UVA COVID-19 MODEL WEEKLY UPDATE

January 7th, 2022

KEY TAKEAWAYS

- The Omicron variant has displaced Delta and is now responsible for an estimated 94% of new cases in Virginia.
- Case rates have accelerated to unprecedented levels throughout the Commonwealth, and all 35 health districts are now in surge.
- Models project a continued sharp rise in cases for several weeks, possibly followed by an equally sharp decline.
- There is some evidence that Omicron may be less severe than Delta, but the explosion of new cases is still expected to put an enormous burden on communities and the healthcare system.
- The sheer number of new cases may overwhelm testing capacities and drive down the case detection rate. As such, case rates may not be as reliable a marker of epidemic trends as they once were.

152 per 100k
Average Daily Cases Week Ending Jan. 2, 2022

673 per 100k
Omicron Scenario Forecast Average Daily Cases, Week Ending on Jan. 23, 2022

6,891 / 4,124
Average Daily 1st / 2nd Doses Jan. 2, 2021

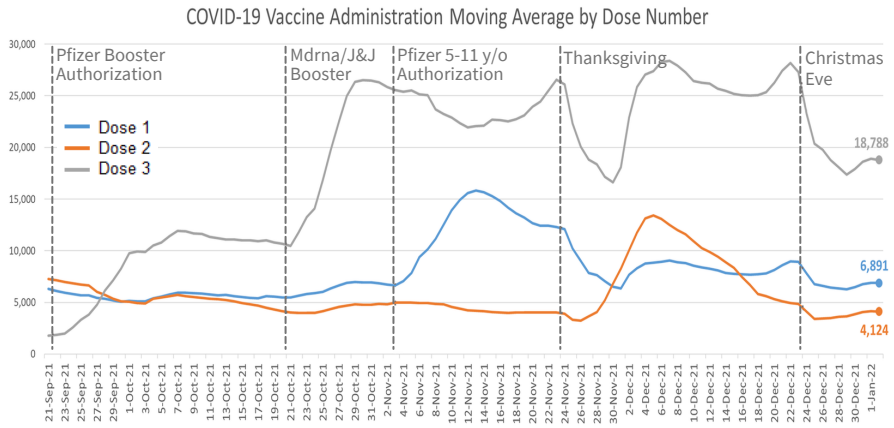
18,788
Average Daily Boosters Jan. 2, 2021

KEY FIGURES

Reproduction Rate
(Based on Confirmation Date)

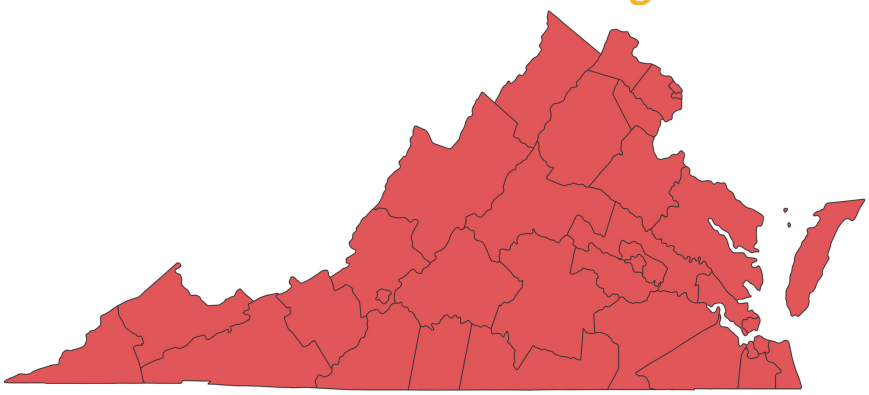
Region	R_e Jan. 3rd	Change vs Previous
Statewide	**1.158**	**0.042**
Central	1.170	0.111
Eastern	1.213	0.141
Far SW	1.114	0.195
Near SW	1.225	0.302
Northern	1.138	-0.043
Northwest	1.213	0.217

Vaccine Administrations



Growth Trajectories: All 35 Health Districts in Surge

Status	# Districts (prev report)
Declining	0 (5)
Plateau	0 (0)
Slow Growth	0 (9)
In Surge	35 (21)



VIRGINIA'S HEALTH IS IN OUR HANDS. Do your part, stop the spread.

UVA COVID-19 MODEL WEEKLY UPDATE

THE MODEL

The UVA COVID-19 Model and these weekly results are provided by the UVA Biocomplexity Institute, which has over 20 years of experience crafting and analyzing infectious disease models. It is a county-level **S**usceptible, **E**xposed, **I**nfected, **R**ecovered (SEIR) model designed to evaluate policy options and provide projections of future cases based on the current course of the pandemic. The Institute is also able to model alternative scenarios to estimate the impact of changing health behaviors and state policy.

COVID-19 is a novel virus, and the variant mix changes constantly. The model improves as we learn more.

THE SCENARIOS

Updated: The models use various scenarios to explore the path the pandemic is likely to take under differing conditions. The **"Adaptive"** scenario continues to track the current course of the pandemic assuming that the Delta variant remains dominant. Though genomic surveillance data is still pending, CDC estimates suggest that the Omicron variant has largely displaced it. This model scenario is retained for comparison purposes but will likely be retired in the coming weeks.

All other model scenarios are based on the immune escape profiles of the new Omicron strain. "**Adaptive-Omicron**" assumes that Omicron is as transmissible as Delta, but with an added immune escape of 80%. This figure has been updated from 30% since the last model run. The **"Adaptive-Omicron-SurgeControl"** scenario shows the likely impact of prevention and mitigation efforts (masking, social distancing, testing and isolating, etc.) on the impending Omicron surge. This is done by employing a 25% reduction in transmission rates starting next week. The **"Adaptive-Omicron-FallWinter"** scenario captures the transmission drivers of the entire 2020 holiday season and projects them forward. In this scenario, transmission rates from January 2021 to February 2022 are manually set to reflect the sharply rising and then falling transmission rates from the same time period last year, but boosted by Omicron's enhanced transmissibility and immune escape.

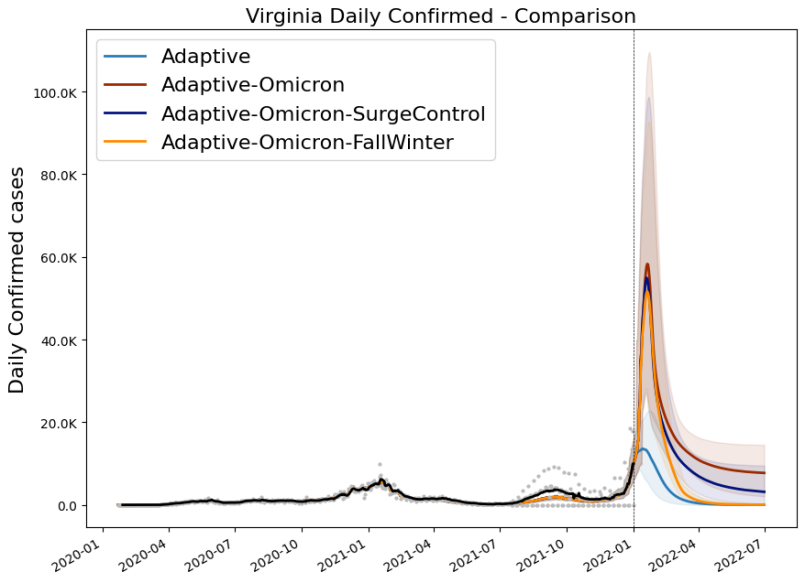
All model scenarios use COVIDcast surveys to estimate county-level vaccine acceptance. They then assume that vaccination uptake continues in each county until this value is reached and 40% of vaccinated individuals will receive a booster.

MODEL RESULTS

Updated: The Delta-dominant "**Adaptive**" scenario (light blue) shows a continued gradual rise in cases, peaking in mid-January at around 95,000 cases per week. Given Omicron's displacement of Delta, this seems overly optimistic.

All three Omicron scenarios are largely identical in the short term. They project a continued sharp rise in cases, peaking around 350,000-400,000 cases per week in the second half of January. The difference between these three scenarios is in the decline after the peak.

The "**Omicron**" scenario (maroon) forecasts a gradual decline. The "**SurgeControl**" scenario (purple) shows a steeper decline into April. The "**FallWinter**" scenario (orange) shows a drop off matching the one seen last winter, reaching a rate of fewer than 30,000 weekly cases by the middle of March.



Date of Latest Model Run: 2022-01-05

Please do your part to stop the spread and continue to practice good prevention, including indoor masking, social distancing, and self-isolating when sick, and get vaccinated and boosted when eligible.

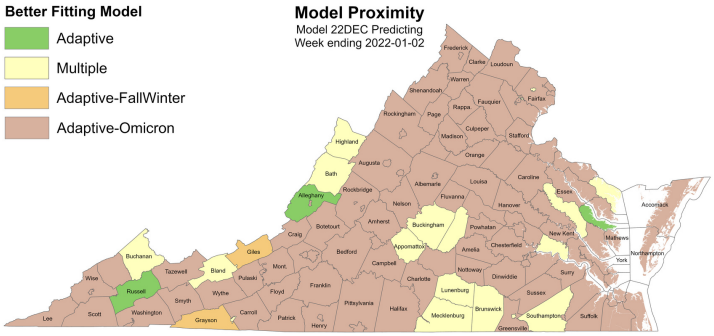
ANOTHER WINTER STORM

This week Virginia was hit by a winter storm that dumped up to 14" of snow on some parts of the Commonwealth. The damage to power lines and effects on highway traffic were substantial. Yet it was a bit of a surprise to some given the preceding week of unseasonably warm weather. Virginia is now facing a different kind of winter storm, and one that won't melt away so quickly.

After a relatively calm November and early December, case rates suddenly surged following the introduction of the Omicron variant (B.1.1.529). This was likely compounded by cold and dry winter weather, and holiday travel and gatherings. Models now forecast a repeat of last year's winter surge, with another peak in late January. Unfortunately, Omicron's extensive immune escape may allow this year's surge to dwarf those of 2021.

A satellite view of Tuesday's Winter Storm. Source: Joshua Stevens at the NASA Earth Observatory with MODIS / EOSDIS LANCE and GIBS/Worldview.

Omicron Supplants Delta

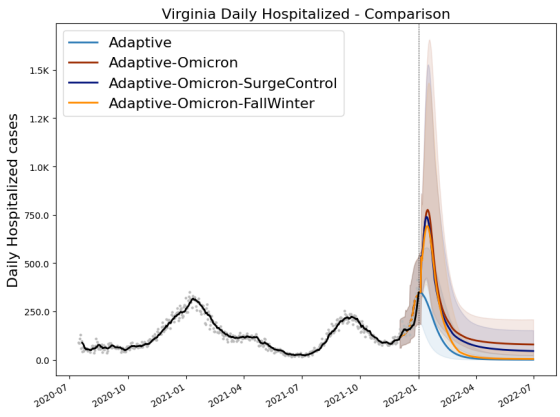


This map shows which of the modeling scenarios run on December 22nd was closest to the ground truth for each county in the Commonwealth.

The Omicron variant was first detected in Virginia on December 9th, but is now likely the dominant strain. As of the time of this writing, the CDC estimates that it represents 93.8% of new cases, up from 70.1% last week. Though modeling scenarios for the Delta variant are still being run, they are likely obsolete. Among the scenarios run on December 22nd, the Omicron scenario was the most accurate in predicting last week's cases for 110 of Virginia's 135 counties and cities (see map on left). Given this trend, we expect to retire the Delta scenarios in the coming weeks.

The Good, the Bad, and the Ugly

There is some good news: Preliminary evidence suggests that Omicron may be less virulent than Delta and earlier variants. This may be the result of the variant's weaker ability to attack the lungs. Moreover, while the variant seems adept at dodging antibodies, and can cause breakthrough cases and reinfections, T-cell response remains strong. This suggests that vaccinations should still be quite protective against severe disease and hospitalization.



The bad news is that the virus is potentially 70x better at infecting airways than Delta, and with its enhanced immune escape, is causing extreme spikes in case rates across the United States. Though milder than Delta, Omicron is far from harmless, and far more than "just a cold". It is still hospitalizing substantial numbers of patients, and still carries the risk of long COVID.

The ugly bit is that Virginia's hospitals will still be hit hard by the Omicron surge. Despite seeming less virulent than Delta, it is causing so many more cases than Delta did, that models forecast a deluge of hospitalizations far exceeding those of last winter.

Fortunately, each of us have the tools available to brave this winter storm. Though reduced, vaccination does provide protection from Omicron. Boosters appear to be effective at preventing infection and severe disease by Omicron. The advice for preventing Omicron remains the same as with other COVID-19 variants: Continue to practice good prevention; including indoor masking, social distancing, and self-isolating when sick; and get vaccinated and boosted as soon as eligible.