Cambridge
Public Health
Department

Agenda
Cambridge COVID-19 Expert Advisory Panel
1 pm, Thursday February 4, 2021

Join with Google Meet

[redacted]

Join by phone

[redacted]

1) Clinical, case and wastewater data update

2) Vaccine roll-out update

3) Variants update and risk of 4th wave

4) Obstacles to Getting Rt below 1 (article and op-ed)

Adjourn

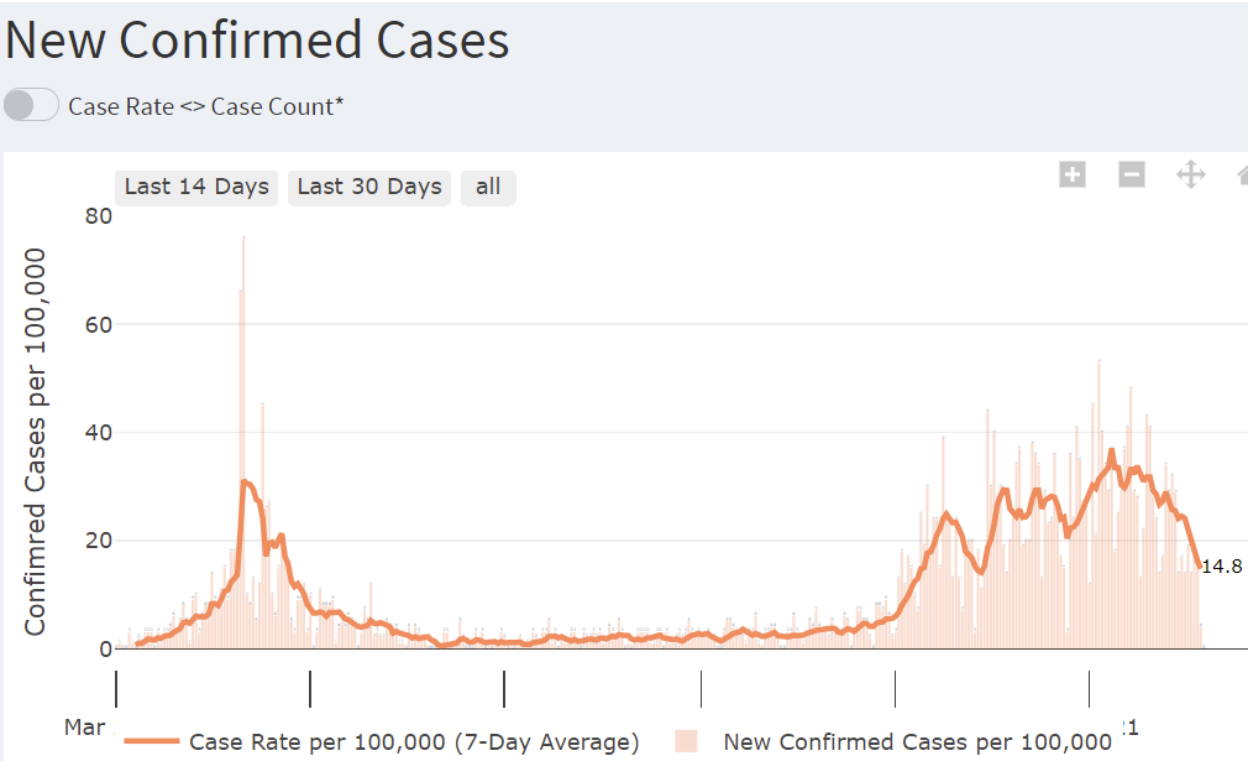
Attachments:

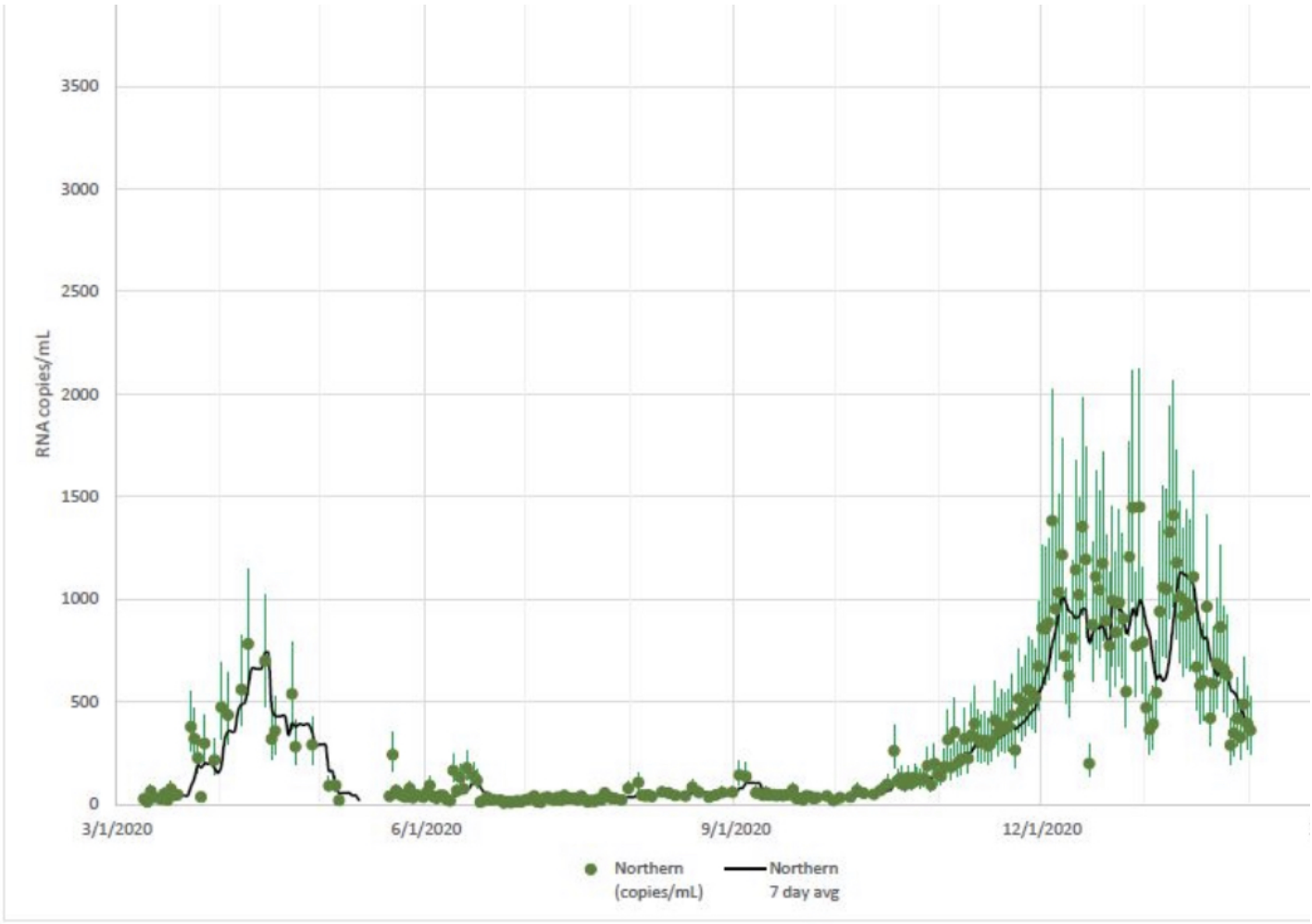
1) Cambridge New Case Data (2/2/21)
2) MWRA Boston North wastewater (2/2/21)
3) MA Daily New Cases and Deaths (2/2/21)
4) *Herd immunity to SARS-CoV-2 may not be achievable with current vaccines*
5) *The COVID questions we don't want to face*

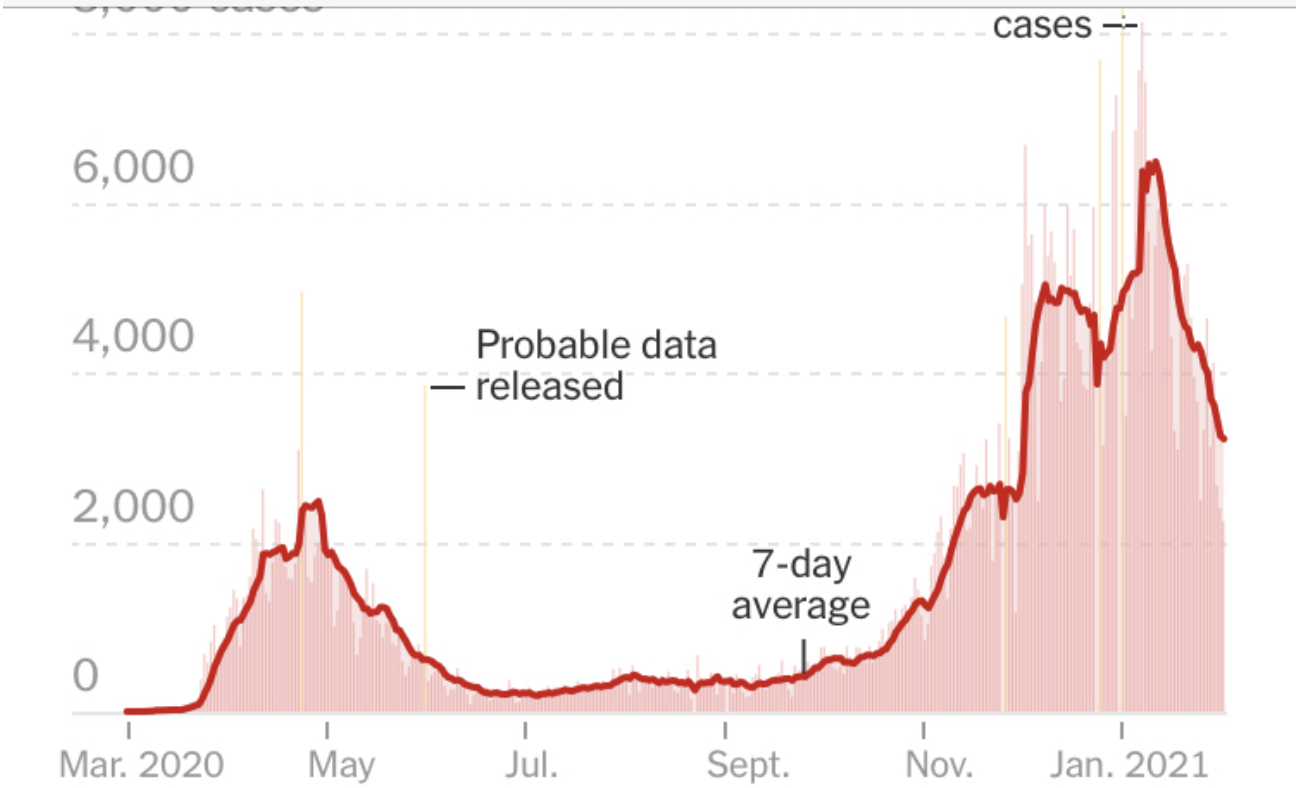
119 Windsor Street
Cambridge, MA 02139
Phone: 617.665.3800 | Fax: 617.665.3888
www.cambridgepublichealth.org

CHA Cambridge Health Alliance

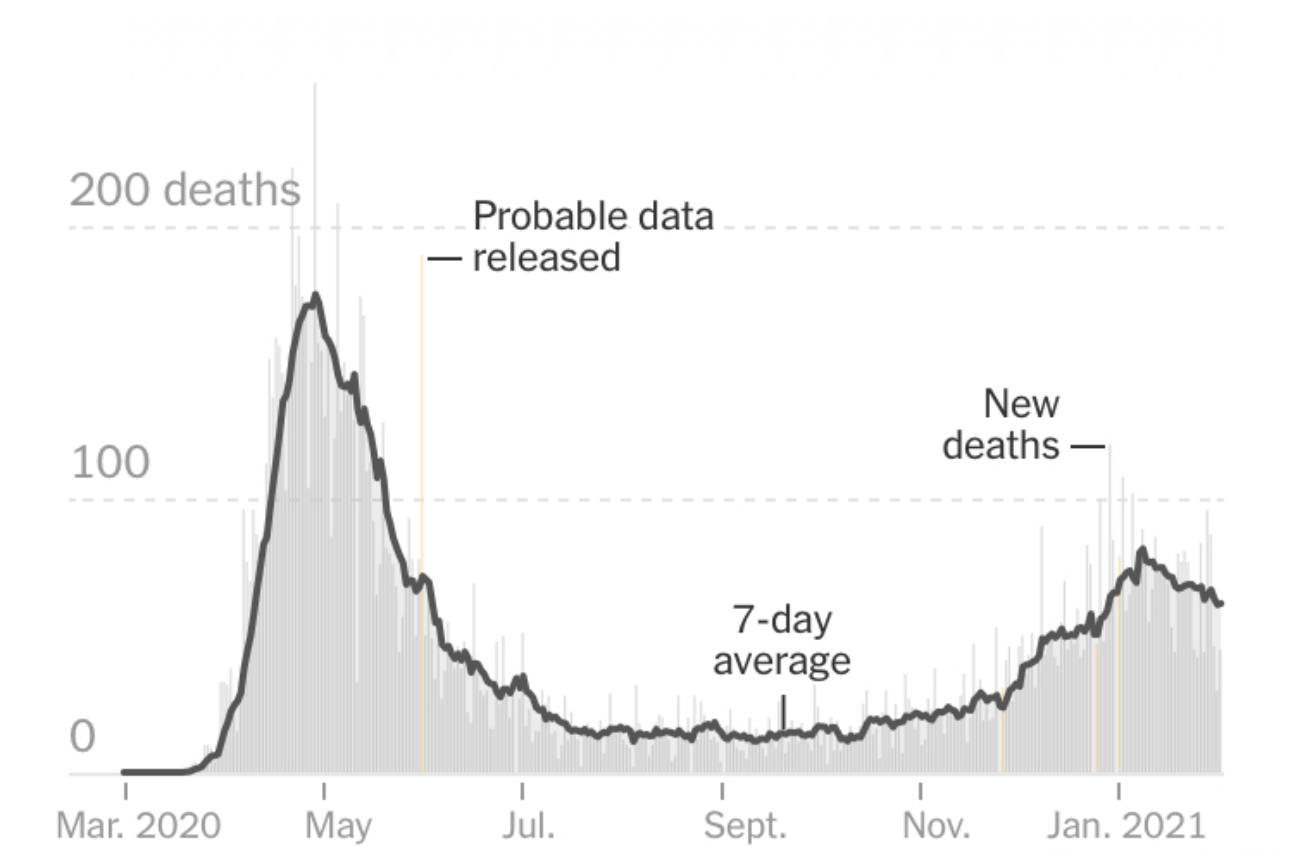
New confirmed daily COVID cases in Cambridge (as of 2/5/21)




3500
3000
2500
2000
1500
1000
500
0
RNA copies/mL
3/1/2020
6/1/2020
9/1/2020
12/1/2020
Northern (copies/mL)
Northern 7 day avg



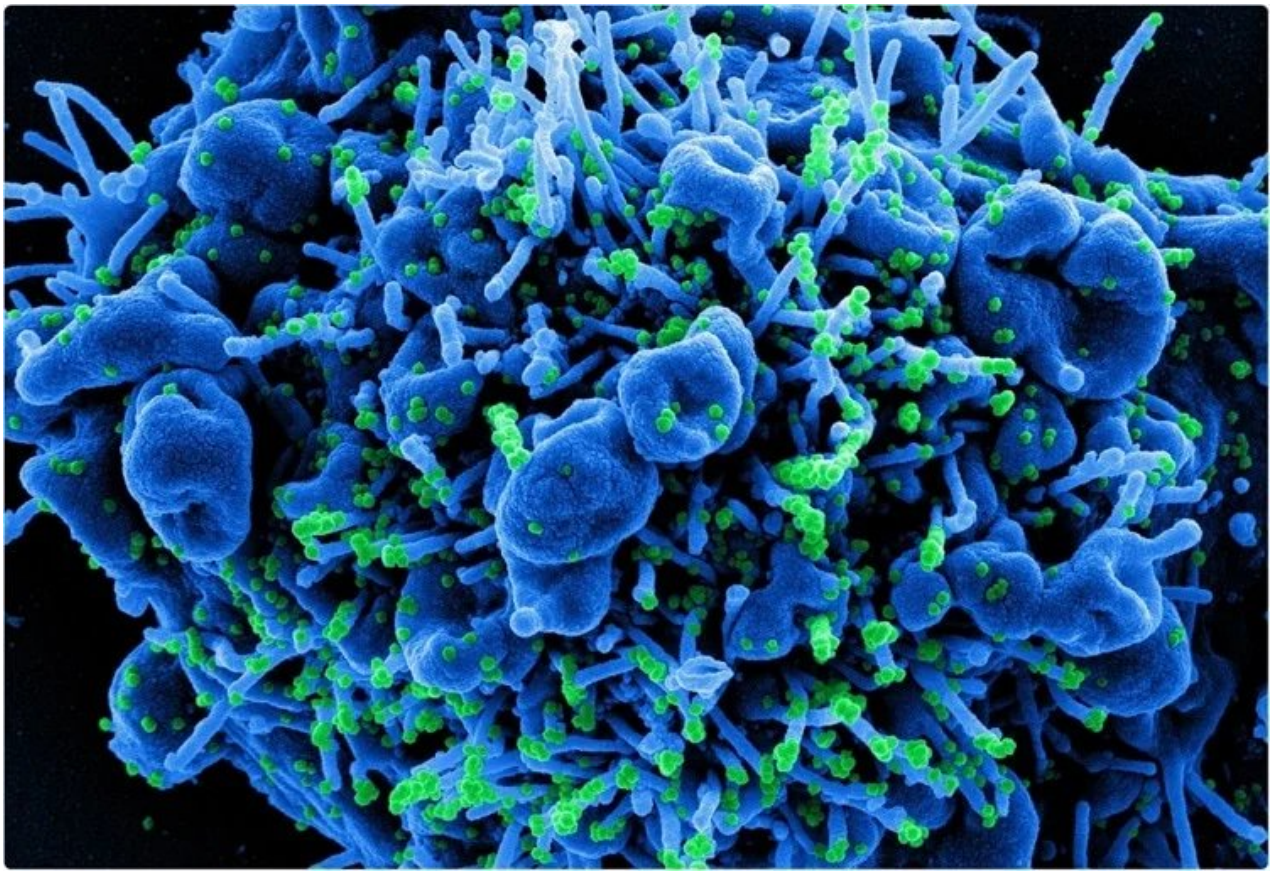
Daily reported deaths



Herd immunity to SARS-CoV-2 may not be achievable with current vaccines

By Dr. Liji Thomas, MD Jan 25 2021

As the coronavirus disease 2019 (COVID-19) pandemic continues to cause severe disruptions to ordinary life the world over, scientists persist in searching for a vaccine that will help achieve herd immunity to the virus. The earliest vaccines by Pfizer, Moderna, Astra-Zeneca, and other pharmaceuticals are already being rolled out in England, the USA, China, India, and a host of other places. However, a recent preprint research paper posted on the *medRxiv** server asks the question: "*Is "herd immunity" to COVID-19 a realistic outcome of any immunization program with the two main vaccines currently licensed in the UK?*"



Study: Immunisation, asymptomatic infection, herd immunity and the new variants of COVID 19. Image Credit: NIAID

Vaccine efficacy

R0 at the beginning of the pandemic was estimated as 2.87, but with the emergence of the D614G strain, it became a little higher, currently estimated to be 3.72. A new variant, dubbed the British variant (Lineage B.1.1.7, termed Variant of Concern VOC-202012/01), is thought to have higher transmissibility than the ancestral strain, with the R0 being 1.5 times higher. If the original value of 2.87 is used, then the current R0 for B.1.1.7 would be 4.48, while for the higher original value of 3.72, the new lineage would have an R0 of 5.80.

The researchers from the University of East Anglia noted that the efficacy of 95% is recorded in the regulatory approval documents for the Pfizer and Moderna vaccines, and of 70% against the symptomatic illness for the Oxford vaccine. The latter was derived from data pooled from two different dose regimens.

The Pfizer vaccine has the potential to stop viral shedding from the nose from the first-day post-vaccination, judging from the data in non-human primate studies, though human studies on this aspect have not been conducted. The Oxford Astra-Zeneca vaccine is not fully effective against asymptomatic infections. However, since these are somewhat less infectious (65%) than symptomatic cases, it still reduces transmission but may not entirely prevent it.

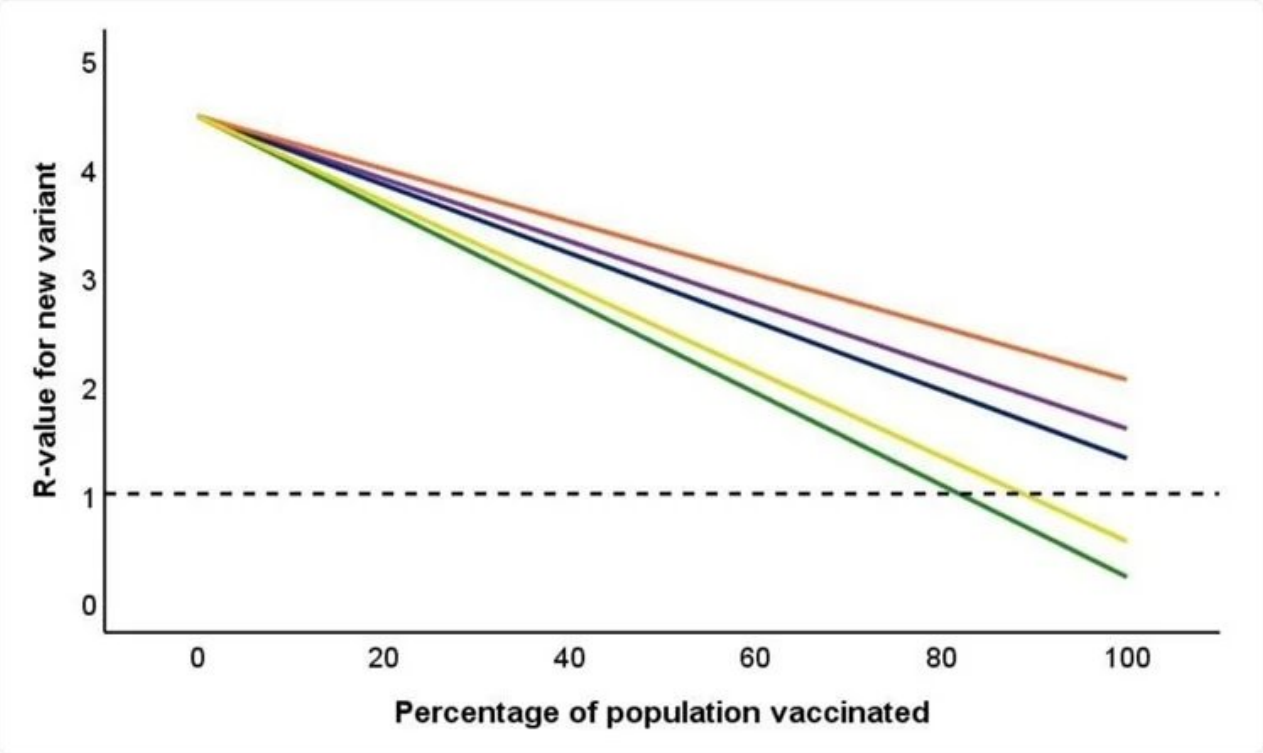
The Oxford vaccine is meant to prevent serious illness and symptomatic illness, though the former is more commonly achieved. It is relatively ineffective against asymptomatic infection, estimated to account for 15% of total transmission. When total incidence is considered, this brings its efficacy against all infections down to 52.5% from the pooled data.

Population coverage and protection

If the reproduction number (R0) of the virus is taken to be 2.87, the population coverage with the Pfizer and Oxford vaccines would need to be 69% and 93%, respectively, to bring the R0 below 1. Alternatively, the infection would need to spread through almost 90% of the population to achieve an R0 less than 1.

With the higher R0 of 4.48, vaccination with the Pfizer vaccine would have to cover 82% of the population to prevent further spread of this variant. Even if

100% coverage was achieved with the Oxford vaccine, the R0 would drop only to 1.325, preventing effective containment. When asymptomatic infections are included, the R0 goes up by a fifth or more, from 1.325 to 1.6, even assuming 100% coverage with this vaccine. This is because vaccinated individuals can still contract an asymptomatic infection, transmitting the virus to the unvaccinated or those with weakened immunity.



Impact of percentage of population vaccinated on overall R-value for COVID-19. Reference line is drawn at R = 1. Green line is Pfizer vaccine; Three upper lines are for Oxford vaccine. Blue: efficacy against symptomatic infection as stated in regulatory approval documents, based on pooling data for SD/SD and LD/SD regime. Purple: same pooled data, but including asymptomatic infection amongst vaccinated individuals. Orange: efficacy for licensed SD/SD regime against both symptomatics and asymptomatics observed in the phase 3 clinical trial (Voysey et al., 2021). Yellow line is equivalent information for immunity in response to natural infection based on data from the SIREN study (Public Health England, 2021c).

Vaccines authorized only for 16+

Since neither vaccine is meant to be given to children, this will push up the R0 to 2.2, say the researchers, even with 100% coverage with the Oxford vaccine. While being more effective in asymptomatic infection, the mRNA Pfizer vaccine may still be unable to fully arrest the pandemic because it is

not approved for pediatric use, allowing viral spread among children.

With the Pfizer vaccine, if all adults are vaccinated and a sizable number of children become immune due to natural infection with SARS-CoV-2, the transmission should drop below sustainable levels, with the R-value below 1.

What are the implications?

The researchers conclude that vaccines in current use against SARS-CoV-2 infection can prevent serious illness in a substantial majority of cases among those who have received the vaccine. The Oxford vaccine claims only this function. With the mRNA Pfizer vaccine, non-human primate studies indicate that it may have the ability to stop the virus from being shed through the nasal secretions, thus reducing its spread.

Both vaccines will protect the most vulnerable individuals from severe or critical COVID-19. However, this hinges on adequate coverage.

Since surveys have revealed that a substantial minority of people are unwilling to take the vaccine even when available, full protection is likely to be only a dream for some time to come. However, given the potential for asymptomatic infection in those who receive the Oxford vaccine, the researchers recommend that at least among those professions that involve numerous contacts with other people, including all healthcare and social workers, a vaccine that protects against asymptomatic infection should be strongly preferred. This will avoid the false security resulting from vaccination with a vaccine that prevents symptomatic illness but may still allow transmission.

Secondly, since the Oxford vaccine allows the virus to continue circulating, it is quite possible that the virus may adapt by increased transmission efficiency or escape mutations to current neutralizing antibodies. This would make revaccinating with another vaccine that prevents infection altogether a top priority.

Finally, the evidence that the Pfizer vaccine limits asymptomatic transmission is indirect and must be updated by actual human data. The reasons for the lower efficacy of the Oxford vaccine should also be explored, as well as for the variations in the effectiveness of the two-dose regimens, where the low

dose/standard dose regimen appears to have led to a higher level of protection than two standard doses. The role played by the difference in intervals between the doses should be examined.

Nonetheless, with these currently approved vaccines, "*herd immunity to COVID-19 will be very difficult to achieve*." It appears likely that non-pharmaceutical interventions (NPIs) will need to be continued for some time, at least.

*Important Notice

medRxiv publishes preliminary scientific reports that are not peer-reviewed and, therefore, should not be regarded as conclusive, guide clinical practice/health-related behavior, or treated as established information.

Journal reference:

- Grant, A. et al. (2021). Immunisation, asymptomatic infection, herd immunity and the new variants of COVID-19. *medRxiv* preprint. doi: https://doi.org/10.1101/2021.01.16.21249946. https://www.medrxiv.org/content/10.1101/2021.01.16.21249946v1

Written by

Dr. Liji Thomas

Dr. Liji Thomas is an OB-GYN, who graduated from the Government Medical College, University of Calicut, Kerala, in 2001. Liji practiced as a full-time consultant in obstetrics/gynecology in a private hospital for a few years following her graduation. She has counseled hundreds of patients facing issues from pregnancy-related problems and infertility, and has been in charge of over 2,000 deliveries, striving always to achieve a normal delivery rather than operative.

The Washington Post
Democracy Dies in Darkness

Opinion: The covid questions we don't want to face

Opinion by **Megan McArdle**

Feb. 2, 2021 at 6:34 p.m. EST

For nearly a year, most of us have assumed this pandemic could end only one way: herd immunity. Maybe we'd get there by staying inside until a vaccine arrived, or maybe we'd all give up, catch covid-19 and acquire immunity the old-fashioned way. Almost none of us considered whether it was possible that *neither* of those things might happen.

So let's ask: What if the virus gets more contagious and even more lethal, like the variant first identified in Britain, instead of less deadly, like the 1918 flu? What if the virus keeps reinventing itself and evading our immune defenses, so much so that it's not possible to reach herd immunity without continually updated vaccinations? What if the pandemic never really "ends"?

The situation in Manaus, Brazil, is making me ask those questions. And I don't like the answers.

Manaus, a city of 2 million in Brazil's Amazon region, basically followed the prescription of lockdown skeptics: Restrictions were few, and infections were many. By last month, some scientists estimated 75 percent of the population had already had the disease — putting Manaus at least close to herd immunity, if not already there.

Then Manaus got hit by its deadliest wave yet. Hospitals ran out of oxygen; patients who probably could have been saved asphyxiated. Many of the dead ended up in mass graves. Given prior infection rates, the volume of emerging cases in Brazil suggests that a variant, known as P.1, may be infecting people who've already survived covid-19 once. And, possibly, making those it does infect sicker.

"What has been said before, that this is a strain more transmissible but not more severe — that's not what is happening in Manaus," epidemiologist Noaldo Lucena told The Post last month. "This isn't a feeling. It's a fact."

There are similar worries about another strain emerging in South Africa — though there are reasons not to despair quite yet. For one thing, Manaus might not have had as many infections as researchers estimated, so reinfection may not be the problem some fear. But even if things are as bad as they look, we should be able to develop new vaccines that contain the nascent variants. In theory, with global vaccination, caseload numbers could be crushed so low that the virus has nowhere to go and no time to evolve around most people's immune defenses.

The problem is that life happens not in theory but in practice. Poorer countries probably won't be fully vaccinated for years — and, for that matter, the United States might not be, either. Fewer than half of U.S. nursing home workers got vaccinated in the first round of on-site distributions at their facilities. What might resistance rates look like among Americans who *don't* work with our most vulnerable? What if only 50 percent of Americans get vaccinated, about the share of people who get flu shots? What if it's even fewer?

In that case, our best hope is probably that vaccine skeptics who assume that they'll be immune after they get infected realize their mistake when another wave materializes. They might opt to take their chances on vaccination rather than risk a third bout of covid-19. In this situation, many people would die. But it's almost certainly better than other possibilities.

For vaccine skeptics might dig in, creating reservoirs of infection in which new variants can arise — for example, by spreading to immunocompromised people whose infections could function as laboratories where the virus effectively experiments with ways to evade immune defenses. And since we clearly won't keep locking ourselves down forever, we might decide, as a nation, to accept greater death rates rather than doing what it would take to actually shut down transmission.

Alternatively, we could get tired of all the dying and take the kinds of strenuous steps that have so far been off the table in the United States: making it near-impossible to live and work without proof of current vaccination. Require people to show their card before boarding a plane or cruise ship, attending a concert or movie; make such evidence mandatory for occupations as varied as nursing assistants and waitresses. And use a central, instantly checkable database so the certificates can't be forged.

It's not clear to me which of these outcomes is more likely. What's obvious is that they're all terrible. Yet it also seems clear that at least one possibility is even worse.

Unfortunately, it's easy to imagine Americans dividing on this, as they have on so much else, to the point where everyone gives up on a unified solution. The risk-averse — disproportionately affluent, educated and Democratic-leaning — might wall themselves off into well-vaccinated enclaves, leaving the rest of America to itself. I'm not sure that any nation could survive half-vaccinated and half-free. But I'm quite sure that I'd rather not explore that question any further.

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Updated January 31, 2021