

## **RSV and HPIV: do they interact?**

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Pathogen- pathogen interaction, a form of epidemiological synergism, is an emerging arena of new research and understanding in studies of infectious disease in the health and clinical care. Pathogen interactions can be operational at different scales and is very common when they share a common host population. We focus on two closely related viruses in the Paramyxovirus family (data obtained from Department of Pediatrics and Biomedical Informatics, University of Utah):

- **Respiratory Syncytial Virus (RSV)**, a cause of severe illness in very young children,
- **Human Parainfluenza (HPIV)**, the current cause of the majority of cases of croup in the United States, which breaks into four distinct serotypes.

Though preliminary statistical analysis of correlation and regression on datasets indicates apparent interaction between them, but it does not exhibit the nature of interaction. To address the issue, we came up with two different hypotheses of interactions: cross-immunity and convalescence, and build up two different seasonally forced two-disease models. Using a variety of model-fitting approaches including trajectory-matching, probe-matching, and Bayesian methods, we estimate the strength of interactions along with other parameters such as amplitude of seasonality and rate of waning immunity.