

COVID-19

Weekly Science Review

July 11-17, 2020

This weekly science review is a snapshot of the new and emerging scientific evidence related to COVID-19 during the period specified. It is a review of important topics and articles, not a guide for policy or program implementation. The findings captured are subject to change as new information is made available. We welcome comments and feedback at covid19-eiu@vitalstrategies.org.

DATA INSIGHT

Tracking COVID-19 in the United States

The use of accurate, real-time data to inform decision-making is essential for infectious disease control. Unlike many other countries, the United States does not have standard, national data on COVID-19. The US also lacks standards for state-, county- and city- level public reporting of this life-and-death information. We identified 15 essential indicators, and evaluated COVID-19 data dashboards for all 50 states and the District of Columbia.

Key findings include:

- **Overall, data are inconsistent, incomplete, and inaccessible, making it impossible to understand risk and focus on important core components of the response.** For 11 of the 15 essential indicators, not a single state was reporting according to best-practice criteria, and for 9 of 15 essential indicators, more than half of states were not reporting at all. No state reached even half an optimal score, and half of states scored 20% or below compared with optimal reporting.
- **The U.S. is missing crucial opportunities to find and stop COVID-19.** Currently, only 18% of states are reporting on flu-like illnesses on their COVID-19 dashboard (despite widespread collection of this information) and only 37% of states are reporting COVID-like illnesses—both important early signals of potential COVID-19 spread.
- **Nursing homes and high-risk essential workplaces remain overlooked in many areas.** One third of states do not report any data on outbreaks in congregate facilities (e.g., nursing homes, homeless shelters, correctional facilities) or workplaces such as meatpacking plants, known to be hotspots for spread. This leaves communities without the information necessary to protect these vulnerable populations and can skew understanding of risk in the broader community.
- **Incomplete demographic information obscures the extent of unequal COVID-19 burden.** Most states report proportions of total cases and deaths among different racial and ethnic groups, but disparate access to testing, hospitalization rates, and other factors remain unreported, making the development of effective measures to protect those most at risk more difficult. Few states provide demographic information on recent cases and deaths, with the result that trends in race/ethnicity and other factors are not readily apparent (cumulative reporting, which many states provide, does not enable reporting of this crucial trend).
- **Information shared on contact tracing is abysmal.** Not a single state reported on turnaround time of tests, a crucial indicator of program effectiveness. Only two states reported

data on how quickly contact tracers were able to interview people testing positive to learn about their potential contacts. Just eight states reported data on source of exposure for people who test positive; cases coming from unknown exposure signal much higher risk from undetected community transmission. And not a single state reports on the percentage of cases arising among people that are under quarantine after being notified of their potential exposure by a contact tracer—the single most important indicator of the effectiveness of contact tracing.

[Read the full report](#), including essential indicator availability by state and an [example data dashboard](#).

Weekly Research Highlights

[An mRNA vaccine against SARS-CoV-2—preliminary report](#)

(NEJM, July 14)

Main message: Preliminary data from a Phase 1 vaccine trial supports further investigation of this candidate mRNA 1273 vaccine against SARS-CoV-2, the virus that causes COVID-19. The vaccine resulted in an immune response in all 45 healthy adult study participants without any trial-limiting safety concerns. The report is based on data from the first 57 days of the trial; final results have not yet been published.

- Phase 1 clinical trials for vaccines are designed to establish the safety, reactogenicity (tendency to cause adverse events or reactions), and immunogenicity (ability to result in the desired immune response) of a candidate vaccine. For this trial, 45 healthy adults between 18 and 55 years old were recruited to receive two vaccinations at one of three doses. Vaccinations were performed on days 1 and 29, and clinical

or laboratory follow-up and assessment were performed on days 7, 15, 29, 36, 43 and 57.

- Local mild adverse events such as pain at the injection site, redness or swelling were reported among recipients of all three vaccine doses, and were generally mild to moderate in severity. Systemic adverse events were more common after the second dose of vaccine, and included fever, chills, nausea, headache or fatigue. The vaccine induced an immune response in all vaccine participants in a time- and dose-dependent manner. Although seroconversion was high two weeks after the first dose of vaccine, the presence of neutralizing antibodies was low until after the second dose of vaccine, indicating the need for a two-dose vaccination. Levels of antibodies detected after the second dose of vaccine were similar to those measured in plasma from recovered COVID-19 patients. The middle dose of vaccine had a high neutralization response with a better reactogenicity profile than the highest dose vaccine, and will be studied further in a later phase trial in the coming months.
- At the time of this preliminary report on day 57 of the trial, the duration of protective immunity cannot be assessed.

Disentangling increased testing from COVID-19 epidemic spread

(MedRxIV, preprint, July 9)

Main message: In this modeling study, authors examined whether increased numbers of positive COVID-19 test results in the United States stem from increased epidemic spread or from an increase in testing. Results from the study suggest that: the COVID-19 epidemic is more widespread than indicated by test results; the increasing number of positive tests does not necessarily mean that the incidence of disease is increasing; and states at highest risk of COVID-19 epidemic spread are not necessarily those with the largest number of positive test results.

- Authors estimated COVID-19 incidence for all 50 states using a probabilistic model that included observed positive test counts, negative test counts, and an additional parameter representing the degree of bias toward testing people most likely to test positive. Authors selected multiple values for this additional parameter based on the results of seroprevalence studies.
- Both the number of positive tests and the estimated incidence were initially higher in states with a higher population density than in the states with a lower population density (e.g., the estimated daily incidence in New York reached a peak in mid-April, while estimates of daily incidence in Arizona and Texas have increased over time). Early in the epidemic, there was a positive correlation between population density and the weekly change in estimated incidence, while later in the epidemic, the correlation was negative. The rate of increase in estimated incidence is lower than the rate of increase in the number of positive test results. This could indicate that testing availability is expanding at a faster rate than the epidemic is spreading. It might also reflect that the bias towards testing those who will test positive is decreasing over time (in part because test availability is increasing). The states at highest risk for increased COVID-19 spread changed after correcting for increased testing: the states with the largest percentage increase in positive test counts were Montana, Idaho, West Virginia, Delaware and Alaska, while the five states with largest increases in estimated incidence were Nevada, Vermont, South Carolina, Mississippi and Washington.
- The results of this study are dependent on the quality of the seroprevalence studies, and on test results, which are dependent on test availability and use and are influenced by the accuracy of test results.

Cumulative incidence and diagnosis of SARS-CoV-2 infection in New York

(Annals of Epidemiology, June 17)

Main message: In this seroprevalence study of COVID-19 in New York State, an estimated 14% of New Yorkers were found to have been infected with COVID-19 by March 29, which corresponds to more than two million infections. Infection rates were highest in New York City (23%) and among Hispanic New Yorkers (28% statewide; 33% in New York City). Researchers estimate that only 9% of these infections were diagnosed and that New York had an infection fatality rate (IFR) of 0.6% (based on deaths through April 17).

- New York State conducted SARS-COV-2 antibody tests (IgG antibodies) on a convenience sample of 15,101 patrons at 99 grocery stores across 26 counties between April 19 and April 28 to assess the cumulative incidence of COVID-19 across the state. Of the tests conducted, 12.5% of specimens were positive. After weighting and adjusting for the test performance, the researchers estimate that the cumulative incidence was 14%, which corresponds to an estimated 2,139,300 people infected with COVID-19 by March 29. Cumulative incidence varied across areas: 23% in New York City, 16% in Westchester and Rockland counties, 13% in Long Island and 4% in the rest of the state.
- Racial disparities in infection rates were found both at the state level and within Long Island, New York City and Westchester/Rockland counties. Within New York City, 33% of Hispanics; 25% of non-Hispanic Blacks; 17% of non-Hispanic whites; and 15% of non-Hispanic Asians were found to have been infected with COVID-19. Men were more likely to be infected than women overall (15% versus 13%); some differences were found by age group with people aged 55 years or older least likely to be infected (12%) and people aged 45 to 54 most likely to be infected (16%).
- Using April 9 as the last day of diagnosis (assuming four days to symptom onset and an average of eight days from onset to diagnosis), researchers estimate that 9% of those infected were diagnosed (with a maximum of up to 16% if they include diagnoses up to May 8), with people over 55 most likely to be diagnosed (11%) and people between the ages of 18 and 34 least likely to be diagnosed (6%).

- Limitations of the study include that people who do not leave home to grocery shop were not included in the sample and may be less likely to have been infected with COVID-19. In addition, people who got very sick or died before the survey date are not likely to have been included.

Clinical ordering practices of the SARS-CoV-2 antibody test at a large academic medical center

(MedRxIV, preprint, July 14)

Main message: In a previous [COVID-19 Insight](#), we described how antibody tests for SARS-CoV-2 can detect if a person has previously been infected with the virus that causes COVID-19. These tests can be highly variable and perform best when they are done [at least two weeks after the start of a symptomatic illness and in specific clinical and epidemiological situations](#). In this study at a large academic medical center in the United States, at least 42% of antibody tests were conducted for reasons that [did not match with guidelines](#) based on [expert recommendations](#). Physicians ordered serology tests to assess potential immunity more often than they did so to make a late diagnosis of COVID-19 illness or sequelae. Researchers conclude that clinical curiosity and direct patient requests were important drivers of testing outside of recommended guidelines, incurring health systems costs while producing poorly reliable results with little value for patient care.

- Researchers evaluated the electronic medical records of 447 patients for whom SARS-CoV-2 antibody tests were ordered at the University of Virginia between May 14 and June 15, 2020 and systematically recorded the physician's reasons for requesting the test. Half of all tests were requested as part of an epidemiological prevalence study. Among the others, only a small number (37, 16.7%) were conducted for recommended indications. Tests were most commonly requested to assess potential immunity in people with prior illness (105, 47.5%) or potential exposure (60, 27.1%) where

COVID-19 had never been documented, or were requested without any indication noted (49, 22.2%).

- Outside of the epidemiological study, SARS-CoV-2 antibodies were detected in 17% of samples requested for a recommended indication and only 5% of those collected outside of expert guidance ($p < 0.0001$). It is unlikely that the non-recommended testing practices produced any effect on clinical treatment, but they did incur substantial cost to the health system that the authors estimated could total more than half a million dollars over the course of a year.
- Although the format and performance of SARS-CoV-2 tests can vary considerably, the health system used a single FDA-authorized product for all tests at the time of this study. This is the first study reporting on physicians' reasons for obtaining COVID-19 antibody testing. However, its limited size and the single health system setting preclude drawing conclusions about other settings. In the epidemiological study only 2% of tests were positive, which raises the risk of false positive results in this population. Given the uncertainty and fear that COVID-19 has stirred, it is not surprising that physicians and their patients are looking for answers and turning to antibody testing. Clear and consistent guidelines for the use of antibody tests should be emphasized and potentially enhanced with clinical decision support tools.

Factors associated with cloth face covering use among adults during the COVID-19 pandemic—United States, April and May, 2020

(MMWR, early release, July 14)

Main message: Researchers used an online survey to ask 1,005 adult participants representative of the U.S. population about their use of cloth face coverings when outside the home. Overall, most people (62% in April, 75% in May) reported wearing a mask or face covering when they left home in the week prior to responding to the survey. Between April and May, the largest

increases in use of cloth face coverings were seen among white people, people aged over 65 years, and people living in the Midwest. Public messaging can be used to reinforce the benefits of wearing a cloth face covering, and to reinforce positive attitudes and social norms around face covering use.

- Cloth face covering use has been adopted in varying degrees by different sectors of the U.S. population since the initial recommendation from federal health authorities for their use on April 3, 2020. To assess behaviors around cloth face covering use over time, researchers at the U.S. Centers for Disease Control and Prevention used an online survey to collect information from representative samples at two time points in April and May. A total of 1,005 people participated (503 in April and 502 in May).
- Among the 839 participants who reported leaving their homes in the week prior to taking the survey, 62% reported wearing a cloth face covering in April and 75% reported wearing one in May. The proportion of people aged over 65 years who reported using a face covering when leaving their home increased from 37% to 79% between April and May. Reported use of a cloth face covering was highest among non-white people in April, and remained as such in May, although the proportion of white people reporting cloth face covering use increased from 54% to 75%. Higher rates of face covering use were observed in the Northeast at both time points.
- This survey did not assess the use of masks other than cloth face coverings, such as medical or surgical masks. As with any survey, self-reported data may be subject to bias.

Suggested citation: Cash-Goldwasser S, Kardooni S, Kachur SP, Cobb L, Bradford E and Shahpar C. Weekly COVID-19 Science Review July 11-17, 2020. Resolve to Save Lives. 2020 July 21. Available from <https://preventepidemics.org/coronavirus/weekly-science-review/>

