UNIVERSITY of VIRGINIA
BIOCOMPLEXITY INSTITUTE

UVA COVID-19 MODEL WEEKLY UPDATE

VDH VIRGINIA DEPARTMENT OF HEALTH

October 21, 2022

KEY TAKEAWAYS

- Case rates across the Commonwealth have plateaued at 12.2 per 100k (same as last week). The statewide effective reproduction number (R_e) continues to hover just below one at 0.923. Hospitalizations are at a five-month low of 478.

- Most health districts are in declining or plateaued case trajectories. Only five are in growth trajectories with none in surge. Only 12 counties or cities are at medium community levels. None report high levels.

- Models from early October underpredicted this week's cases in some districts. This suggests that weather is already having some effect on transmission rates. This is expected to continue. Along with new variants, it could cause a significant surge.

- BA.5 remains the dominant subvariant in Virginia. But, for the first time since June it represents fewer than 70% of new cases. BQ.1.1 and BA.2.75.2 are beginning to make inroads in Virginia. XBB is not growing in Virginia but is spreading quickly in Asian nations. It is expected that one or more of these will outcompete BA.5 in the coming months. All three exhibit significant immune escape properties.

- The new bivalent boosters are expected to grant significant protection against hospitalization and death. Given the new variants and impact of weather, it is critical for Virginians to get their boosters as soon as possible.

590,687
Total Bivalent Booster Doses Administered by Oct. 19, 2022

11.1%
Of eligible Virginians have received a Bivalent Booster

12.2 per 100k
Average Daily Cases Week Ending Oct. 17, 2022

Zero
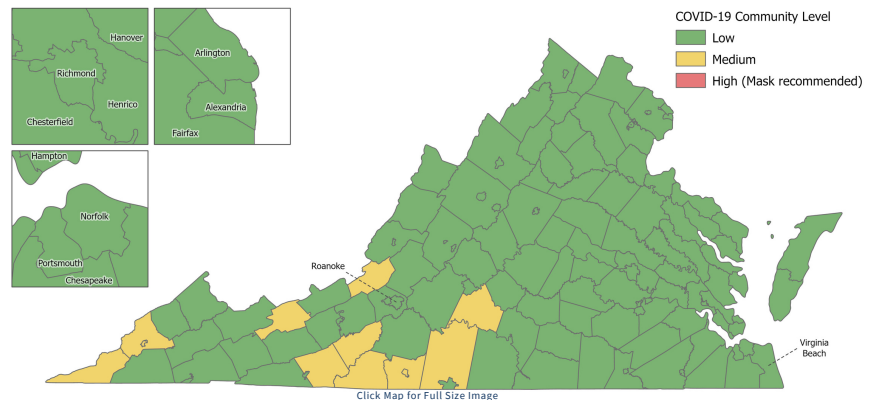*Virginia Localities at **High** CDC Community Levels as of October 20, 2022*

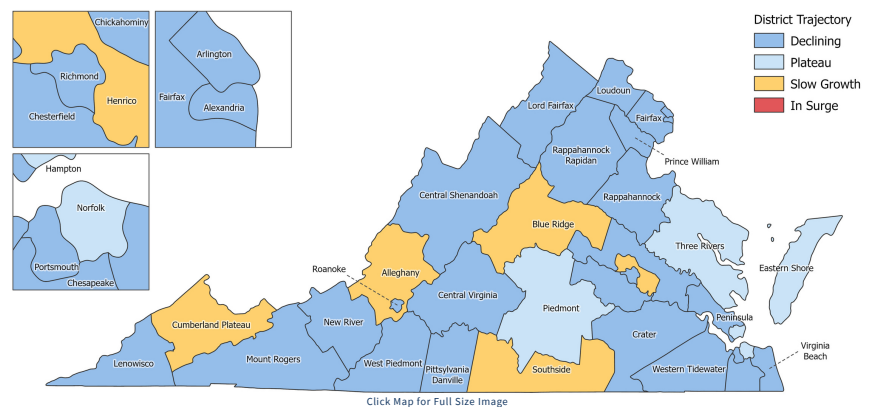## KEY FIGURES

Variant Mix – HHS Region 3

CDC Community Levels

As of October 20, 2022

Click Map for Full Size Image
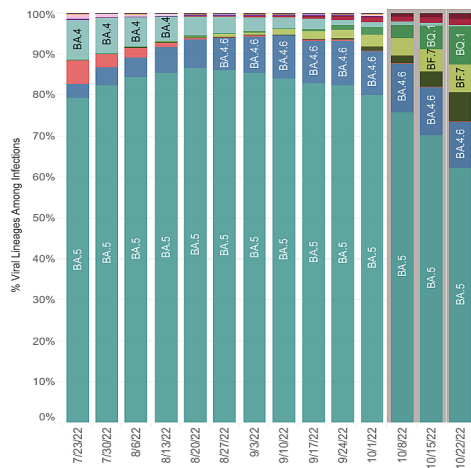
Growth Trajectories: No Health Districts in Surge

Status	# Districts (prev week)
Declining	25 (20)
Plateau	5 (4)
Slow Growth	5 (10)
In Surge	0 (1)

Click Map for Full Size Image

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THE MODEL

The UVA COVID-19 Model and 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 health district-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 periodically. These models improve as we learn more.*

THE SCENARIOS

Updated: The model uses scenarios to explore the potential paths the pandemic may take under future conditions. Model projections take a variety of factors into account, including current variants, vaccine uptake, vaccination/boosting rates, previous infection, waning immunity, weather, and behavioral responses. **All models now account for bivalent boosters.** Unless otherwise specified, they assume that booster administrations will continue at the current pace. The "**Adaptive**" scenario represents the current course of the pandemic, projecting it forward with no major changes. The "**VariantX**" modifier explores the potential impact of a new variant. This hypothetical variant is imagined as having the same immune escape and transmissibility advantages over BA.4/5 that BA.4/5 did over the earlier BA.2. See page three of the July 15 report for details. The "**FallWinter**" modifier layers seasonal increases associated with colder weather, holiday gatherings, and travel, on top of the base scenarios. It does this by artificially adjusting transmissibility between September and January to match transmissibility from the same time last year. The new "**OptBooster**" (optimistic) modifier assumes that bivalent booster coverage will increase *beyond* the current pace and be 25% higher than 3rd dose boosters from Fall of 2021. The new "**PessBoost**" (pessimistic) modifier assumes administrations will *slow down*, and be 25% lower than 3rd dose boosters.
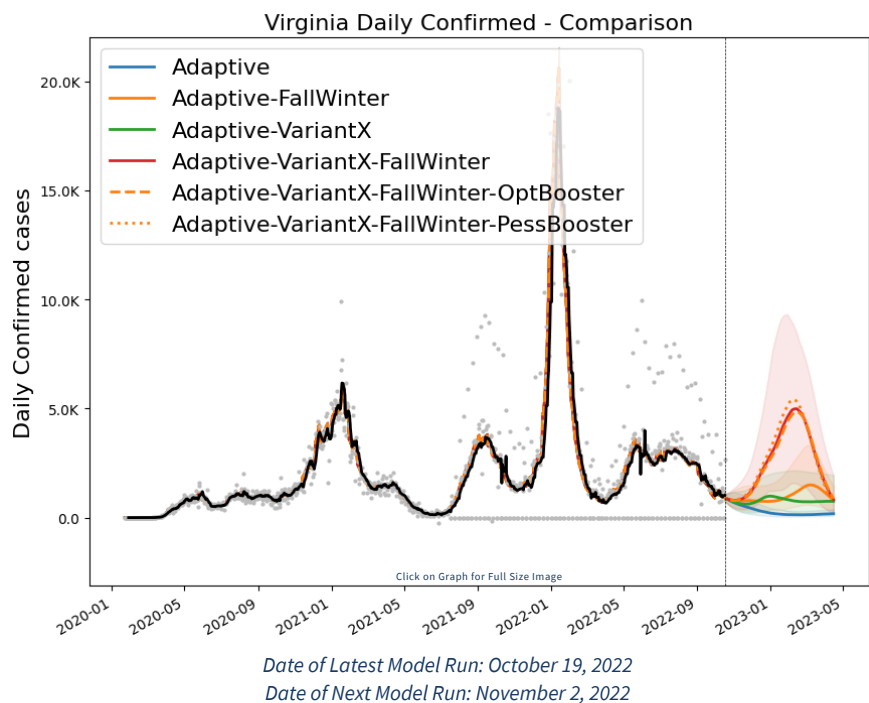
MODEL RESULTS

Updated: As always, the current course "**Adaptive**" scenario is shown in blue. This scenario projects a continued decline of cases. In this scenario, Virginia will fall below 500 daily cases by mid-November.

Both the "**Adaptive-FallWinter**" (orange) and "**Adaptive-VariantX**" (shown in green) scenarios project mild surges. The former peaks at 1,500 daily cases in early March, the latter at 1,000 daily cases in early January.

The "**Adaptive-VariantX-FallWinter**" (red) combines both a hypothetical new variant with the seasonal forcing of Fall / Winter. The combination allows for a significant surge, peaking at about 5,000 daily cases in early February, before quickly declining.

Both the "**OptBooster**" and "**PessBooster**" scenarios (dashed orange lines) are applied to the VariantX-FallWinter scenario. They show that increasing booster uptake could prevent over 10,000 cases. If booster rates slow, this could cause an extra 25,000 cases.

Virginia Daily Confirmed - Comparison

Legend:
- Adaptive
- Adaptive-FallWinter
- Adaptive-VariantX
- Adaptive-VariantX-FallWinter
- Adaptive-VariantX-FallWinter-OptBooster
- Adaptive-VariantX-FallWinter-PessBooster

Click on Graph for Full Size Image

Date of Latest Model Run: October 19, 2022
Date of Next Model Run: November 2, 2022

Please note: The data and projections shown here reflect reported cases. During the Omicron wave, testing shortages resulted in far fewer infections being reported as cases. This suggests fewer total infections than experienced in January. Please see page three of the May 13th modeling report for more details.

(Explore the model results in detail on this dashboard)

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WINTER OUTLOOK

The COVID-19 situation has continued to improve. Case rates have plateaued at a low level; the lowest they've been since April. Hospitalizations are also down to levels not seen since May. Also, for the first time since May, the CDC did not designate a single virginia locality as having a high community level. This is good news, especially as we enter the holiday season. But just as we prepare for winter during the last warm days of fall, it makes sense to expect, and prepare for, winter COVID-19 case surges.

Some Early Signs

Nationally, some wastewater surveillance systems are seeing increased viral loads. Case rates and hospitalizations are picking up in France and the UK, which frequently lead the US by a few weeks in COVID19 surges. Hospitalizations are also starting to pick up in Northeastern states, which are often hit by surges before Virginia. Finally, for the first time in months, models are underpredicting cases in some regions.

Mechanistic models are better able to make forecasts if the situation is stable. This was the case all summer, and models run in early July did an excellent job forecasting the last three months. Recently, though, models have begun to underpredict cases, suggesting the situation is changing. This change is likely the result of two factors: weather and variants.
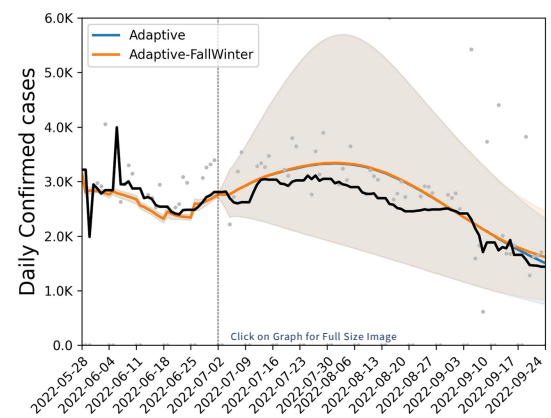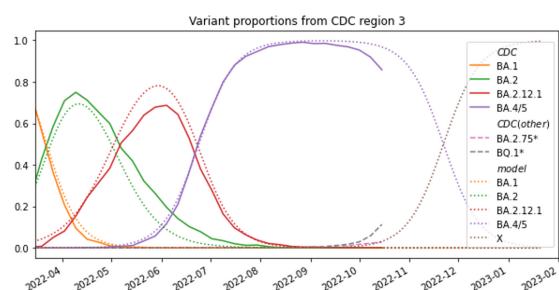

Models from July 2 accurately forecast cases rates (black) through October. This week, models began to underpredict cases in Virginia.

New Variants on the Horizon

COVID19 has followed a very predictable pattern. A new variant arises and infects many people. These people develop natural immunity. Along with vaccines, this limits the number of susceptible individuals, which drives cases back down. In the wake of this, there is incredible selective pressure on the virus. The only way for it to propagate in this immune-rich environment is to evolve a means to escape this prior immunity. Eventually a new variant does just that, and the entire process repeats.

The Variant X scenario was introduced on July 15 to model the potential effects of such a new variant, but for months genomic surveillance found no good candidates. Now, however we have several new candidates have emerged: BA.2.75.2, BQ.1.1, and XBB. Unfortunately, information is still preliminary. All three variants display significant immune escape properties. All three also show significant growth advantages over BA.5. So far, BQ.1.1 seems to have the strongest growth advantage, but these

Models of variant prevalence suggest that BA.5 may soon be replaced by a competitor. The new variant could be dominant by mid-November.

calculations are based on only a few weeks of data. XBB seems to be more immune evasive than the other two. It also resists several monoclonal antibody treatments. XBB is dominant in Singapore and making significant inroads in India where it is competing with BA.2.75.2. Meanwhile, BQ.1.1 is growing quickly in Belgium, France, and the UK. XBB has not yet been found in Virginia. But both BQ.1.1 and BA.2.75.2 are already here, and BQ.1.1 is already spreading in Virginia. While it is difficult to predict how competition between these variants will play out, they are likely to underpin a winter surge in COVID-19 cases.

Bivalent Boosters Are Critical

When we combine the new variants with Fall/Winter weather and travel, a new surge becomes likely. But this doesn't necessarily mean deaths and hospitalizations. Despite the large surge, 99.8% of cases in Singapore were mild, and fewer than 3 per 10,000 needed intensive care. Singapore's extensive vaccination coverage (over 95%) is likely preventing a surge in hospitalizations. Data regarding the efficacy of bivalent boosters against XBB and BQ.1.1 are still preliminary. Singapore did not authorize bivalent boosters until October 14, but it is expected that the booster will provide broad protection against hospitalization and death, just as 3rd dose boosters did in 2021.

These boosters are the best way to protect Virginia from the coming surge. With fall weather already here, and new variants knocking on the door, now is the best time for Virginians to get their boosters. Please consider getting yours as soon as possible.