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BRIEF19

A daily review of covid-19 research and policy.

RESEARCH BRIEFING

Asymptomatic testing in nursing homes reveals many cases.

Approximately 40 percent of covid-19 in the U.S. have occurred in [nursing home](#) residents. Chronic medical conditions and a less robust immune system make these individuals more susceptible to infections and less able to fend infection off. In addition, residents may live in sub-par conditions, promoted by a reimbursement scheme that favors cramming residents over providing skilled care and safe infrastructure. Approximately [1 in 3](#) nursing home residents die each year. (The [rate](#) is 1 in 5 for all people older than 65).

The U.S. Centers for Disease Control and prevention recommended in March that long-term care facilities test residents only if they had symptoms. Nevertheless, there continue to be [outbreaks](#) in [long-term](#) care [facilities](#). The authors of [a new study](#) in *JAMA Internal Medicine* tested all residents, regardless of symptoms in eleven long-term care facilities in Maryland. In so doing, they uncovered 354 additional cases, of which 79 percent had no symptoms. At two-week follow-up, 11 percent were hospitalized and 4 percent (7 people) died. However, the authors were only able to reach half of the participants for follow-up and only 7 of the 11 sites could be reached for follow-up. This suggests selective reporting that could bias the results. It is unclear why 73 additional symptomatic individuals were discovered during this study. One possibility is a lack of compliance with CDC recommendations, though it is challenging to determine whether a person unable to communicate because of dementia, a stroke, or other diseases feels short of breath, has lost their sense of smell, or felt muscle aches

The findings of this study suggest that testing symptomatic individuals only deprives a vulnerable population of access to care. Many of the initial signs of covid-19 are not due to the virus but to the body's response to it. Healthy older individuals have less responsive immune systems; those with chronic medical conditions may have even less brisk responses. Testing based on symptoms systematically excludes a vulnerable segment of the population and risks failure to detect a brewing outbreak amongst an at-risk population.

–Michael Chary, MD, PhD

POLICY BRIEFING

Why antibody tests that are “95 percent accurate” might actually be dangerous.

Understanding statistics is never easy, but it is an essential skill in assessing covid-19 research and policy. We invited an expert in data sciences to write this essay on how and why antibody tests may mislead the public.

–Brief19

Blood tests that detect antibodies against SARS-CoV-2 are being presented as a cure-all for letting people go back to work amid the covid-19 pandemic. The hope is that such tests might identify individuals who had unknowingly caught the virus and recovered, and are now immune. However, a statistical wrinkle means that even if an antibody test is correct 95 percent of the time that it gives a positive result (and *never* misses a real case) a positive test might still mean

that there is well under a 50 percent chance that the person who took the test truly has antibodies. To understand why, let's first go through the four potential outcomes:

- 1) You are positive, and you test positive. Test did its job.
- 2) You are negative, and you test negative. Test did its job.
- 3) False negative. The test says you don't have antibodies, but you do.
- 4) False positive. The test says you do have the antibodies, but you don't.

In the case of coronavirus antibody testing, Option 4 (false positive) is dangerous. It might cause you to resume your normal life, mistakenly believing yourself to be immune to the virus and unable to spread it.

What is the chance of Option 4 occurring in an antibody test that has a known false positive rate of 5 percent (such as Cellex, the first FDA approved antibody test)? Let's imagine testing 1,000 people in a population in which 3 percent have been infected and have antibodies. Thirty people will have antibodies and test positive (3 percent of 1,000 people, as expected). But, 50 people will falsely test positives (5 percent of 1,000 people).

But all 80 of these individuals, whether they have antibodies or not, will have tested positive for them. This means that someone who tested positive for antibodies only has 37.5 percent chance of actually having them (30 actual cases out of 80 positive tests). So even a test that is 95 percent accurate leaves someone who tested positive with less than a 50/50 chance of having gained any information. It's worse than tossing a coin.

[Some tests claim](#) to be 98.8 percent effective, some 92 percent. Regardless, as the above math shows, many who take these tests will think they have antibodies and are therefore immune, but in reality, do not and are not.

Here's the catch. If a significant proportion of the population (i.e. far more than 3 percent) has already had coronavirus, then we are in a very different situation.

Imagine that instead of 3 percent, 90 percent of the population has actually been infected and now has antibodies. In this scenario, 900 out of 1000 people will test positive and be positive. Of course as before, 50 people (5 percent) will test positive while not actually having antibodies. But at least in this scenario, the chance of being positive, if you test positive is 95 percent (900/950).

What does this all mean? Unless a large percentage of the population has had coronavirus (and has antibodies), antibody tests are irrelevant.

We need to stop using the words "accurate" and confusing tests that sound useful with ones that are if we want the public to understand their risk with respect to testing. The development of sound policy over the coming months may depend upon it.

—Liberty Vittert, PhD, Professor of the Practice of Data Sciences, Washington University in St. Louis, and Feature Editor for the Harvard Data Science Review.

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Brief19 is a daily executive summary of covid-19-related medical research, news, and public policy. It was founded and created by frontline emergency medicine physicians with expertise in medical research critique, health policy, and public policy.