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Potential Benefits of Expanded COVID-19 Surveillance in the US

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When public health officials

assert that a new vaccine, drug, or policy is “safe,” the public needs to have full confidence in that assertion. This trust is boosted when the public knows that health officials tried hard to find flaws in their proposed strategies and “pressure tested” their assumptions. Public health strategies should be evaluated long after programs have been deployed to ensure that anticipated consequences occur as planned and unanticipated ones are detected early. This is the rationale used when the US Food and Drug Administration grants Emergency Use Authorization and requires postmarketing surveillance for adverse events before full product approval.

By June 2021, public health agencies (especially the Centers for Disease Control and Prevention [CDC]¹) had gathered substantial data relevant to the COVID-19 response. There are, however, some key epidemiologic blind spots. This Viewpoint proposes several important areas of surveillance expansion.

Enhance COVID-19 Testing Efforts

At its peak in the US (November 2020 to January 2021), the number of COVID-19 tests performed often exceeded an estimated 2 million per day.² The number of daily tests in June 2021, however, declined to well under 1 million tests per day, estimated at approximately 577000 tests per day during the week of June 20 through [T]he nation’s confidence in the overall COVID-19 response is only as strong as its COVID-19 surveillance system June 26.² Some of this decline may be among fully vaccinated persons without a need for frequent testing.

However, a reenergizing of testing efforts is needed because without vigorous testing the nation cannot be sure whether declining cases are a function of decreased numbers of infections or reduced numbers of tests. The test positivity rate is still approximately 2%

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in the US (as of mid-June 2021),² so testing continues to identify cases. As the pandemic phases unfold, testing may take on enhanced roles such as further aiding in the reopening of businesses, schools, and other organizations. Furthermore, as the highly transmissible SARS-CoV-2 delta variant arises in the US, a new focus on wide-spread testing of unvaccinated and partially vaccinated persons takes on additional urgency. Vaccination status should be obtained along with each COVID-19 test.

Increase Vigilance for Detecting Breakthrough Infections

Although COVID-19 vaccines are highly effective and making a large difference in the pandemic in the US, they are not perfect. Breakthrough infections among fully vaccinated persons do occur but at a very low rate.³ For instance, in a study at Rockefeller University between January 21, 2021, and March 17, 2021, a fully vaccinated cohort (Pfizer-BioNTech or Moderna vaccine) of 417 individuals had positive polymerase chain reaction test results and symptomatic disease at a rate of 0.48% during that period.⁴ In a study of 1843 health care personnel between January and March 2021 across 33 US sites who received Pfizer or Moderna vaccine, of 623 case patients with a positive polymerase chain reaction or antigen-based test result (and with 1 or more COVID-19–like symptoms), only 19 (3.0%) had had 2 vaccine doses greater than or equal to 7 days before.⁵ In a study of 3950 health care workers, first responders, and other frontline workers at 8 US sites between December 14, 2020, and March 13, 2021, the SARS-CoV-2 incidence rate was 0.04 per 1000 person-days among persons fully immunized with messenger RNA vaccines.⁶

Recently, CDC made a decision that has taken many by surprise, focusing its surveillance efforts only on breakthrough infections that resulted in hospitalizations or deaths, and ceasing to document asymptomatic or symptomatic breakthrough cases.⁷ CDC should once again add symptomatic infections to its surveillance efforts for breakthrough infections. Even if a patient is not hospitalized, a symptomatic case indicates that for that vaccinated person, the ability to build an immune response was suboptimal, and if the individual is symptomatic, they may have more potential to transmit SARS-CoV-2 to others. Such symptomatic cases are relevant to the nation and should be reported by CDC. To do so would mean a heightened emphasis in the surveillance system on the routine testing of symptomatic persons, even if they have been fully vaccinated.

Furthermore, because the CDC surveillance system is passive⁷ (ie, information reported to it is assembled through the state medical and public health systems), it may tend to underreport breakthrough infections; it is therefore important to further increase studies⁵⁻⁸ that actively seek breakthrough infections among cohorts of vaccinated persons who are repeatedly tested, particularly if they are symptomatic. Such studies should be expanded in more geographic areas and social settings, given the delta variant emergence. In these studies, resultant positive tests should be subjected to genomic sequencing, and clinical outcomes measured. One key benefit of such studies would be to further inform discussions about the need for vaccines for new variants or boosters in the face of waning immunity, including whether there is a difference in the duration of immunity, depending on the type of vaccines received.

So far, breakthrough infections appear to occur at a low rate, but given the very large number of vaccinated persons in the US, even a small fraction of a large population can still represent a moderate number of cases. This is important for communication efforts because CDC needs to be able to indicate that some very small number of symptomatic breakthrough infections is expected, and if the public becomes aware of a few breakthrough infections they should not be alarmed. However, if CDC does not look for symptomatic breakthrough infections actively (or even seek to assemble passive reports of such infections), it will not be able to make this assertion with much authority.

It is also immensely helpful to be able to compare infection-fatality rates (IFRs) between vaccinated and unvaccinated persons in large survey studies. The IFR differs from case-fatality rates (CFRs) in that the denominator for IFR is all infected persons, whereas that for CFR is all recognized cases.⁹ (Both IFR and CFR are true rates only if they are expressed for a specified unit of time.⁹) It is plausible that IFR among vaccinated persons is vanishingly low and this would be important to document. This might be a vital observation to help overcome vaccine hesitancy because prevention of COVID-19 deaths can serve a critical role in restoring society to normalcy.

Expand Efforts to Understand the “Flat” CFR in the US

The CFR is the number of COVID-19–related deaths divided by the number of recognized COVID-19 cases (per unit time).^{9,10} The CFR is crude, but it gives an indication of mortality among diagnosed persons. Despite the conventional wisdom that treatments have improved for COVID-19, the CFR for the US has hovered at approximately 1.7% since December 2020 through mid-June 2021.¹⁰ Two likely explanations for stagnation in the CFR may be posited, including that the CFR is truly flat, reflecting a need for better treatment options or improved access to current options; and that the true CFR is declining with improved diagnosis and treatment, but deaths may be counted accurately in the face of undercounting of cases owing to decreases in testing, giving a stable but misleading CFR. Given the array of tests, vaccines, and treatments that are now available, the CFR might be expected to be declining over time. This area is worthy of intensive monitoring and study by national health agencies. It is important to identify whether persons living with COVID-19 receive a diagnosis early in their illness, and whether they have access to and use treatments that are more beneficial early in the disease course.

Some social epidemiologic measures deserve enhanced attention as COVID-19 in the US enters this newest phase. For instance, expanded use of the Social Vulnerability Index, income inequality metrics, and other social determinants of health are needed to better understand and address causes of inequities in access to vaccines and other interventions in communities especially affected by the pandemic. Also, since the CDC’s most recent mask guidance for fully vaccinated persons was released, there have been increasing anecdotal reports of stigmatization of persons who continue to wear masks even if they do so for rational reasons. COVID-19–relevant stigma measures should be developed to inform antistigma interventions.

These expanded surveillance efforts would come with communication challenges. For instance, if testing is expanded and the seropositivity rate remains the same, experts need to communicate in the media that the increased number of cases detected is in the context of the expanded number of tests administered. Reporting on a surveillance statistic alone without a meaningful, contextual denominator can lead to misinterpretation and falsely placed alarm or reassurance.

COVID-19 vaccines are effective and safe, and, as of June 21, 2021, approximately 45% of the total US population had been fully immunized according to CDC. The US is observing important reductions in reported cases and deaths. But the nation's confidence in the overall COVID-19 response is only as strong as its COVID-19 surveillance system, which should continue to persistently and rigorously look for trouble even as everyone hopes there is little trouble to be found.

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