UNIVERSITY of VIRGINIA
BIOCOMPLEXITY INSTITUTE

UVA COVID-19 MODEL WEEKLY UPDATE

VDH VIRGINIA DEPARTMENT OF HEALTH

September 18, 2020

KEY TAKEAWAYS

- Models are designed to project what **could** happen based on current trends but do not forecast what **will** happen.
- Behavioral responses drive changes in current trends. This is increasingly important as we enter the fall season.
- Growth in cases has plateaued overall. However, 2 health districts are currently in a surge trajectory, likely driven by students returning to college and university campuses.
- Nevertheless, the statewide reproduction rate fell below 1.0. It also fell in all regions, with each falling below 1.0 as well. While this is good news, reproduction rate estimates are preliminary and have tended to be more volatile during direction shifts.

205,333

Cases Expected by Thanksgiving

0.894

Reproduction Rate

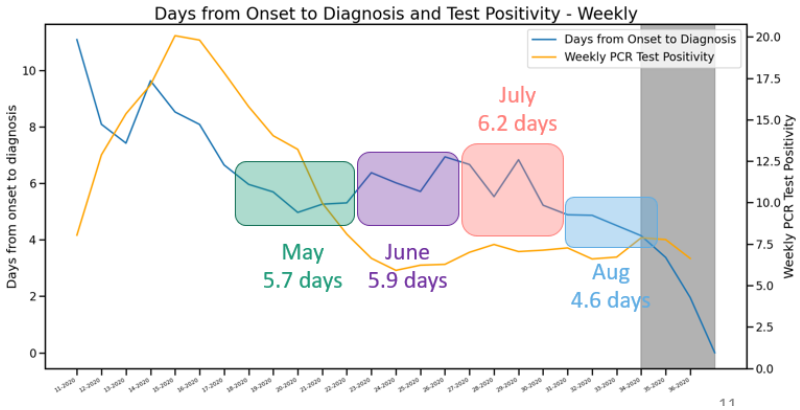
Based on onset date
7 days ending Sept 5

KEY FIGURES

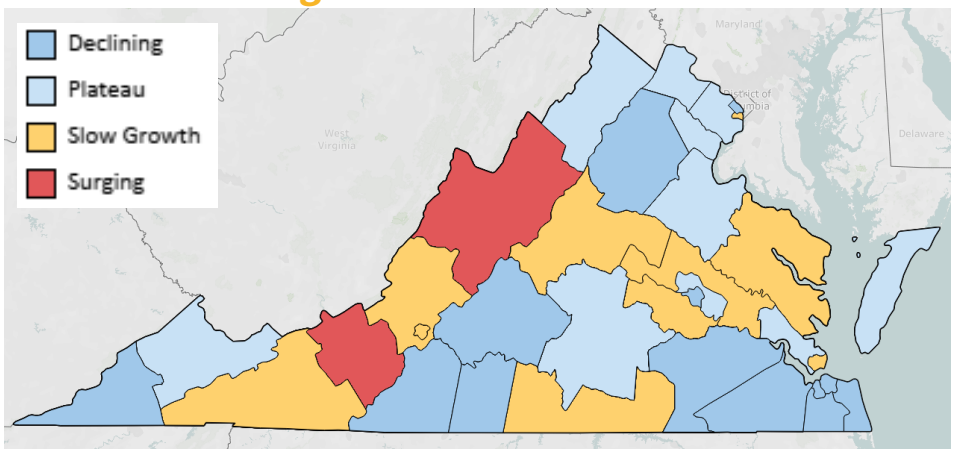
Reproduction Rate

Region	R_e Sep 05	Weekly Change
State-wide	**0.894**	**-0.133**
Central	0.965	-0.017
Eastern	0.791	-0.134
Far SW	0.814	-0.389
Near SW	0.988	-0.084
Northern	0.833	-0.088
Northwest	0.983	-0.666

Case Detection



In Surge: 2 Health Districts



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THE MODEL

The UVA COVID-19 Model and the 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 (S)usceptible, (E)xposed, (I)nfected, (R)ecovered epidemiologic model designed to evaluate policy options and provide projections of future cases based on the current course of the pandemic.

COVID-19 is a novel virus causing an unprecedented global pandemic and response. The model improves as we learn more about it.

THE PROJECTIONS

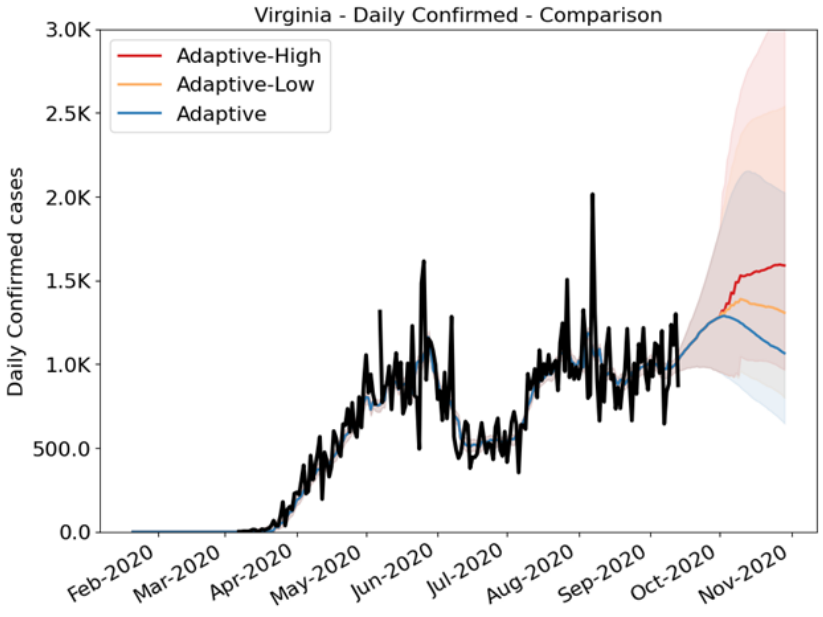
The UVA team continues to improve the model weekly. The UVA model now uses an "adaptive fitting" methodology, where the model precisely traces past and current trends and uses that information to predict future cases. These new projections are based on recent trends the model learns through its precise fitting of each individual county's cases.

The new model also includes two "what-if" scenarios to predict what we might see if cases increase in response to seasonal effects in the Fall, such as schools re-opening and changing weather patterns. While the impact of school reopening is beginning to influence model results, it is still too early to know the impact other seasonal effects will have. For now, the model assumes a 10-20% increase in transmissibility beginning with the onset of flu season. The model will be updated regularly to incorporate new information.

Low impact of seasonal effects: 10% increase in transmission starting October 1, 2020
High impact of seasonal effects: 20% increase in transmission starting October 1, 2020

MODEL RESULTS

With the adaptive modeling approach, the current course predicts that confirmed cases will peak during the week ending **October 11** with **8,924 weekly cases**. If cases continue on this trajectory, we would expect **205,333** total confirmed cases by Thanksgiving. Upcoming seasonal changes, including schools reopening, flu season, and changing weather patterns, may cause transmission rates to increase. With a 10% increase in transmissibility at the beginning of flu season on October 1, we would expect weekly cases to peak at 9,612 the week of ending October 18th. A 20% increase in transmissibility at the beginning of flu season on October 1 would lead to a higher peak during the week ending November 1st with 11,137 weekly cases. These scenarios result in 10,000 and 25,000 more confirmed cases by Thanksgiving, respectively.



DATING CASES

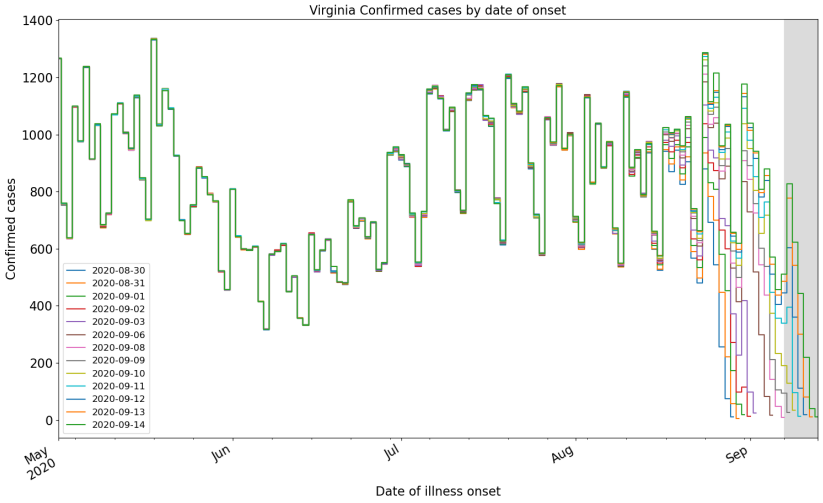
This week's key figure section included quite a bit of good news. While two of Virginia's health districts remain in surge, and statewide new cases have plateaued, the number of health districts with a declining number of cases increased from 10 to 13. With just one week of August in the shaded "preliminary" box, the days from onset to diagnosis declined to 4.6 days for the month. Perhaps most striking though is the reproduction rate table. This week the box is all green, indicating that the reproduction rate has declined in all six of Virginia's Health Planning and Preparedness Regions. Furthermore, it has dropped below 1.0 in all regions. If this holds, we could expect the number of new confirmed cases in Virginia to decline.

When does a case begin?

Before we get too excited though, it may be worth digging a little deeper into the data. Observant followers of this report may have noticed that the reproduction rate is almost two weeks old when reported. This is due in part to the time it takes to produce, validate and report the rate. However, we also wait a week for the data to stabilize. Even then, the estimate tends to change. The reason for this is that reproduction rate estimates are based on onset date. Onset date is one of two ways to "date" a case. For the most part, people focus on the other method: report date. **Report date** is the date a new case is first reported by the Department of Health. **Onset Date** is the date of disease onset, often defined as symptom onset. However, with COVID-19, asymptomatic cases and spread are important factors, complicating this reference point.

While report date is pretty straightforward, onset date is trickier. To identify onset date, VDH relies on health providers, case investigators, contact tracers, and patients themselves to provide information. Due to this complexity, onset date is operationalized by something we call **Event date**, which is the earliest date VDH can identify a case of COVID-19 occurring. Initially, this may be the date a case is reported or specimen collection date. As investigators and contact tracers follow up with health care providers, patients, and care-givers, they can often identify when the patient first experienced symptoms. Ideally, however, they can identify the likely date a patient contracted COVID-19, usually when they had contact with another known case.

Although the chart to the right is difficult to interpret, it shows how much this date can change (and how dogged VDH staff is in collecting this data). The green line represents the latest onset date data pull, which occurred on September 12. All other colors are earlier pulls, going back to August 30. If you can see a color other than green, that means onset date data was updated to that date in the latest pull. You can see this data is volatile for several weeks, and sharp eyes will notice updates for dates as early as May.



How to interpret early estimates

Especially during a fast-moving pandemic, data-reporting involves a balancing act between timeliness, usefulness, and accuracy. Our goal is to provide as accurate data as possible, but if we wait too long, it may be too late to act on the information. VDH's COVID-19 Dashboard mostly relies on report date but onset date is a much more useful measure of disease spread. The best thing to do is to take early estimates with a grain of salt. So far, early estimates of reproduction rates have tended to underestimate later estimates, so we can expect the actual rate to be a bit higher. Additionally, early estimates tend to be more volatile when the rate is especially high or low. This may reflect a time crunch on staff when cases are high or catching up when low.

Another factor may be at play this week. Northwest and Southwest Virginia have seen the most volatility recently. This may be due to students returning to campuses in these regions, as discussed in last week's report. This affect may explain both real, short-term swings in reproduction rates and volatility due to the workload of local public health staff. If so, lower rates may indicate these impacts are contained and case growth is returning to a lower trend. But, for now, take that with several grains of salt.