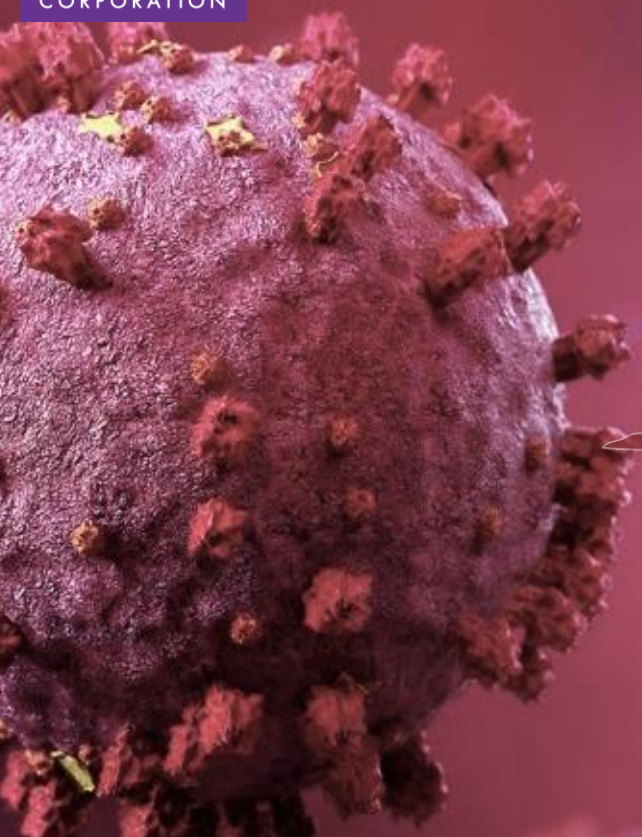
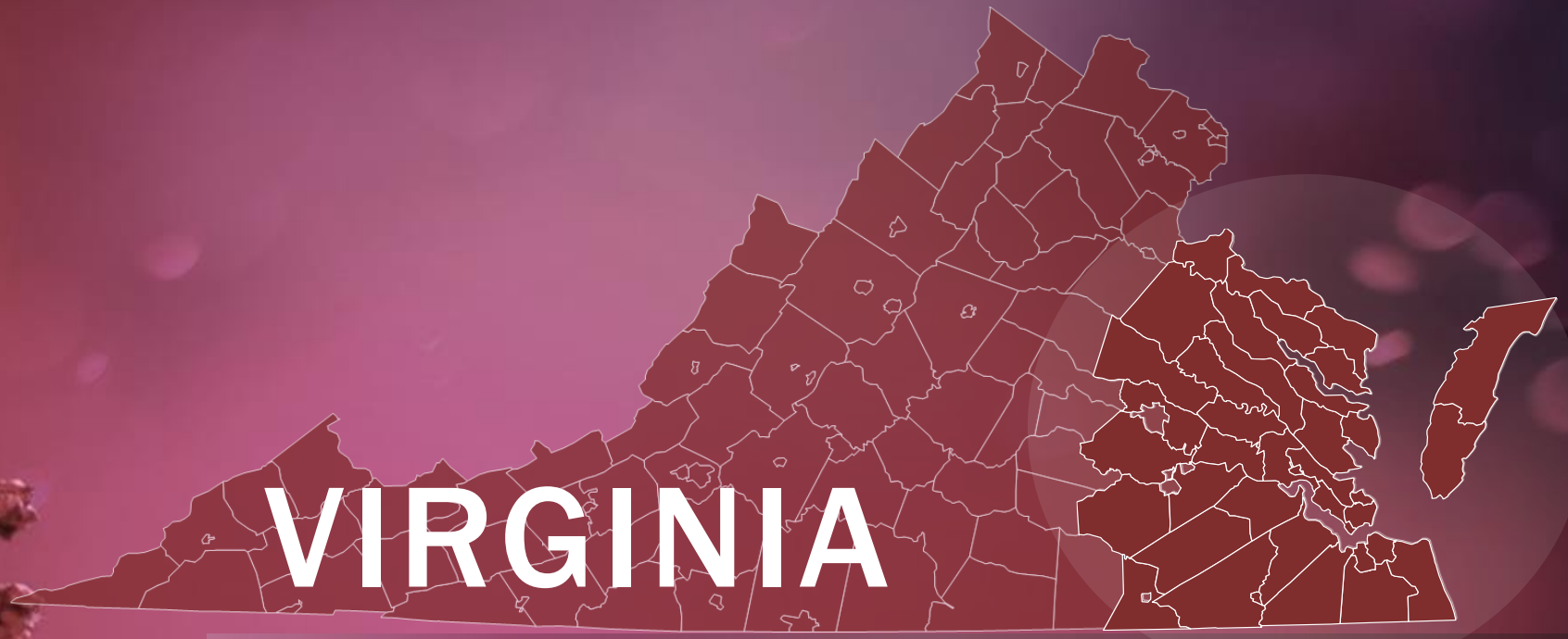




VIRGINIA

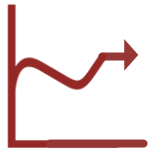
COVID-19 Update March 11th, 2021

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



Virginia's total case levels continue to decline, and they are now at the levels of previous peaks

- Hospitalizations are declining but remain somewhat elevated
- Testing has returned to the pre-winter levels

Vaccine administration has reached the majority of elderly Virginians

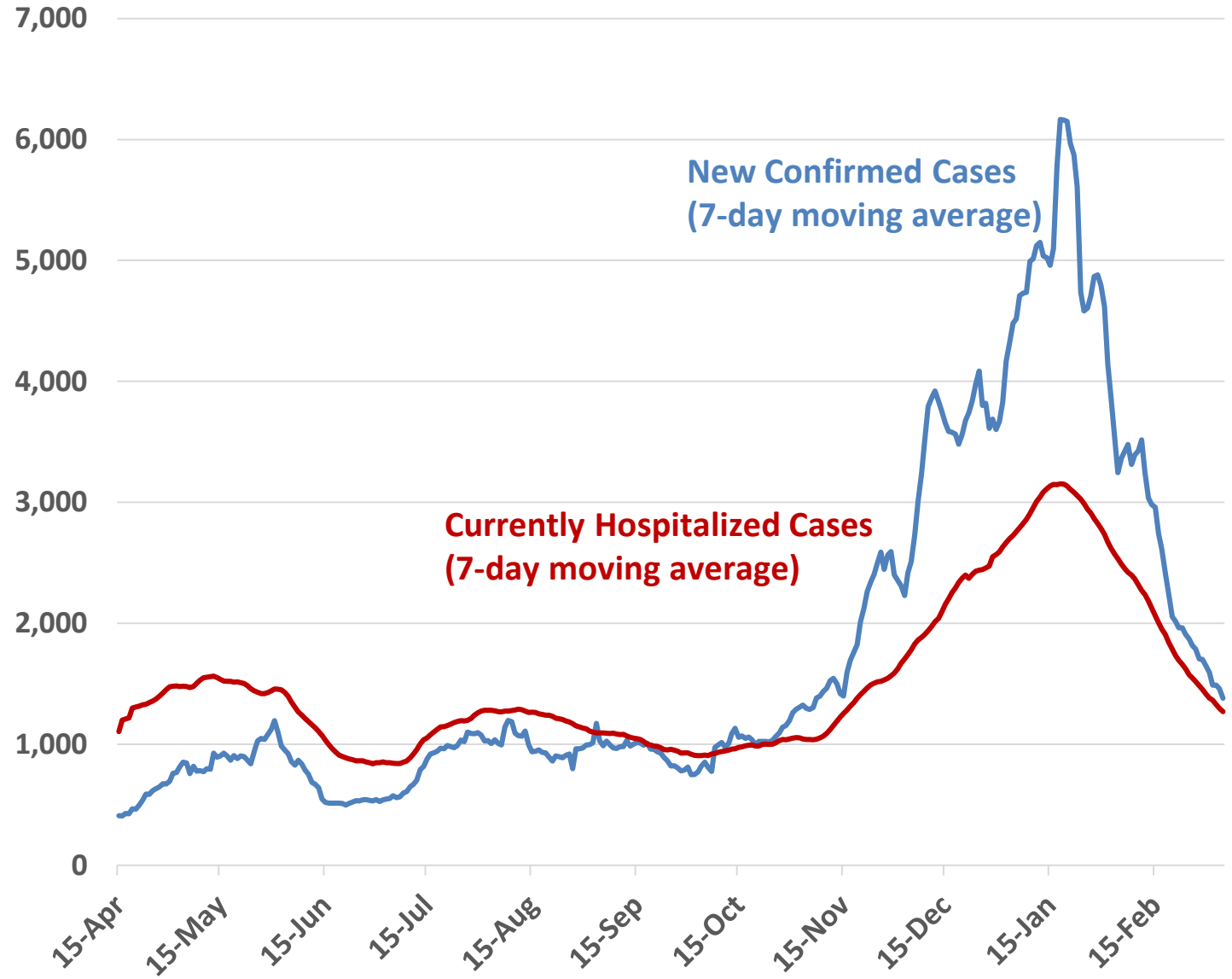
- Supply will remain a constraint for another month or two
- Efforts to increase vaccine demand will be needed to reach some populations

New COVID variants have been detected in Virginia and could accelerate spread

Model forecasts may be less accurate because behavior is driving growth

- Models will continue to be useful for comparing policies and exploring scenarios

Cases and hospitalizations have declined significantly, and levels are now at the peaks from previous waves



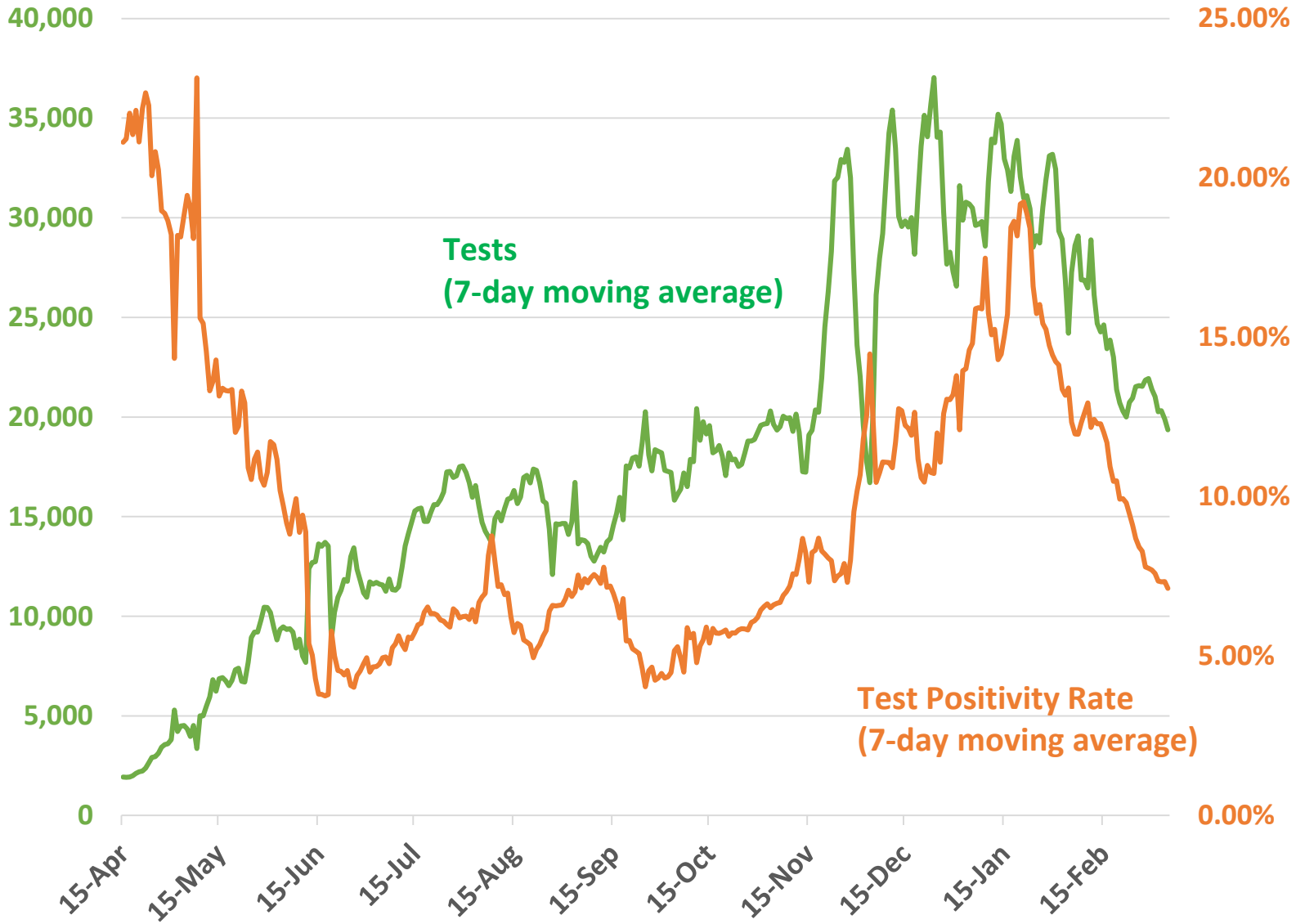
New confirmed cases have dipped to around 1,200/day on average

- This is the level from late October
- The rate of decline has slowed, but it is not clear whether this is a plateauing or pause before a continued drop

Currently hospitalized cases peaked in mid-January

- Hospitalizations are likely to continue to fall for the next few weeks
- The decline in hospitalizations will typically be slower than that of cases

Testing has drifted to the levels before the third wave



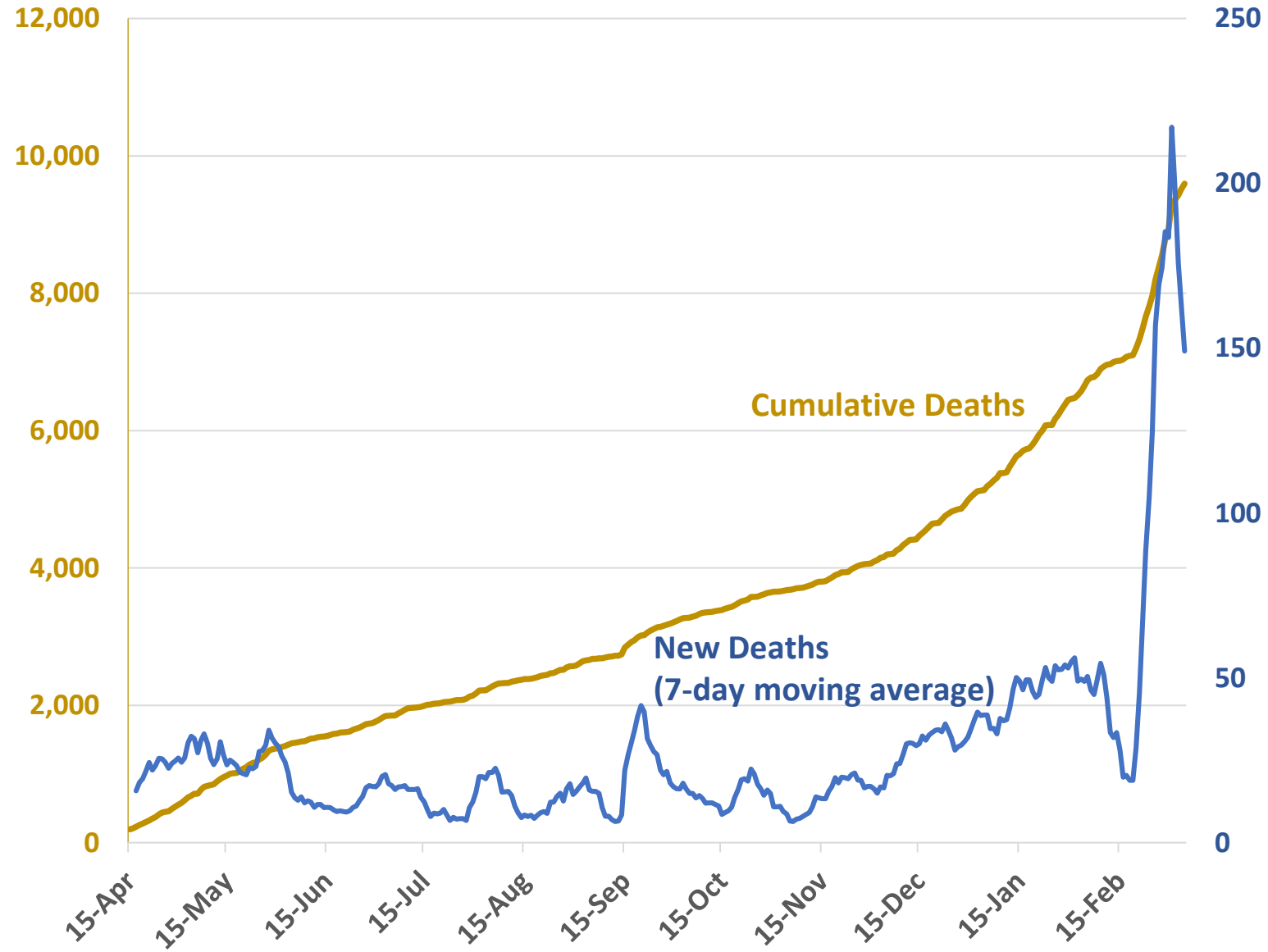
Tests per day have averaged around 20,000

- This is roughly equivalent to the highest level before November

The test positivity rate is roughly 7 percent

- Five percent is a suggested target
- At this rate, the case count levels are likely to be slightly less reliable

New deaths from COVID remain elevated



Cumulative Deaths have approached 9,600

- At 115 per 100,000, Virginia's death rate from COVID remains well below the national rate of 161 per 100,000

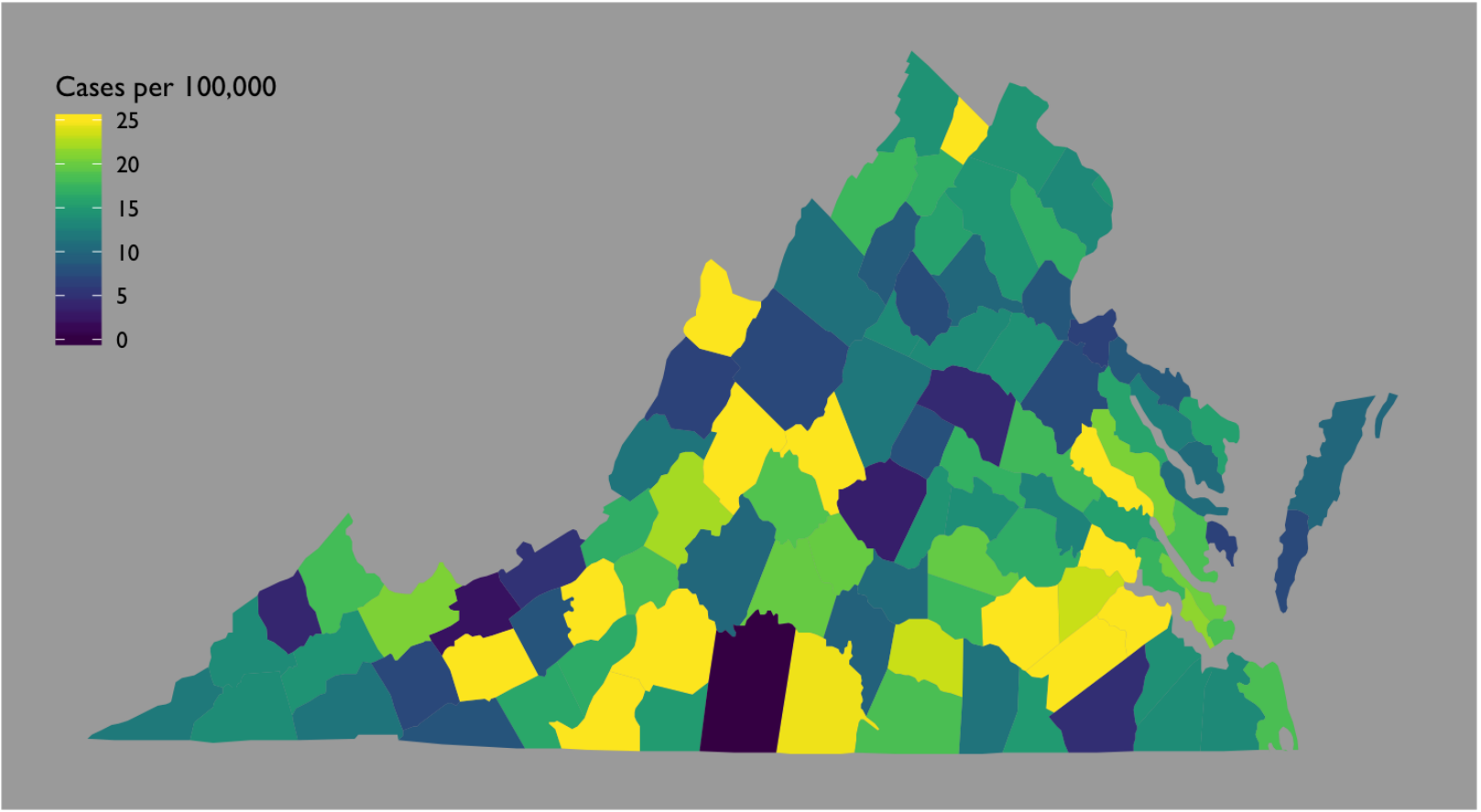
New deaths spiked over the last three weeks

- This spike was largely driven by a lag in reporting and data entry
- Death rates typically lag case rates by several weeks

Case levels have continued to decline but remain very high in pockets

CASE COUNT

Source: VDH



Yellow indicates at least 25 cases per 100,000

- This is a decline from 30 per 100,000 from last week

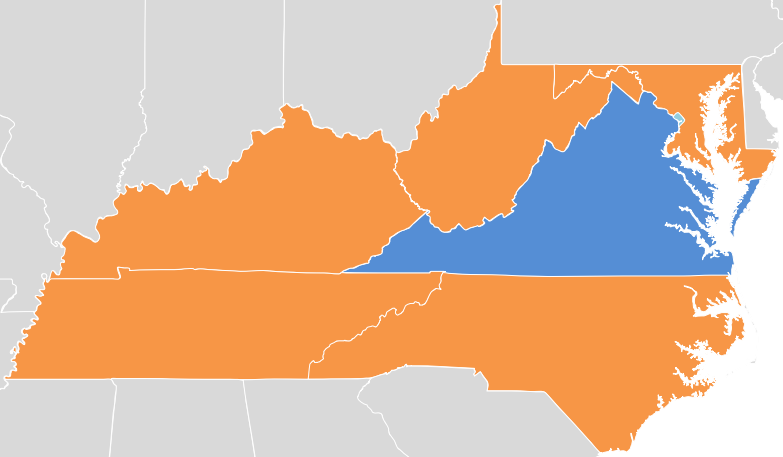
Case levels have declined across the Commonwealth

- 78 percent of counties have fewer than 20 cases per 100,000
- 24 percent of counties have fewer than 10 cases per 100,000

These data were updated March 10th and represent a seven-day average of the previous week

Case levels are converging across neighboring states

Over the last 7 days, Virginia had 16.2 new confirmed cases per day per 100,000 (-19% from last week)



Very high case loads (>20): None

High case loads (10-20):

- Kentucky (19.5 new cases per 100k, -20% from last week)
- North Carolina (18.6, -14%)
- District of Columbia (16.6, -14%)
- Tennessee (15.1, -27%)
- West Virginia (12.7, -29%)
- Maryland (12.3, +2%)

Lower case loads (<10): None

These data were updated March 10th and represent a seven-day average of the previous week

Nine percent of Virginians are fully vaccinated, and an additional seven 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	4,260	64,342	92,399	102,853	116,613	130,809	151,351	104,082	766,709
% Full	0.0%	0.4%	5.6%	7.9%	9.6%	10.4%	13.4%	24.6%	33.4%	9.0%
Partially Vaccinated	0	4,891	35,701	50,355	59,337	79,269	171,212	163,304	67,424	631,493
% with Partial	0.0%	0.4%	3.1%	4.3%	5.5%	7.0%	17.5%	26.6%	21.7%	7.4%
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 10th

Vaccinations are being rolled out in Virginia

- 2,790,135 doses have been distributed as of March 10th
- Virginia's program has administered 88 percent (1,364,418 out of 1,552,720) of its first doses
- It has also administered 72 percent (734,507 out of 1,013,945) of its 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

- As other strains are introduced to Virginia, the dynamics of the spread may change

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, the vaccines are less effective against the B.1.351 variant, and one of the studies included 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

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 on data on 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., deploy 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 to respond
- 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?

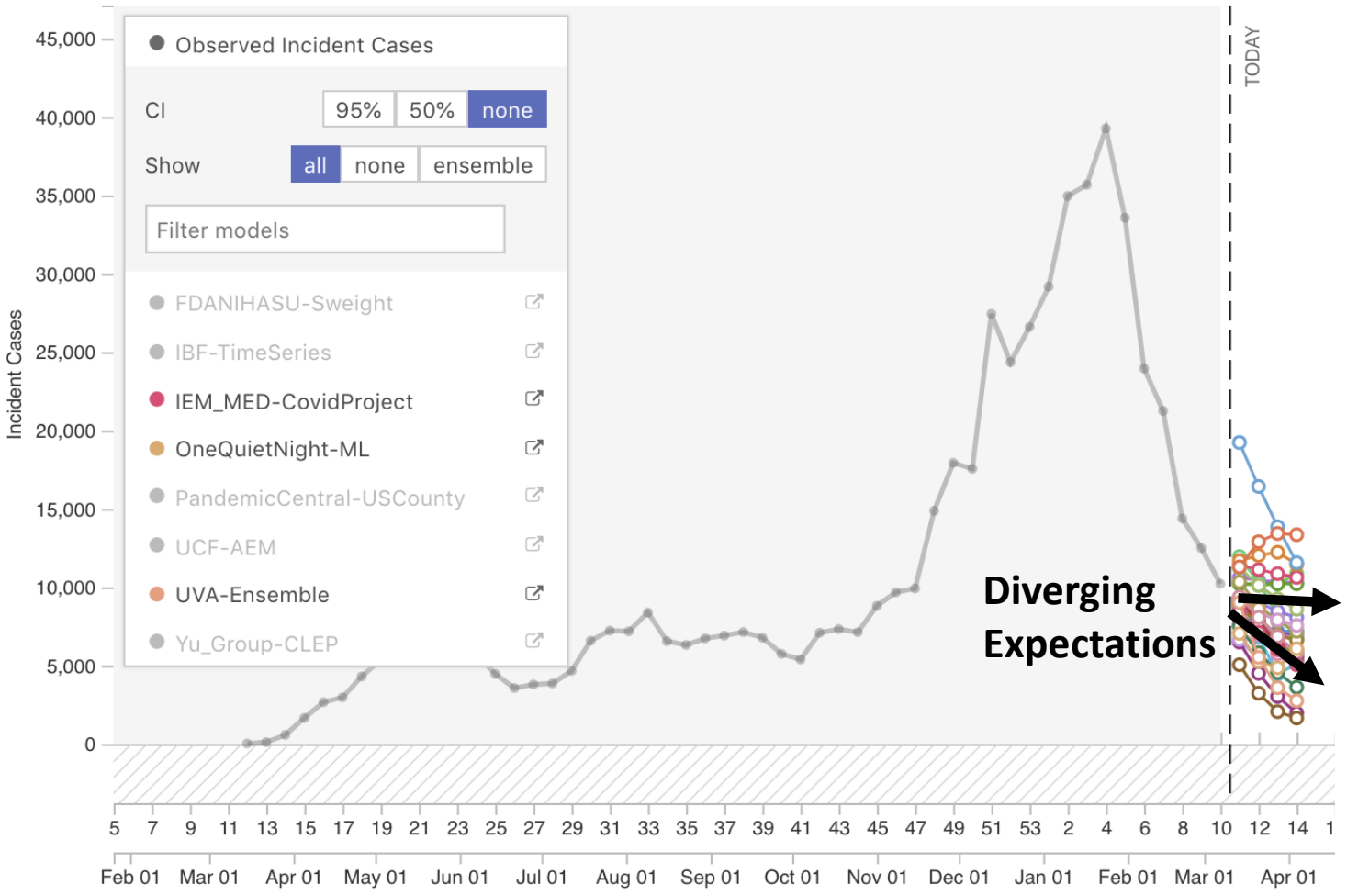
For other questions, surveillance is likely to be more useful:

- 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 split between a leveling off or a continued decline



The models are nearly evenly split between those expecting a leveling off in the next few weeks versus those predicting a continued decline

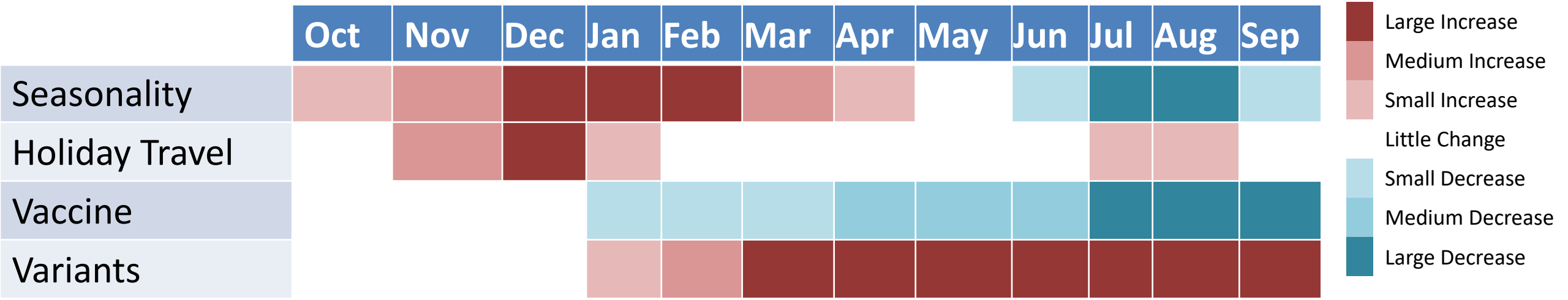
- These differences seem to be arising from different structural forms (SEIR-types predict declines, while others do not)
- It is not clear how the trade off between the variants and vaccines is made in each model

Many of the model predictions lag the data

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

Source: COVID-19 Forecast Hub, https://viz.covid19forecasthub.org/ Accessed March 10th

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