

Monitoring COVID-19 through Trends in Influenza-like Illness and Laboratory-confirmed Influenza
and COVID-19 – New York State, excluding New York City, January 1 – April 12, 2020

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Abstract:

Innovative monitoring approaches are needed to track the COVID-19 epidemic and potentially assess the impact of community mitigation interventions. In this report, we present temporal data on influenza-like illness, influenza diagnosis and COVID-19 cases for all four regions of New York State through the first six weeks of the outbreak.

Keywords: COVID-19; influenza; New York; Epidemiological Monitoring

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Introduction

Since March 2, 2020, New York State (NYS) has been experiencing the largest outbreak of Coronavirus Disease 2019 (COVID-19) in the United States. By the end of March, COVID-19 cases were reported throughout the state, although cases outside of New York City (NYC) were concentrated in one of four New York State Department of Health (NYSDOH) regions (Metropolitan Region) [1]. In response, state officials implemented a series of community mitigation strategies throughout the month of March that culminated in the “New York on PAUSE” executive order which closed all non-essential businesses and ordered residents to stay at home [2, 3]. Innovative monitoring approaches are needed to track the epidemic and potentially assess the impact of these interventions.

Accurate monitoring of this outbreak is complex and likely influenced by specimen collection supply, provider testing practices, and patient care seeking behaviors. Since COVID-19 symptoms are similar to those of influenza or other respiratory infections, monitoring influenza-like illness (ILI) alongside diagnostic trends for influenza and COVID-19 could provide a broader understanding of COVID-19, which is often mildly symptomatic and undiagnosed [4, 5]. Given the regional nature of COVID-19 within NYS, a regional monitoring approach may offer early warning and facilitate local planning. In this report, we present temporal data on influenza-like illness and COVID-19 for all four regions of New York State, excluding NYC, as a case-study for other settings.

Methods

Data for this analysis come from two sources. First, data on influenza-like illness is from the Outpatient Influenza-like Illness Surveillance Network (ILINet) in NYS, which consists of 140 outpatient providers with specialties in emergency medicine, family medicine, internal medicine, pediatrics, employee health, and student health in 49 of 57 NYS counties outside of NYC. Each week, ILINet providers report the aggregate number of all-cause outpatient/emergency department visits and total number of visits with ILI. Influenza-like illness (ILI) is defined as fever of 100°F or greater

with cough and/or sore throat in the absence of another known cause. Weekly trends are compared against the regional baseline of 3.2% established by CDC [6]. Second, data on influenza types A-B and SARS-CoV-2, the causative agent of COVID-19, are mandatorily-reported by laboratories to NYSDOH electronically [7]. Population data are from National Center for Health Statistics bridged-race annual county-level population estimates [8].

NYSDOH operates four regional offices (Capital, Central, Western, Metropolitan) that cover all counties outside of NYC[9]. For each week of ILINet data, we aggregated the total number of ILI visits and outpatient visits per region to calculate the regional percent of visits that were for ILI. Additionally, we aggregated the number of new COVID-19 and influenza and cases to respectively calculate daily rates (per 100,000 population) and average weekly rates for each disease by region. To align with other disease surveillance data, we present results according to weeks defined by CDC's Morbidity and Mortality Weekly Report.

Results

In all four regions, the average rate of reported laboratory-confirmed influenza cases per 100,000 increased from the beginning of the year until early February before declining through the end of March. From Weeks 10 through 14 (March 1-April 4), the average daily influenza case rate decreased by 98.9% in the Central region, 98.7% in the Capital region, 98.4% in the Western region, and 96.9% in the Metropolitan region.

After declining for several weeks in February, ILI increased in 3 of 4 regions starting Week 10 and in all 4 regions during Week 11 (beginning March 8) and Week 12 (beginning March 15)(Figure). Between Weeks 10 and 12, the largest increases occurred in the Metropolitan region (3.5% to 9.3%, 2.7-fold change) and the Capital region (4.4% to 7.1%, 1.6-fold change). During Week 11 through Week 13 (beginning March 22), all regions exceeded the ILI baseline of 3.2%. Starting with Week 13, the percent of visits with ILI decreased in all regions except the Metropolitan region. Between Week 13 and Week 15 (beginning April 5), ILI decreased by 60.0% in the Capital region, 65.4% in the

Central region and 45.5% in the Western region. At the end of Week 15, ILI was noticeably lower than the baseline of 3.2% in both the Capital (Week 15 ILI=2.9%) and Central (Week 15 ILI=2.3%) regions.

COVID-19 was first confirmed in the Metropolitan region on March 2nd before its first diagnosis in the other three regions around a week later (Capital and Central: March 9th, Western: March 11th). During Week 11 and Week 12 (March 8th-March 21st), the slope of daily COVID-19 cases (per 100,000) in each region was 3.6 (Metropolitan), 0.33 (Capital), 0.20 (Central) and 0.17 (Western). During Weeks 13-15 (March 22nd-April 10th), the slope of daily COVID-19 cases was lower in all four regions (Metropolitan=-0.07; Capital=0.19; Central=-0.02; Western=0.14). By the end of Week 15, the weekly average rate of new reported COVID-19 cases was 63.3 in the Metropolitan region, 5.5 per 100,000 in the Capital region, 3.1 per 100,000 in the Central region, and 5.7 per 100,000 in the Western region.

Discussion

Until the emergence of COVID-19 in early March, ILI and laboratory-confirmed influenza tracked closely together, with both declining. Thereafter, in the NYS region with the highest rates of confirmed COVID-19 (Metropolitan), ILI increased most sharply. In the other three regions, ILI increased ahead of the emergence of COVID-19. This might signal early COVID-19 activity without diagnosis in those regions or increased concern over COVID-19 and care-seeking among people with mild ILI illness. On April 16th, the White House released guidelines for reopening states and regions that are predicated on the monitoring of COVID-19 cases and related symptoms, including ILI activity [10]. This report offers a framework and example for such local monitoring to identify areas in which COVID-19 is emerging or reemerging.

Furthermore, observation of ILI, influenza and COVID-19 case trends throughout the first six weeks of the COVID-19 outbreak in New York State can provide insight on the impact of community mitigation policies, beyond cases alone [11]. In the weeks before New York on PAUSE (week 13),

average ILI and the daily rate of COVID-19 cases were increasing in all four regions. Beginning in Week 13, the daily rate of COVID-19 cases stabilized in the Central and Metropolitan regions and ILI decreased in all regions, with Metropolitan ILI decreasing later. The heterogeneity in these indicators across NYS suggests the benefits of a more granular, rather than statewide, approach to monitoring the outbreak and for tailoring the application or suspension of mitigation strategies. While these data provide part of that picture, the inclusion of additional regional data on testing, test positivity and estimated reproductive number will help further inform strategies [12].

These findings are subject to a few limitations. First, we present the temporal association between policy interventions and ILI activity and COVID-19 rates, but we cannot attribute causality. Second, it is possible that observed ILI, as well as laboratory-confirmed influenza diagnoses, might be lowered by healthcare system efforts to triage mildly ill persons with ILI away from the healthcare setting to alternative COVID-19 testing locations (e.g. drive-through or home visit collection) where they would not be captured in the ILINet or tested for influenza. Finally, COVID-19 diagnostic results might be influenced by ongoing changes in COVID-19 testing patterns during the reporting period.

Together, these results support use of multiple sources for triangulation in regional monitoring of trends and impact of policies for COVID-19, particularly in locations where the disease is emerging, testing capacity is still being strengthened, and/or influenza is in decline.

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Figure: Influenza-like Illness reported to ILINet, laboratory-confirmed Influenza, and laboratory-confirmed Coronavirus Disease 19 (COVID-19) reported to surveillance, by region - New York State, excluding New York City, January 1 - April 12, 2020 ^{1,2}

1. Capital Region: Albany, Clinton, Columbia, Delaware, Essex, Franklin, Fulton, Greene, Hamilton, Montgomery, Otsego, Rensselaer, Saratoga, Schenectady, Schoharie, Warren, Washington Counties; Central Region: Broome, Cayuga, Chenango, Cortland, Herkimer, Jefferson, Lewis, Madison, Oneida, Onondaga, Oswego, St. Lawrence, Tioga, Tompkins Counties; Metropolitan Area Region: Dutchess, Nassau, Orange, Putnam, Rockland, Suffolk, Sullivan, Ulster, Westchester Counties; Western Region: Allegany, Cattaraugus, Chautauqua, Chemung, Erie, Genesee, Livingston, Monroe, Niagara, Ontario, Orleans, Schuyler, Seneca, Steuben, Wayne, Wyoming, Yates Counties

2. COVID-19 cases subject to weekly trends in testing, which typically declines on weekends.

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Figure 1

