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ORIGINAL RESEARCH

The Incidence of Common Respiratory Viruses During the COVID-19 Pandemic: Results from the Louisville COVID-19 Epidemiology Study

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Abstract

Introduction: Social distancing has been utilized during the COVID-19 pandemic to reduce the spread of SARS-CoV-2, which is also expected to reduce the spread of common respiratory viruses.

Methods: This retrospective, descriptive study assessed the rate of positivity of common respiratory viruses from commercially available respiratory pathogen panel, across a five-hospital health-system, during four-week periods within March to April of 2019 and 2020.

Results: During the four-week period in 2019, the percent positivity of common respiratory viruses from week one to week four decreased from 6 to 32% among the four included viruses. In the comparator period in 2020, a decrease ranging from 74 to 100% was observed from week one to week four.

Conclusions: These data indicate that the social distancing efforts implemented in Louisville, Kentucky, may be associated with a decrease in incidence of common respiratory viruses. This decrease in positivity of common respiratory viruses may serve as a surrogate marker for the effect of social distancing on the transmission of SARS-CoV-2.

Introduction

Social distancing has become a key intervention in preventing the spread of SARS-CoV-2 during the COVID-19 pandemic. [1,2] Throughout March and April of 2020 several interventions aimed at reducing the spread of SARS-CoV-2 have been implemented by national, state, and local governments in a stepwise manner. In Louisville, Kentucky, these include limits on public gatherings (3/11), closure of schools (3/12), closure of non-essential businesses (3/23), and more. [3-5] We hypothesize that these interventions, which were intended to address the current pandemic, would have a significant impact on the droplet transmission of common respiratory virus including influenza, respiratory syncytial virus (RSV), rhinovirus, and common coronaviruses (HKU1, NL63, 229E, and OC43). [6] The objective of this study is to assess the effect of social distancing on the incidence of common respiratory viruses as a surrogate marker for the reduction in transmission of SARS-CoV-2.

Methods

This was a retrospective, descriptive study examining the incidence of selected community respiratory viruses (influenza, RSV, rhinovirus, and common coronaviruses) detected by a multiplex molecular respiratory viral panel between 3/10/2019 to 4/6/2019 and 3/8/2020 to 4/4/2020 within the Norton Healthcare health-system. Norton Healthcare consists of five hospitals with over 1800 licensed beds, immediate care centers, and ambulatory medical practices throughout Louisville, Kentucky. A commercially available

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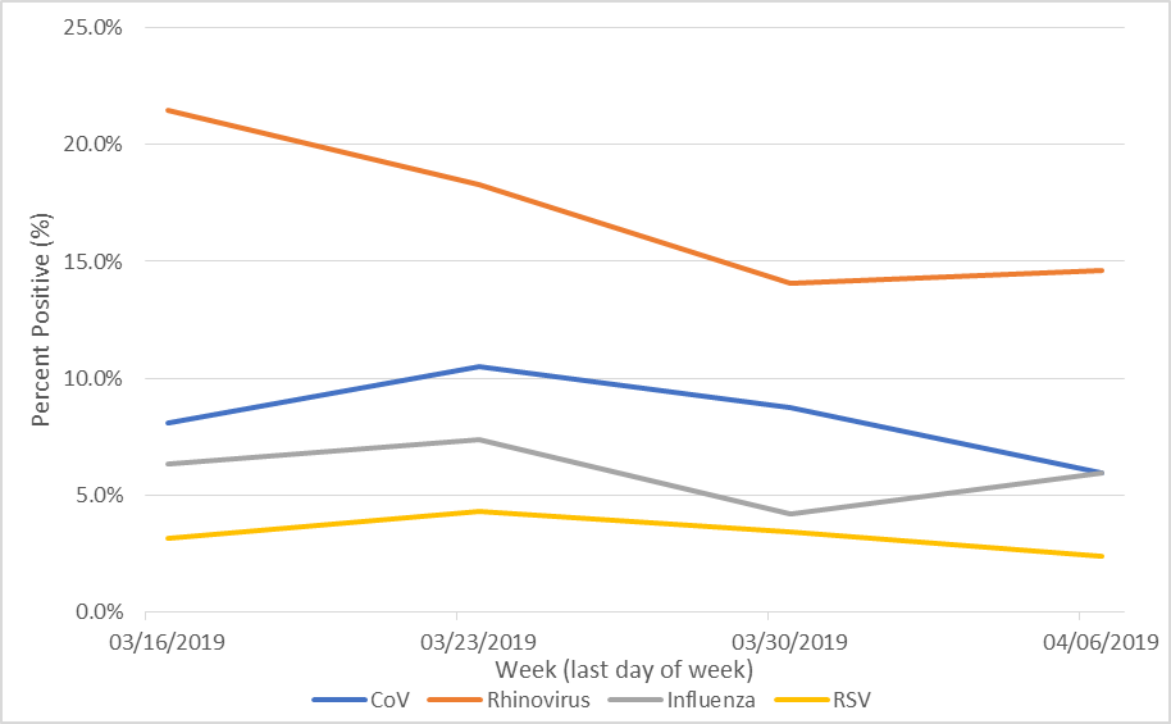
respiratory pathogen panel (RPP) performed in the system's centralized microbiology laboratory is utilized to identify the previously listed common respiratory viruses. This panel is available year-round and can be ordered by any physician or advanced practice provider for work-up of suspected respiratory illnesses in inpatient and outpatient settings. During the study period all RPP results were recorded and a weekly percent positivity rate for each of the included common respiratory viruses was calculated and plotted on a line graph for each week.

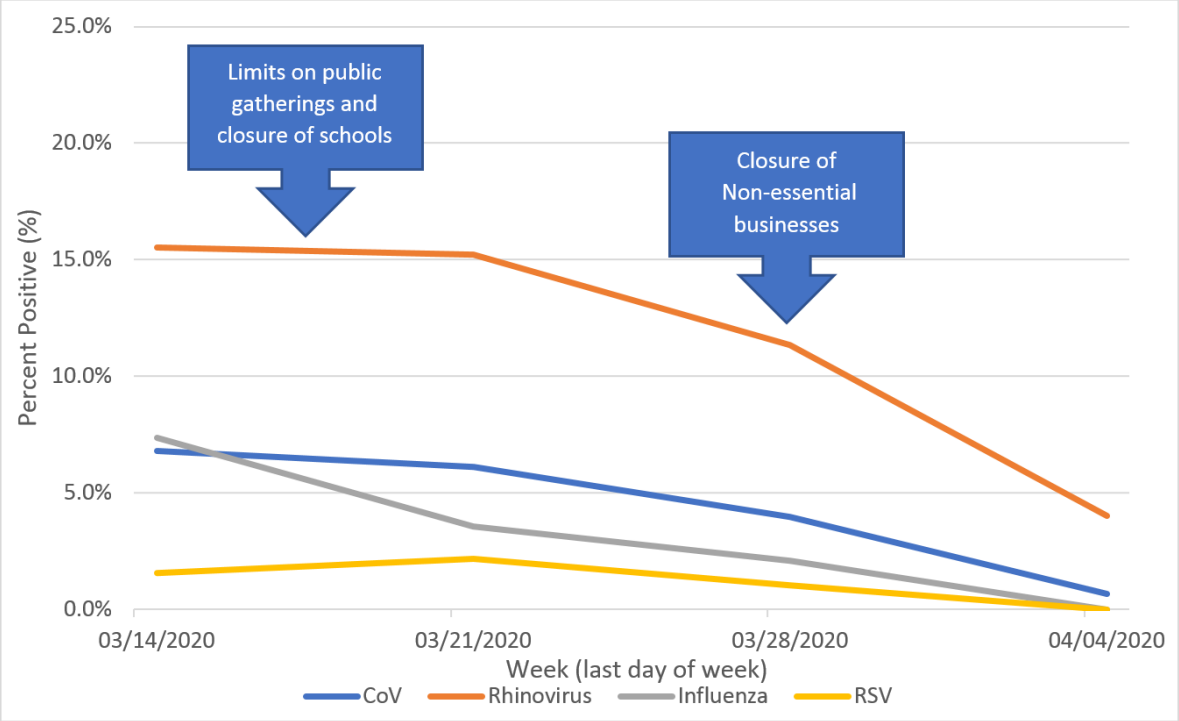
Results

An average of 264 RPPs per week was obtained during the study period in 2019 and an average of 388 per week was obtained in 2020. There was no consistent trend in the incidence of common respiratory viruses during the four-week period in 2019 (**Figure 1**). In contrast, incidence of all common respiratory viruses showed a sharp decline over the same period in 2020 (**Figure 2**). The percentage decrease for common coronaviruses from weeks one to four in 2019 was 27% compared to 90% in 2020. The respective decreases were 32% in 2019 and 74% in 2020 for rhinovirus, 6% in 2019 and 100% in 2020 for influenza, and 25% in 2019 and 100% in 2020 for RSV (**Figure 3** and **Figure 4**).



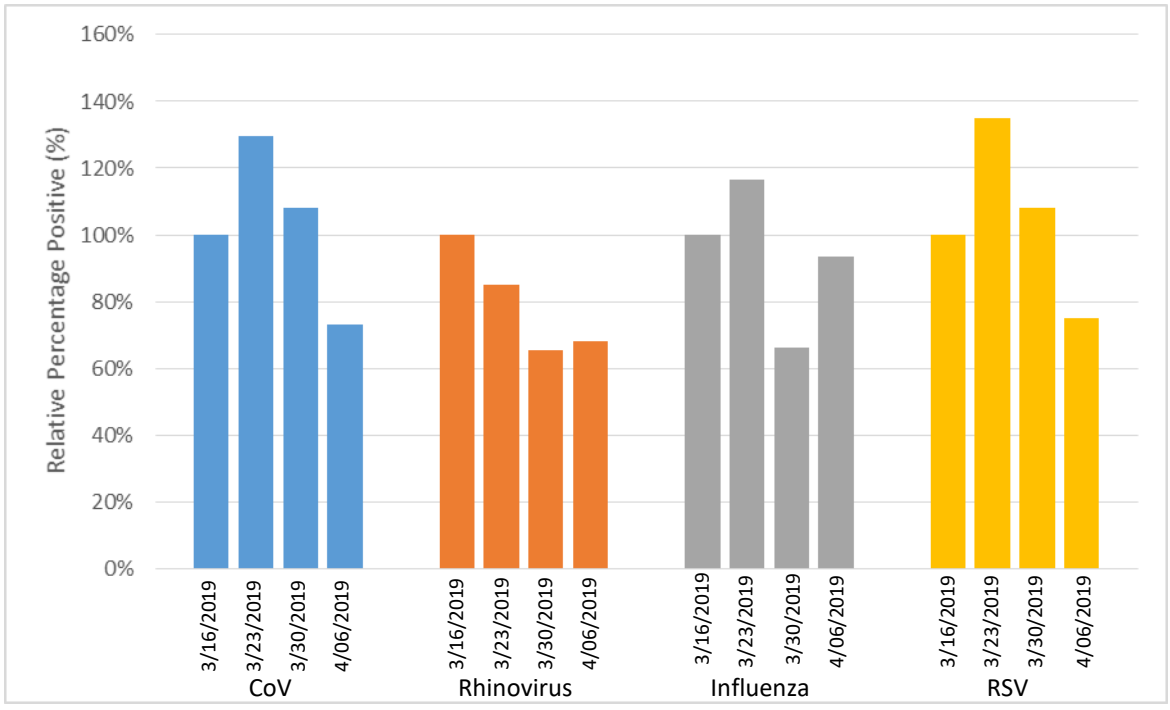
CoV=Coronaviruses (HKU1, NL63, 229E, and OC43); RSV=respiratory syncytial virus

Figure 1. Incidence of Common Respiratory Viruses in a Four Week Period in 2019



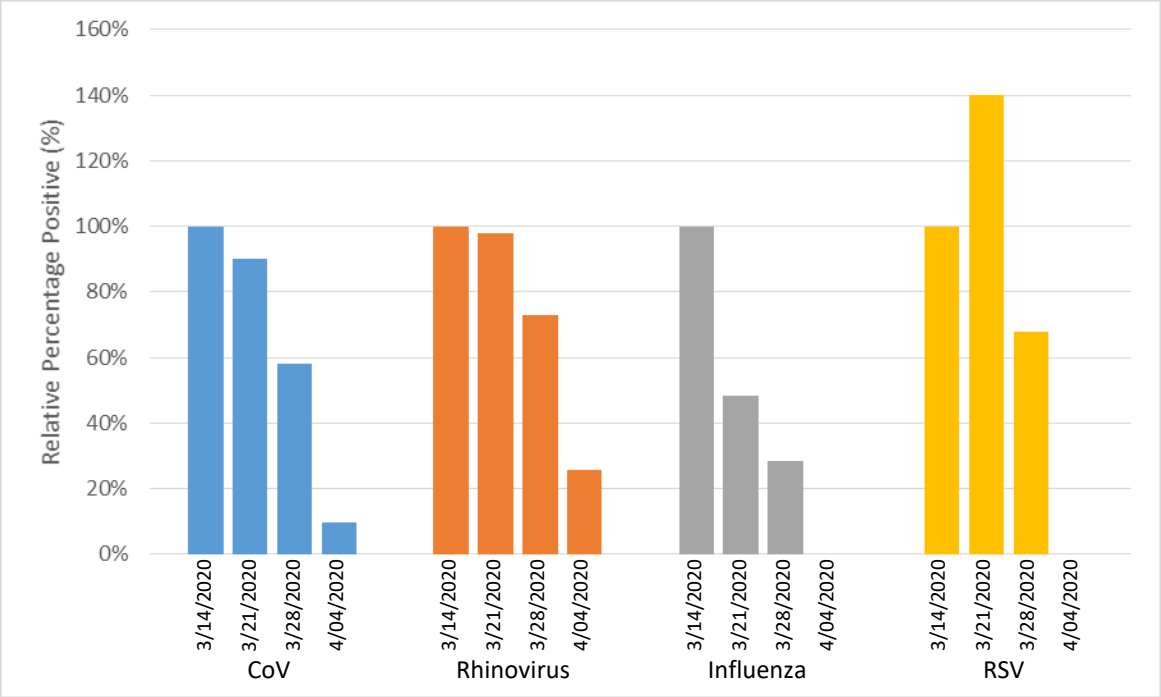
CoV=Coronaviruses (HKU1, NL63, 229E, and OC43); RSV=respiratory syncytial virus

Figure 2. Incidence of Common Respiratory Viruses in a Four Week Period in 2020



CoV=Coronaviruses (HKU1, NL63, 229E, and OC43); RSV=respiratory syncytial virus

Figure 3. Percentage Positivity Relative to Baseline in the Four Week Period from 2019



CoV=Coronaviruses (HKU1, NL63, 229E, and OC43); RSV=respiratory syncytial virus

Figure 4. Percentage Positivity Relative to Baseline in the Four Week Period from 2020

Discussion

These data display a significant decrease in the incidence of common respiratory virus detected by the RPP starting on the week of 3/22/2020. While there were decreases noted from week to week among the different common respiratory viruses in 2019, there was no consistent decline across all noted common respiratory viruses as seen in 2020. Furthermore, the percentage decreases across the four-week period observed in 2020 were a significantly greater magnitude, ranging from 74% to 100%, than those observed in 2019 which ranged from 6% to 32%.

The observed decrease in common respiratory viruses in 2020 coincided with the closure of all non-essential retail businesses in Kentucky, which was the most significant step to date in social distancing. The noted decline in incidence of common respiratory viruses in the third and fourth weeks of these data suggest that the implemented social distancing efforts had an impact on common respiratory virus transmission. These data also emphasize the importance of avoiding contact with others when ill in pandemic and non-pandemic scenarios.

While these data highlight the effect of social distancing on common respiratory viruses, it is expected that efforts also led to a reduction in SARS-COV-2 transmission as intended. As of 4/20/2020, Kentucky had fewer reported COVID-19 cases than all but one (West Virginia) of the seven states it borders. [7] Without the effect of the social distancing efforts enacted swiftly in Kentucky, it is likely that the case burden would be significantly higher and may have resulted in the overwhelming the healthcare system.

In conclusion, the rate of positivity on the RPP of a select group of common respiratory viruses declined simultaneously with the implementation of strict social distancing guidance in Kentucky. The decline occurred more precipitously in 2020 than it did over the same time period in 2019, and was demonstrable in all of the viruses studied, suggesting that the demonstrated decline was likely not due to an expected end to the respiratory virus season, but was instead a result of factors unique to 2020. These data indicate the potential effectiveness of social distancing in reducing common respiratory virus incidence and thus may serve as a surrogate marker for efficacy in reducing the transmission of SARS-CoV-2 as well.

Appendix: CERID COVID-19 Study Group

Available upon request.

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