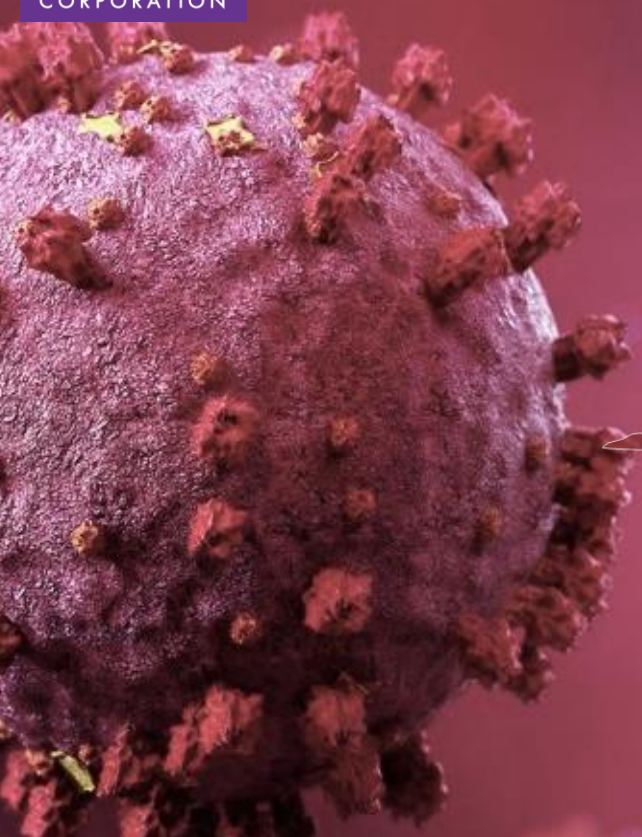
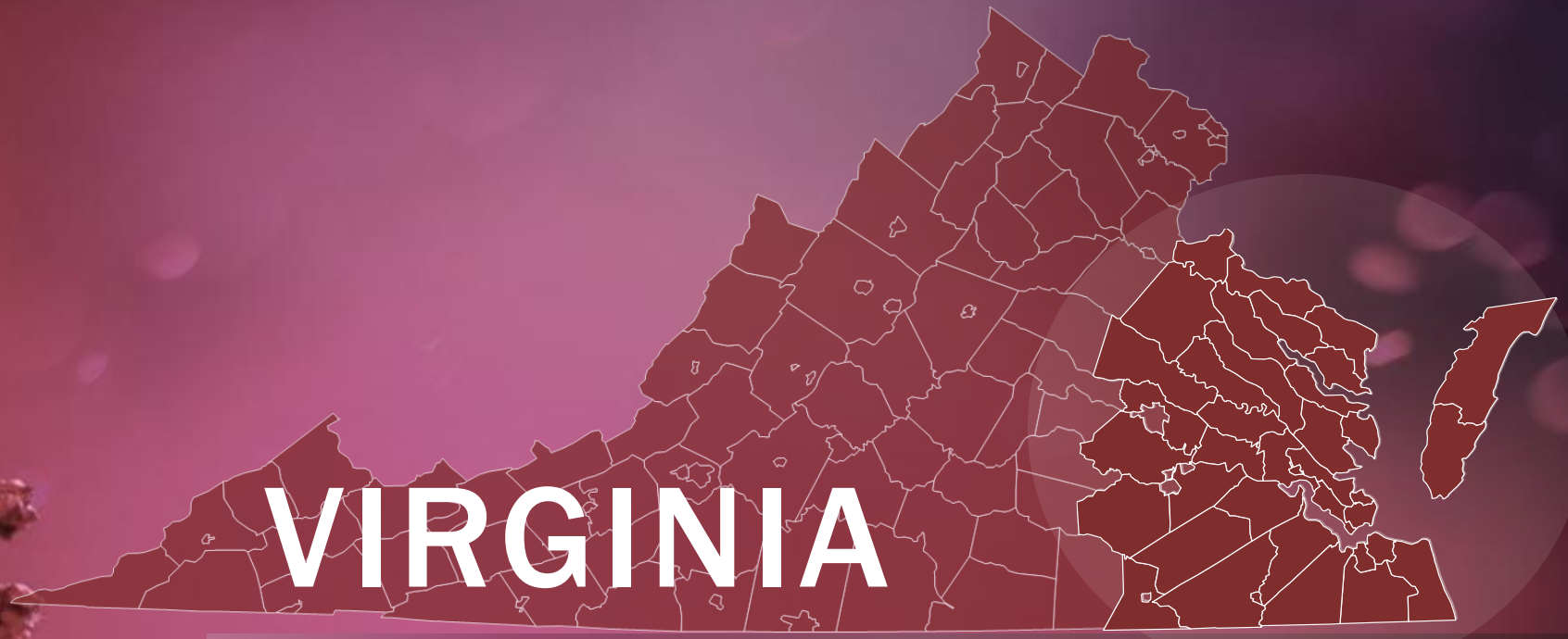




VIRGINIA

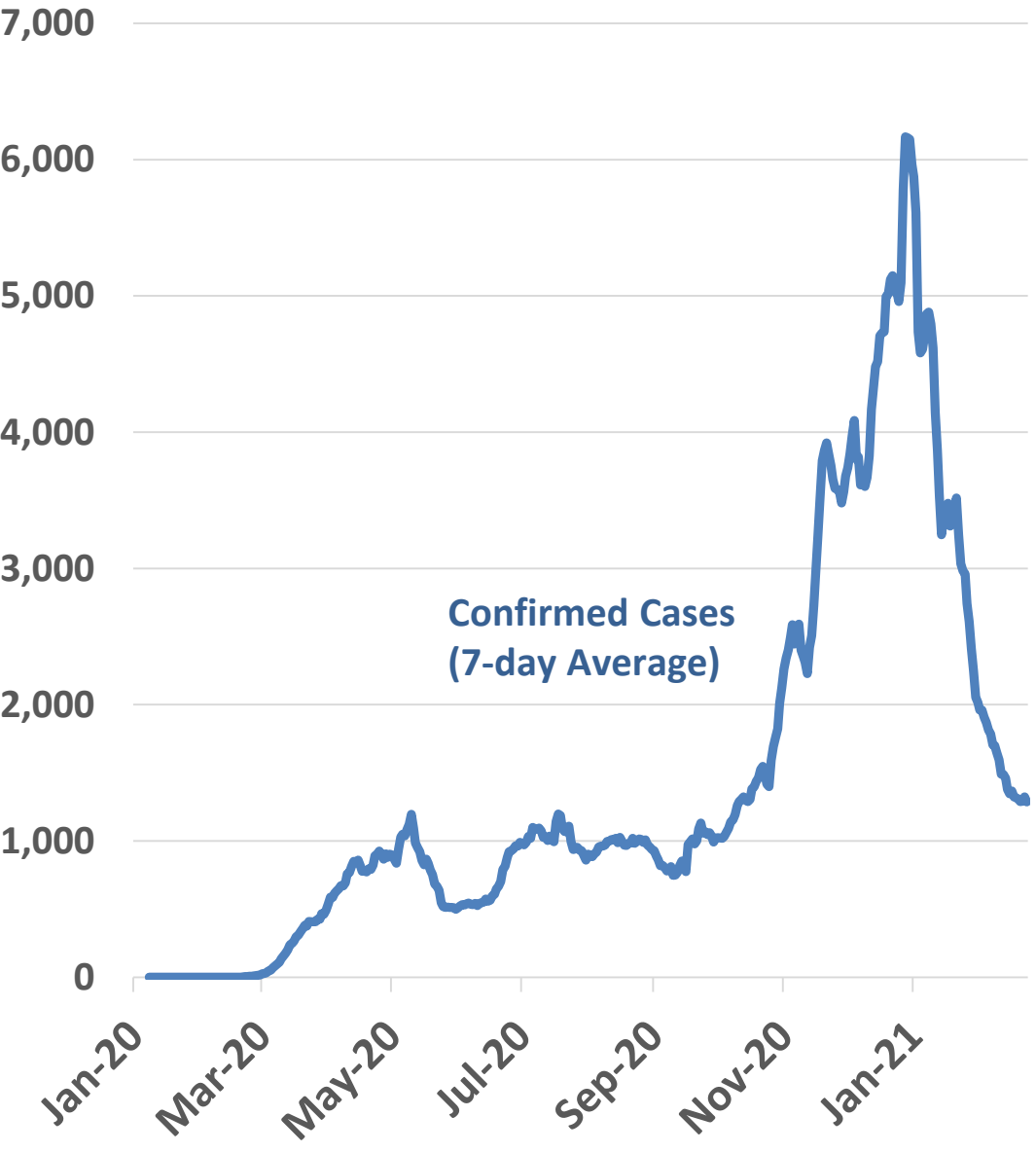
COVID-19 Update March 18th, 2021

Carter C. Price, Ph.D.

A team of RAND researchers was asked by the Commonwealth of Virginia to review available information on COVID-19 models of the Commonwealth to determine the strengths and weaknesses of each model and their relevance to decisionmaking. The information in this presentation is intended to keep policymakers abreast of the latest findings of the research team.

This research was sponsored by the Commonwealth of Virginia and conducted by the RAND Corporation. RAND is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest. For more information, visit www.rand.org.

Bottom Line Up Front



Confirmed cases have declined to 1,290 per day

- This appears to be plateauing at levels near the peaks from the spring and summer waves

COVID hospitalizations have continued to decline and are currently at 1,077

COVID tests are also declining

- However, the test positivity rate is at 5.4 percent and has been declining due to falling case rates

Vaccination is continuing to increase rapidly

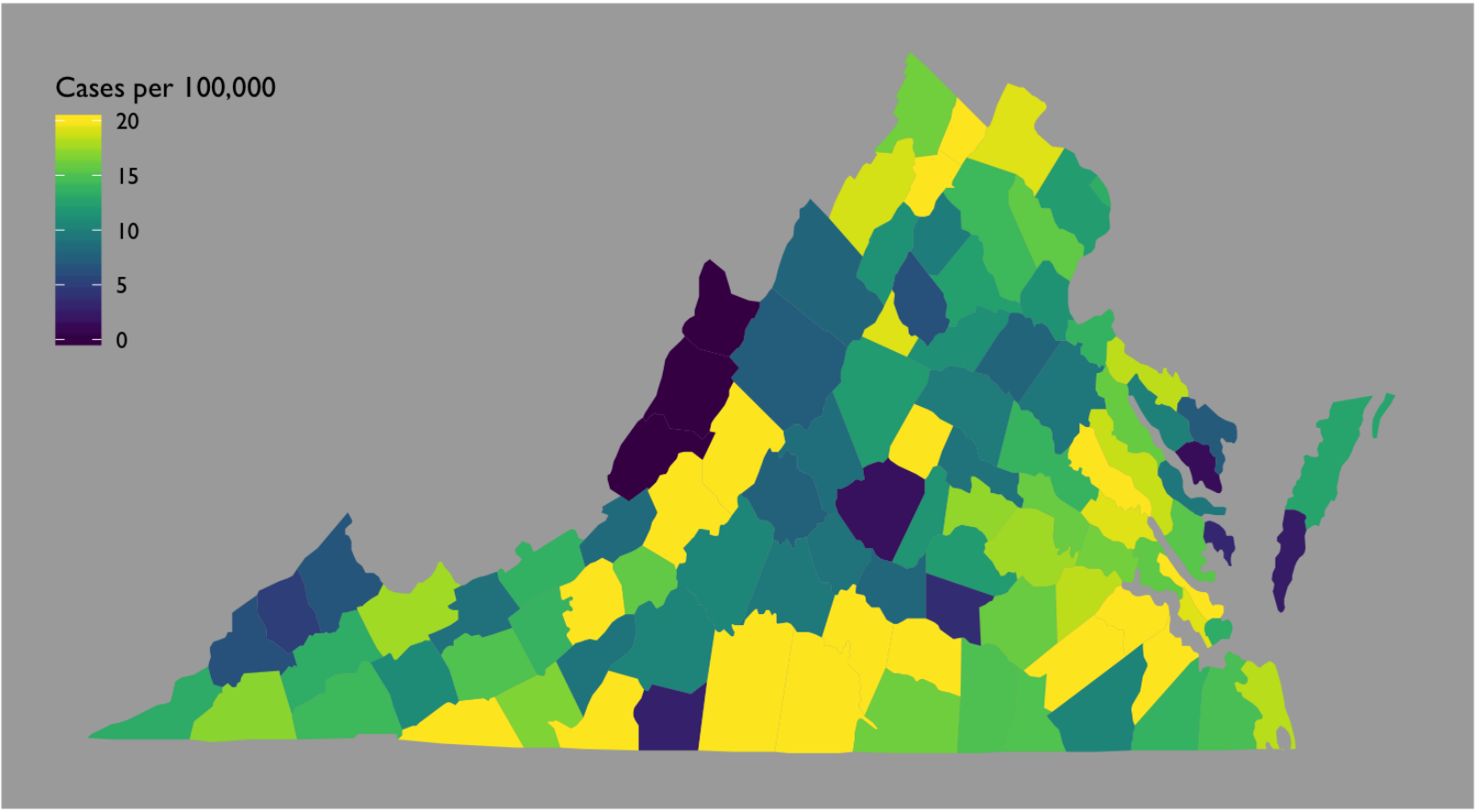
Despite growth in the share of the population vaccinated, cases rates are not continuing to decline

- This may be due to increased presence of variants of concern in Virginia (both B.1.1.7 and B.1.351 have been detected)

Case levels have declined slightly, but a quarter of counties have very high case levels

CASE COUNT

Source: VDH



Yellow indicates at least 20 cases per 100,000

- This is a decline from 25 per 100,000 from last week

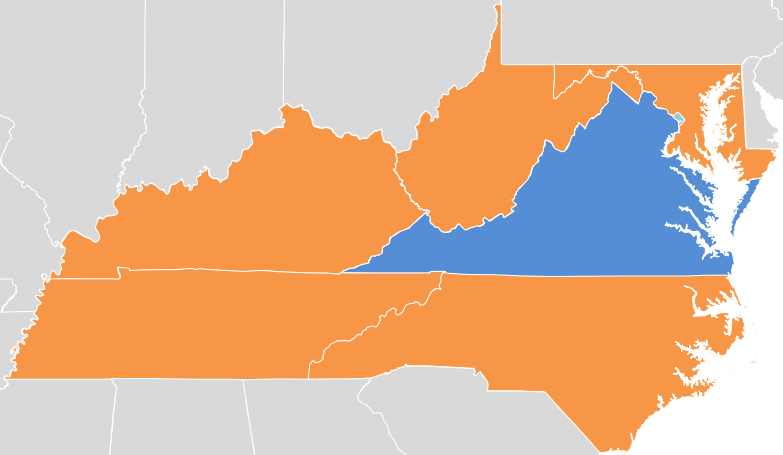
Case levels have declined across the Commonwealth

- 77 percent of counties have fewer than 20 cases per 100,000
- 30 percent of counties have fewer than 10 cases per 100,000

These data were updated March 17th and represent a seven-day average of the previous week

Case levels are converging across neighboring states

Over the last 7 days, Virginia had 15.2 new confirmed cases per day per 100,000 (-2% from last week)



Very high case loads (>20): None

High case loads (10-20):

- Tennessee (18.6 new cases per 100k, -0% from last week)
- Kentucky (17.6, -4%)
- West Virginia (17.2, +29%)
- District of Columbia (16.6, -28%)
- North Carolina (15.5, -9%)
- Maryland (14.3, +8%)

Lower case loads (<10): None

These data were updated March 17th and represent a seven-day average of the previous week

Eleven percent of Virginians are fully vaccinated, and an additional eight percent are partially vaccinated

Age	0-9	10--19	20-29	30-39	40-49	50-59	60-69	70-79	80+	Total
Fully Vaccinated	0	5,720	74,659	107,121	121,240	142,352	176,212	192,791	121,626	941,721
% Full	0.0%	0.5%	6.5%	9.1%	11.3%	12.6%	18.0%	31.4%	39.1%	11.0%
Partially Vaccinated	0	6,952	44,093	63,111	74,100	105,839	172,290	173,726	67,895	708,006
% with Partial	0.0%	0.6%	3.8%	5.4%	6.9%	9.4%	17.6%	28.3%	21.8%	8.3%
Confirmed Cases	25,065	59,828	110,118	93,644	84,764	83,567	57,665	31,599	23,150	569,400
% Confirmed Cases	2.5%	5.4%	9.5%	8.0%	7.9%	7.4%	5.9%	5.1%	7.4%	6.7%

Source: VDH, March 17th

Vaccinations are being rolled out in Virginia

- 3,117,125 doses have been distributed as of March 17th
- Virginia has administered 1,846,094 out of 1,937,600 first doses
- Virginia has administered 964,834 out of 1,179,525 second doses

At some point in the next month or two, vaccine supply will likely be less of a constraint, and growing the vaccination rates will rely on improving demand

Variants could reverse recent declines in the spread

The CDC has estimated that the B.1.1.7 variant could be the dominant strain beginning this month

- B.1.1.7 has been detected in Virginia and all of its neighbors, B.1.351 has been found in all neighbors except West Virginia, and, among neighboring states, P.1 has only been found in Maryland as of March 16th, 2021

Some of the new variants spread faster or bypass immune responses in ways that make a larger share of Virginia's population vulnerable to infection in spite of vaccinations

- Castonguay et al. conducted a meta-analysis of COVID mutations and variants
- They note that while the evidence indicates that vaccines' (Pfizer, Moderna, and Astra Zeneca) efficacy is undiminished for the B.1.1.7 variant, they are less effective against the B.1.351 variant, and one of the studies in the meta-analysis found the Pfizer vaccine is less effective against P.1 (though Liu et al. published analysis showing no efficacy decline)
- Faria et al. examined the P.1 variant and found it to be 1.4 to 2.2 times more transmissible than the baseline for COVID and also that it evaded 25 to 61 percent of the protective immunity from previous infection

Testing will be key to tracking the variants

- Banada et al. produced an RT-PCR screen for a set of mutations common to the B.1.1.7, B.1.351, and P.1 variants
- Spurbeck et al. describe the successful implementation of a wastewater-based epidemiology approach to monitor viral load including a PCR approach capable of detecting the mutations of the S protein characteristic of the B.1.1.7 variant
- Similarly, Graber et al. developed an approach for estimating the prevalence of B.1.1.7 using wastewater

Contact tracing could be particularly useful in containing outbreaks of these variants when paired with better surveillance

We've been monitoring recent, relevant literature (1/2)

Kraay et al. modeled the vaccine rollout to determine when NPIs could be phased-out without a substantive increase in COVID deaths

- Their analysis suggests NPIs could be safely relaxed 2 to 3 months after the national vaccination rate reached 3 million doses per day compared to 6 to 9 months for a rate of 1 million doses per day
- This implies that NPIs could be safely relaxed 2 to 3 months after Virginia reaches 75,000 doses per day
- However, this may be an underestimate because their model does not include vaccine hesitancy, assumes sufficient demand to match supply, and does not consider variants with higher rates of spread or that bypass immunity

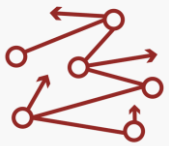
Funk and Tyson conducted a survey of 10,121 adults in February on vaccine acceptance

- They found 69 percent of respondents would probably or definitely take the vaccine (or had already taken the vaccine), which is an increase of nine percentage points from November
- A similar survey from NPR/PBS Newshour/Marist finds that, while vaccine hesitancy across different racial groups has declined, there is a 30-percentage point difference in hesitancy by political affiliation

Hughes et al. assessed the data on county level administration of vaccines up to March 1st

- The most vulnerable communities measured by poverty, employment, income, and education are not receiving vaccines proportional to their share of the population
- Based on these measures, Virginia is 26th for doses of the vaccine distributed to "high vulnerability" populations

We've been monitoring recent, relevant literature (2/2)



Guy et al. examined county level data to assess the role of mask mandates and opening restaurants from March 1st, 2020 to December 31st, 2020

- Mask mandates were associated with a significant decrease in daily COVID-19 case and death growth rates within 20 days of implementation
- On-site restaurant dining (they did not distinguish between indoor or outdoor) was associated with a significant increase in daily COVID-19 case and death growth rates 41 and 61 days after implementation, respectively

Mattingly et al. performed a descriptive analysis of data from 216 of Maryland's nursing homes to identify characteristics relevant to the risk of outbreaks among nursing home residents up to July 1st, 2020

- The key factors associated with higher risk of an outbreak included higher county incidence, larger facilities, shorter lengths of stay, and lower CNA staffing hours

Faherty et al. studied the use of COVID testing in K-12 schools

- Early adopters of testing found their screening programs made staff and families feel safer and also were able to identify and isolate asymptomatic infections
- They noted that partnerships with local health systems, academics, other schools, and vendors were critical to successful implementation
- Testing was only one of the changes made to support reopening (e.g., deployment of PPE, distancing rules, schedule changes)

What is next for modeling and analysis?

Pandemic modeling has greatly evolved over the last year

- Initially, there was a dearth of high-quality data and the models were typically either SEIR-based or statistical
- As behaviors and policies changed, the models grew in complexity and hybrid/ensemble models are also used now
- Growing immunity, behavioral changes, and other factors will make modeling for the purpose of producing accurate forecasts particularly challenging in the coming months

At this stage of the pandemic, modeling and data analysis will be useful for addressing specific types of questions:

- How might the spread change as new variants enter Virginia?
- Which segments of the population remain the most vulnerable?
- As vaccinations increase and case levels decline, which NPIs can be relaxed and when?
- Are there early warnings or triggers that should be monitored to help inform policy?

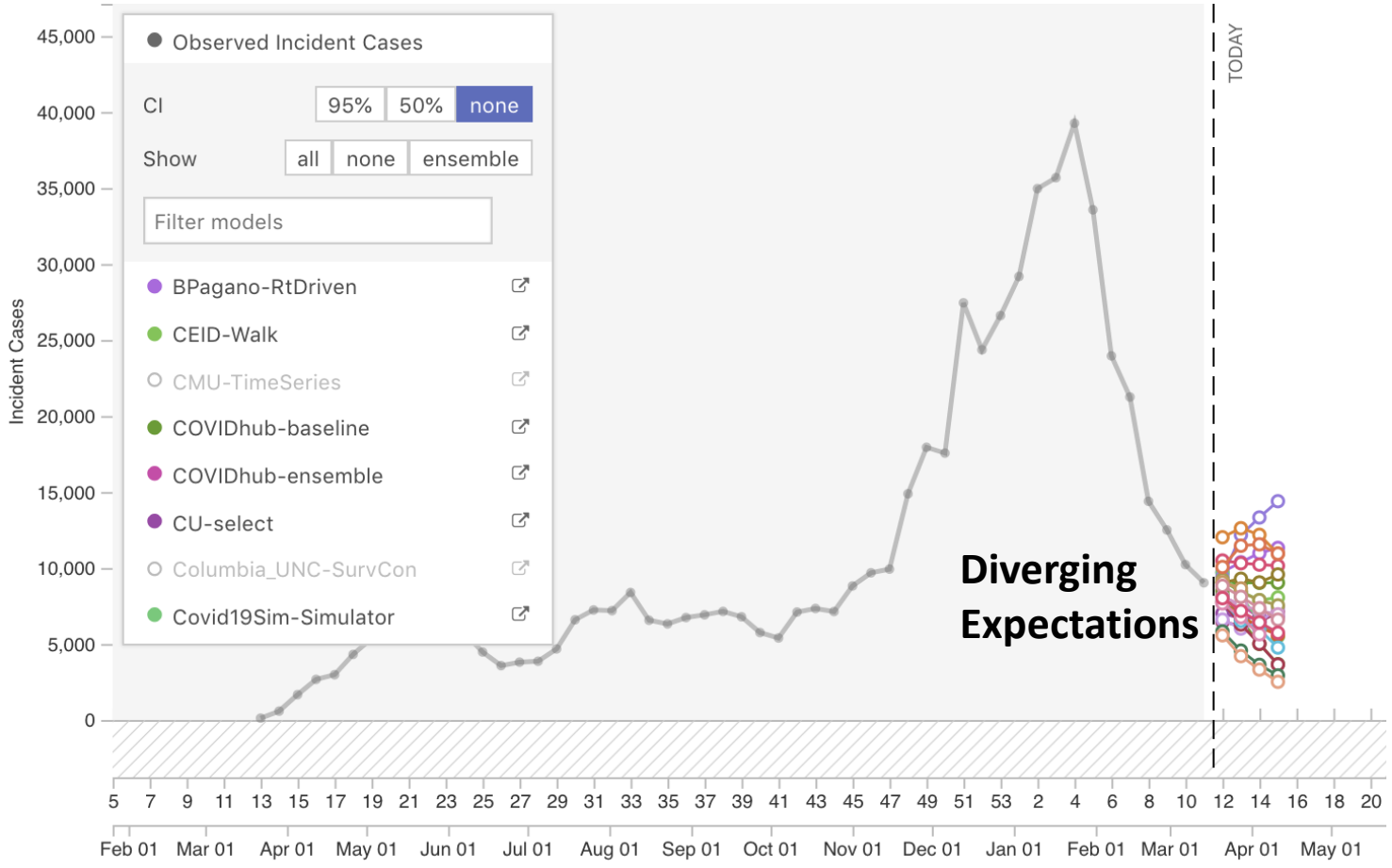
For other questions, surveillance is likely to be more useful:

- How widespread are the variants in Virginia?
- How many cases should we expect in the next few weeks?

Robust, integrated testing programs are necessary to conduct effective surveillance

- Data on the sampling approaches are useful to understand which areas and populations are well covered versus under-covered
- Improving external access to data sources like wastewater testing or genomic sequencing could improve analysis

The models are producing diverging forecasts



Source: COVID-19 Forecast Hub, https://viz.covid19forecasthub.org/
Accessed March 17th

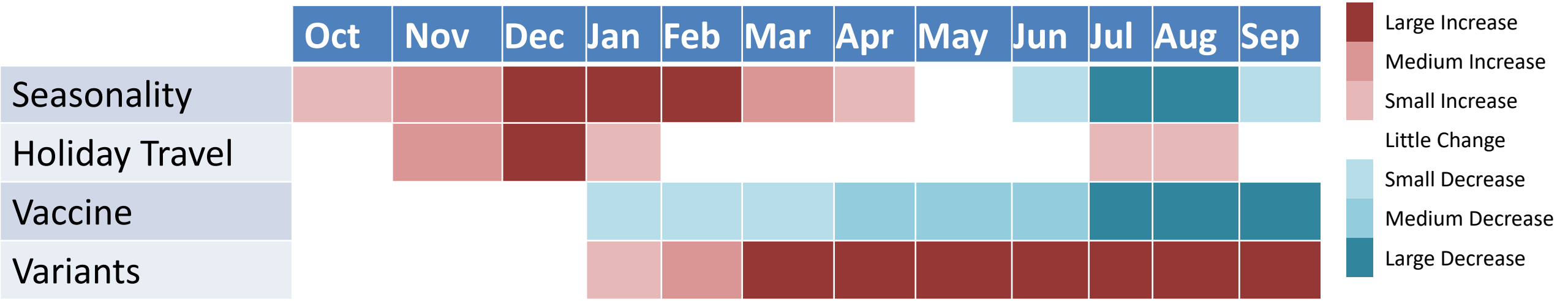
The models differ on whether the rates will continue to decline, level off, or increase

- These differences seem to be arising from different structural forms (SEIR-types predict declines, while others do not)
- It is not clear how the trade off between the variants and vaccines is made in each model

Many of the model predictions lag the data

- This means that they match the trends in retrospect but not as forecasts

The spread will be a race of vaccines versus variants



There are several factors that will continue to drive the spread for the next few months

- Seasonal effects for COVID-19 appear to have increased spread during colder weather
- Holiday activities appear to have increased spread but are largely over for now
- The vaccines may begin to meaningfully slow the spread in the next month or two, but maintaining the rate of vaccine administration will require outreach to skeptical subpopulations
- The B.1.1.7, B.1.351, and P.1 Variants of Concern may increase the rate of spread as they enter Virginia, and future variants could also change the severity or the efficacy of vaccines

There are some key unknowns about the current spread

- How many people have been infected with COVID-19 and have lingering protection?
- To what degree are people complying with best practices for prevention?

Discussion and Questions