**Development of a comprehensive metric for monitoring seasonal respiratory disease using syndromic test data as an alternative to influenza like illness surveillance**

**Introduction**

In the United States (US), epidemiological reporting of respiratory illness typically focuses on influenza-like illness (ILI), which is used by healthcare professionals to monitor seasonal disease onset, duration, and severity. Using FilmArray Trend, a cloud-based epidemiology system, we have developed the Test Utilization Rate Normalized (TURN) metric. Trend aggregates FilmArray RP Panel test results from sites across the US. The RP Panel tests for 20 targets simultaneously, making TURN an indicator of broader respiratory illness. TURN is an improvement upon ILI, a metric which focuses on influenza and may mask other etiologies of respiratory disease.

**Methods**

RP Panel test frequency is used as an indicator of respiratory illness; however, increased adoption of FilmArray products may increase utilization unrelated to disease severity. We use a linear regression model to normalize the rate at which physicians ordered over 300,000 RP tests starting in 2013. TURN is overlaid with ILI and legacy Google Flu data to show differences both nationally and regionally. We performed a multiple regression of TURN with pathogen detection to determine which pathogens contribute most significantly to respiratory disease.

**Results**

TURN varies annually, corresponding to the traditional influenza season; however, upticks in the metric can potentially identify outbreaks that ILI cannot, such as non-Polio Enterovirus (EV-D68) in 2014. TURN correlates with Google Flu (R = x.xx) better than with ILI (R = x.xx), with xx, xx, and xx contributing most significantly to test utilization in the dataset.

**Conclusion**

TURN can be used to monitor respiratory season in the US due to an array of pathogens, a departure from current surveillance focusing on influenza only. This has implications for the diagnosis, treatment, and epidemiology of respiratory illness, as we have identified that pathogens other than influenza are stronger contributors to test utilization, and therefore respiratory illness prevalence, in our dataset.