Monitoring IP-10 within the clinical decision support protocol assisted with personalization of corticosteroid regimens with the aim of reducing IP-10 < 1000 pg/ml. The 10 patients who survived exhibited IP-10 levels >1000 pg/ml for 2.6 days on average. In contrast, the 2 patients that died of COVID-19 related complications displayed an average of 7.5 days with IP-10 > 1000 pg/ml (<0.05).

Conclusion: Providing physicians with real-time measurements of IP-10 in COVID-19 patients proved a useful tool as part of the clinical decision support protocol. Timely identification, monitoring, and personalized treatment of COVID-19 patients exhibiting a dysregulated immune response may aid in improving patient outcomes. Further studies are warranted.

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427. Variation in SARS-CoV-2 molecular diagnostic test performance in symptomatic versus asymptomatic populations
Sanjat Kanjilal, MD, MPH; Meghan Baker, MD, ScD; Ann E. Woolley, MD, MPH; Charan Rhee, MD, MPH; Athena K. Petrides, PhD; Jungshyun Kim, BS; Rajesh Patel, MD, MPH; Rebecca Zaffini, MT(ASCP); Michael Klompas, MD, MPH; Manfred Briitl, MD; Harvard Medical School and Harvard Pilgrim Healthcare Institute, Jamaica Plain, Massachusetts; Brigham and Women's Hospital, Boston, Massachusetts; Brigham and Women's Hospital / Harvard Medical School, Boston, Massachusetts; Brigham Health, Milton, Massachusetts; Brigham and Women's Hospital, Department of Pathology, Boston, Massachusetts; Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, Massachusetts

Session: P-13. COVID-19 Diagnostics

Background: Growing recognition of the importance of asymptomatic and pre-symptomatic transmission for severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) has led to a substantial expansion of testing from symptomatic to asymptomatic populations, and particularly those with risk factors for infection. Viral burden in asymptomatic individuals can differ from symptomatic patients, which can impact test performance. We therefore evaluated the impact of expanded testing indications upon the sensitivity and specificity of molecular diagnostic assays for SARS-CoV-2.

Methods: We performed a retrospective review of laboratory results from 5,122 emergency room patients tested for SARS-CoV-2 between 05/03/2020 and 06/13/2020 using the Hologic Panther Fusion and the Cepheid Xpert assays at the Brigham & Women's Hospital in Boston, MA. Descriptive analyses were performed for trends in testing volume, rates of positivity and cycle thresholds (Cts) over time based on symptom status. We calculated the proportion of new diagnoses made on a patient's first test as an indirect measure of sensitivity. We calculated the proportion of first tests that are positive with a Ct value < 35 as an indirect measure of specificity.

Results: The overall rate of positivity over the study period was 8.7% (599/7,510 tests; 440/4,795 people) and declined by 1.8% (95% CI -2.2% - -1.4%, P<0.0001) each week. Relative to tests in symptomatic people, the asymptomatic population had a higher mean Ct value (35.1 vs 32.3; P < 0.0001). Ct values increased by 0.7 (95% CI -0.1 - -1.4, P=0.07) and 0.8 (95% CI -0.3 - -1.4, P=0.01), sensitivity declined by 4% (95% CI -9% - -1%, P=0.08) and 12% (95% CI -20% - -5%, P=0.01) and specificity declined by 8% (95% CI -3% to 20%, P=0.14) and 9% (95% CI 7% - 11%, P=0.0002), over the time period of the study for asymptomatic and symptomatic patients, respectively. Figure 1: Trends in Ct values by symptoms

Conclusion: We show that the proportion of patients with low SARS-CoV-2 viral loads has increased as testing has expanded to the asymptomatic population and as transmission wanes in the community. This negatively impacts the performance of molecular assays by increasing the risk of false negatives and the detection of non-viable virus. Decision algorithms based on molecular assay results may need re-evaluation in light of these dynamics.

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428. Very High Clinical Likelihood (VHCL) Of COVID-19 Infection: Peering Beyond A Negative Nasopharyngeal Swab
Akhshay M. Khatri, MD; Sarah Flannery, DO; Vansha Singh, MBBS, MD; Aradhana Kherajer, RN, MSN, CIC; Prashant Malhotra, MBBS, MD,FACP, FIDSA; Bruce Farber, MD, FIDSA, FACP; Charles L. Kast, MD; Michael Gitman, MD; Mathew Foley, MD; David Hirschwerk, MD, FIDSA, AAHIVS; Donald and Barbara Zucker School of Medicine at Hofstra/Northwell Health, Glen Oaks, New York; Northshore University Hospital, Northwell Health, Manhasset, New York; Northshore University Hospital Northwell Health, Manhasset, New York; Northshore University Hospital Northwell Health, Manhasset, NY United States, Manhasset, NY; North Shore University Hospital, Manhasset, New York

Session: P-13. COVID-19 Diagnostics

Background: Diagnosis of COVID-19 relies upon RT-PCR assays for SARS-CoV-2 from a nasopharyngeal swab (NPS). However, results depend upon duration of illness at the time of testing and operator performance. False negatives occur 10–30% of the time. In our center we formulated & applied a clinical prediction tool for diagnosis of COVID-19 infection. Patients who satisfied criteria were designated as having COVID-19 regardless of NPS results. Herein, we describe the set of patients who fulfilled full and strict clinical criteria (VHCL) (Table 1) and had at least 2 negative NPSs on hospital admission.
Table 1: Clinical criteria for Very High Clinical Likelihood of COVID-19 Infection (VHCL COVID-19)

| Criterion | Definition |
|-----------|------------|
| Fever | ≥ 38.3°C |
| Temperature | > 37°C for 24 hours of hospitalization OK |
| New Respiratory Symptoms | Bilateral infiltrates without pleural effusions on chest imaging |
| Elevated inflammatory markers | C-reactive protein levels |
| Reduced Immunocompetence | Lymphopenia (Elastase ≥ 1.25 (mg/L)) |

Methods: A retrospective descriptive study was conducted from March 4th to April 11th, 2020. We evaluated patients with ≥ 2 consecutive negative NPS COVID-19 results admitted to our hospital. Of these, we identified patients fitting all 5 criteria for Very High Clinical Likelihood (VHCL) of COVID-19 infection (Table 1). We analyzed symptoms & lab data (including results of repeat NPS testing if performed) in those patients.

Results: 1855 patients were diagnosed with COVID-19 in the study period. Of these, 23 had ≥ 2 negative COVID-19 NPS results but met criteria for VHCL (Table 2). Of these 23, 7 had a subsequent 3rd NPS test which was positive proving infection. Similar to other reports, patients had low lymphocytes and elevated procalcitonin, ferritin, C-reactive protein levels. And consistent with proven cases, our cohort presented after a median of 5 days of symptoms (Table 3).

Table 2: Clinical and laboratory characteristics of VHCL COVID-19 patients | Rows Bolded include those patients who had a 3rd NPS swab that was positive.

Table 3: Demographic and Median Lab Data of VHCL COVID-19 patients

Conclusion: It is critical to be mindful of the imperfection of laboratory testing & to integrate clinical criteria to diagnostic algorithms. This is especially true in the COVID-19 pandemic, which is marked by high morbidity & mortality. In our study, we demonstrated how a set of clinical parameters (which we termed VHCL) can aid in widening the net of patients diagnosed with COVID-19 despite negative laboratory tests. While 16 patients in our cohort did not have a confirmatory result, the strict criteria for VHCL & the close match of other study variables with those of proven cases supports the value of VHCL designation. Applying VHCL can optimize infection control, identify patients for emerging therapeutics & aid in contact tracing to reduce nosocomial & community transmission of COVID-19.

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429. County-level predictors of COVID-19 testing across the 62 counties in New York State: A comparison across machine learning algorithms

Chengbo Zeng, MD MS; Yunyu Xiao, PhD; University of South Carolina, Columbia, South Carolina; New York University, Jersey City, New Jersey

Session: P 14. COVID-19 Epidemiology and Screening

Background: More than 360,000 people infected with COVID-19 in New York State (NYS) by the end of May 2020. Although expanded testing could effectively control statewide COVID-19 outbreak, the county-level factors predicting the number of testing are unknown. Accurately identifying the county-level predictors of testing may contribute to more effective testing allocation across counties in NYS. This study leveraged multiple public datasets and machine learning algorithms to construct and compare county-level prediction models of COVID-19 testing in NYS.

Methods: Testing data by May 15th was extracted from the Department of Health in NYS. A total of 28 county-level predictors derived from multiple public datasets (e.g., American Community Survey and US Health Data) were used to construct the prediction models. Three machine learning algorithms, including generalized linear regression with the least absolute shrinkage and selection operator (LASSO), ridge regression, and regression tree were used to identify the most important county-level predictors, adjusting for prevalence and incidence. Model performances were assessed using the mean square error (MSE), with smaller MSE indicating a better model performance.

Results: The testing rate was 70.3 per 1,000 people in NYS. Counties (Rockland and Westchester) closest to the epicenter had high testing rates while counties (Chautauqua and Clinton) located at the boundary of NYS and were far away from the epicenter had low testing rates. The MSEs of linear regression with the LASSO penalty, ridge regression, and regression tree were 123.60, 40.59, and 298.0, respectively. Ridge regression was selected as the final model and revealed that the mental health predictor rate was positively associated with testing (β=5.11, p=.04) while the proportion of religious adherents (β=−3.91, p=.05) was inversely related to the variation of testing rate across counties.

Conclusion: This study identified healthcare resources and religious environment as the strongest predictor of spatial variations of COVID-19 testing across NYS. Structural or policy efforts should address the spatial variations and target the relevant county-level predictors to promote statewide testing.

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430. Frontline doctors infected with Covid-19 during a hospital outbreak in Veracruz, Mexico.

Luis Del Carpito-Orantes, MD; Alvaro Efren Munguia-Sereno, n/a; Zeltrin Olivia Guerrero-Mancins, n/a; Elisa Estelania Aparicio-Sánchez, n/a; Orlando Israel Segura-Rodriguez, n/a; Omar García-Hernández, n/a; Alejandro Escobar-Huerta, n/a; Claudia Leocia Dorantes-Nava, n/a; Estuardo Galván-García, n/a; Cirilo Ortiz-Espinosa, n/a; José Luis Torres-Sánchez, n/a; Luis Daniel López-Varela, n/a; Samuel Pascual-Epifemnio, n/a; Luis Alberto Márquez-Rodriguez, n/a; Instituto Mexicano del Seguro Social, Veracruz, Veracruz-Llave, Mexico

Session: P 14. COVID-19 Epidemiology and Screening

Background: The current Covid-19 pandemic has affected health workers, some estimates mention more than 90,000 affected, even with deaths throughout the world.