cherokee Nation Assurance, Arlington, VA
[5] Division of Foodborne, Waterborne, and Environmental Diseases, Centers for Disease Control and Prevention, Atlanta, GA
[6] Department of Pediatrics, University of Cincinnati College of Medicine, Cincinnati, OH

**Title:** Prolonged respiratory viral infection associated with presence of coinfections in an urban birth cohort

**Introduction:** Prolonged infection by respiratory viruses has been reported, especially in hospitalized or immunocompromised children. However, little is known of factors contributing to prolonged respiratory viral infection, particularly in asymptomatic and less severe infections. We examined characteristics associated with prolonged viral infection in a community-based birth cohort.

**Methods:** The PREVAIL cohort is a CDC-sponsored two-year birth cohort in Cincinnati, Ohio conducted during 4/2017 to 8/2020. Mid-turbinate nasal swabs were collected weekly from children and tested using the Luminex Respiratory Pathogen Panel. The primary outcome was prolonged viral infection, which was defined as a viral detection lasting 4 or more weeks. Proportions of prolonged viral infections were compared using Fisher's exact test with Holms corrections. Adjusted odds ratios (aOR) and 95% confidence intervals were calculated using a mixed effects logistic regression model while controlling for within-subject clustering, viral species, child age, child sex, symptom status, and coinfection. This analysis was limited to subjects who provided at least 70% of weekly samples.

**Results:** Among 101 children, providing 7871 child-weeks of follow-up, we identified 780 viral infections. The median duration of infection across all respiratory viruses was 1 week, except for bocavirus and coronavirus NL63, each with 2 weeks; 40% of bocavirus and >10% of adenovirus, coronavirus NL63, RSV A, human metapneumovirus, and parainfluenza 1 infections were associated with prolonged infection ($\geq$4 weeks). No prolonged infections were detected for influenza A or B, coronavirus 229E or HKU1, or parainfluenza 2 or 4 infections. Viral coinfection (aOR=3.1, 95% CI 1.9, 5.0) and female sex (aOR 1.8, 95%CI 1.1, 2.9) were significantly associated with prolonged infection, while symptom status and child age were not.

**Conclusion:** In the PREVAIL cohort, detection of respiratory viruses lasting 4 weeks or longer was common for certain respiratory pathogens and was especially prolonged for bocavirus. Biological factors such as the presence of additional viral infections or child sex may affect the likelihood of prolonged infection.

**Table 1. Duration of respiratory viral infections in PREVAIL cohort**

| Pathogen* | Viral infections, n | Prolonged infection, n (%) | Infection duration in weeks | | |
| --- | --- | --- | --- | --- | --- |
| | | | Median | IQR | Maximum |
| Bocavirus | 170 | 67 (39%)[a] | 2 | 1-6 | 33 |
| Coronavirus NL63 | 46 | 8 (17%) | 2 | 1-3 | 5 |
| RSV A | 50 | 7 (14%)[b] | 1 | 1-2 | 5 |
| Adenovirus | 137 | 16 (12%)[b] | 1 | 1-2 | 14 |
| HMPV | 49 | 5 (10%)[b] | 1 | 1-1 | 6 |
| Parainfluenza 1 | 20 | 2 (10%) | 1 | 1-1 | 5 |
| RSV B | 43 | 3 (7%)[b] | 1 | 1-1 | 4 |
| Coronavirus OC43 | 59 | 3 (5%)[b] | 1 | 1-2 | 4 |
| Parainfluenza 3 | 66 | 2 (3%)[b] | 1 | 1-1 | 5 |
| Coronavirus 229E | 10 | 0 (0%) | 1 | 1-1 | 3 |
| Coronavirus HKU1 | 49 | 0 (0%)[b] | 1 | 1-1 | 3 |
| Influenza A | 25 | 0 (0%)[b] | 1 | 1-1 | 2 |
| Influenza B | 4 | 0 (0%) | 1 | 1-1.5 | 2 |
| Parainfluenza 2 | 17 | 0 (0%)[b] | 1 | 1-1 | 2 |
| Parainfluenza 4 | 35 | 0 (0%)[b] | 1 | 1-1 | 2 |

[a] significantly different from proportion of prolonged adenovirus episodes using Fisher's exact test ($p < 0.05$)

[b] significantly different from proportion of prolonged bocavirus episodes using Fisher's exact test ($p < 0.05$)

*Ordered by % of viral infections that are prolonged, in descending order

Figure 1. Duration of respiratory viral infections in the PREVAIL cohort
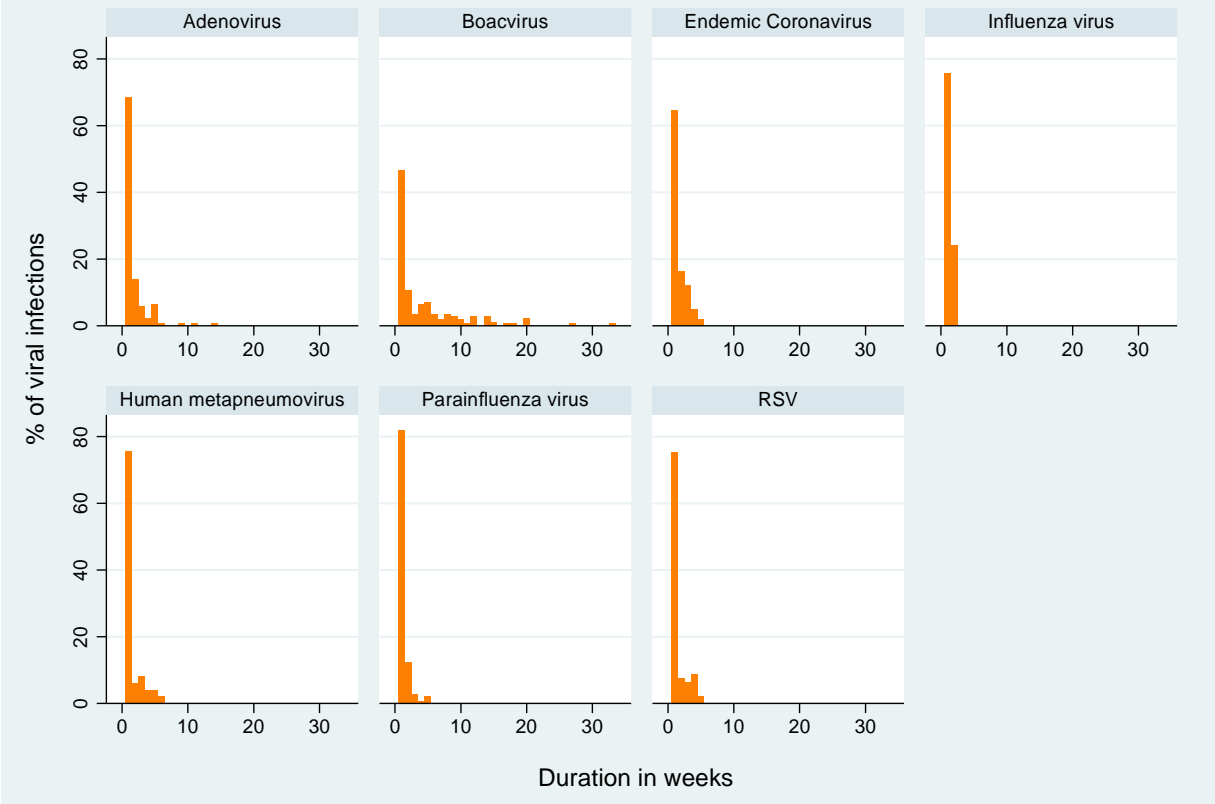
**Table 2. Factors associated with prolonged infections in the PREVAIL cohort**

| | Viral infections, n | Prolonged infections, n (%) | aOR* | 95% CI | *p* |
|---|---|---|---|---|---|
| **Presence of coinfection** | | | | | |
| No | 581 | 60 (10%) | *reference* | | |
| Yes | 199 | 53 (27%) | 3.1 | 1.9, 5.0 | <0.001 |
| **Child age** | | | | | |
| < 6 months | 118 | 17 (14%) | *reference* | | |
| 6-12 months | 250 | 53 (21%) | 1.9 | 0.92, 3.8 | 0.08 |
| 13-18 months | 206 | 20 (10%) | 0.59 | 0.27, 1.3 | 0.19 |
| 19-24 months | 206 | 23 (11%) | 0.69 | 0.32, 1.5 | 0.34 |
| **Child sex** | | | | | |
| Male | 467 | 55 (12%) | *reference* | | |
| Female | 313 | 58 (18%) | 1.8 | 1.1, 2.9 | 0.01 |
| **Presence of symptoms** | | | | | |
| Asymptomatic | 411 | 65 (16%) | *reference* | | |
| Symptomatic | 369 | 48 (13%) | 1.23 | 0.75, 2.0 | 0.41 |

*Adjusted odds ratio (aOR) calculated using a logistic mixed effects model controlling for within subject clustering, type of virus, presence of additional viral infection, child age category, child sex, and the presence of symptoms (fever or cough).