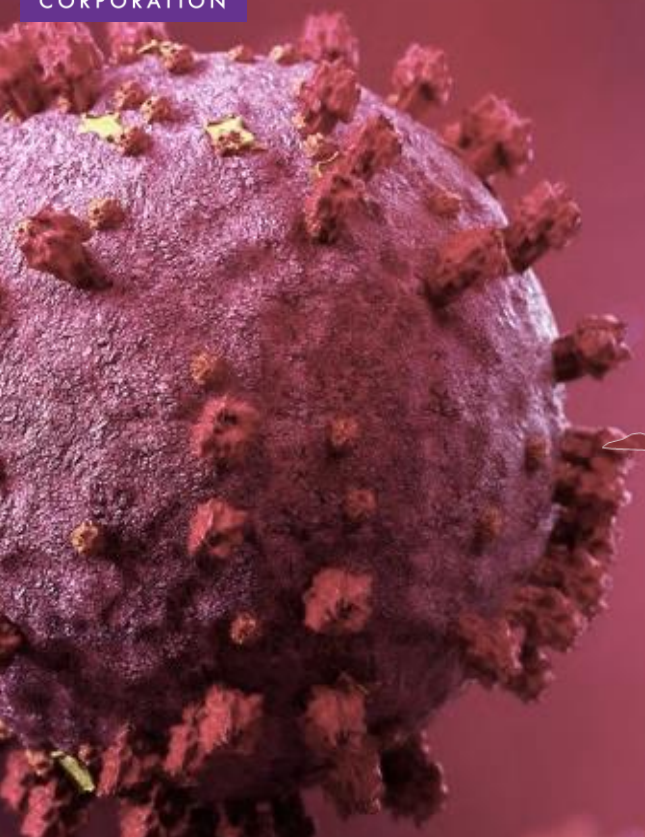


VIRGINIA

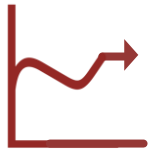
COVID-19 Update December 23rd, 2020

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 remain very high

- Hospitalizations continue to rise rapidly
- Testing has risen but not fully kept up

Key triggers will continue to drive high case levels for the coming months

- Seasonal changes
- Holiday interactions
- COVID-fatigue

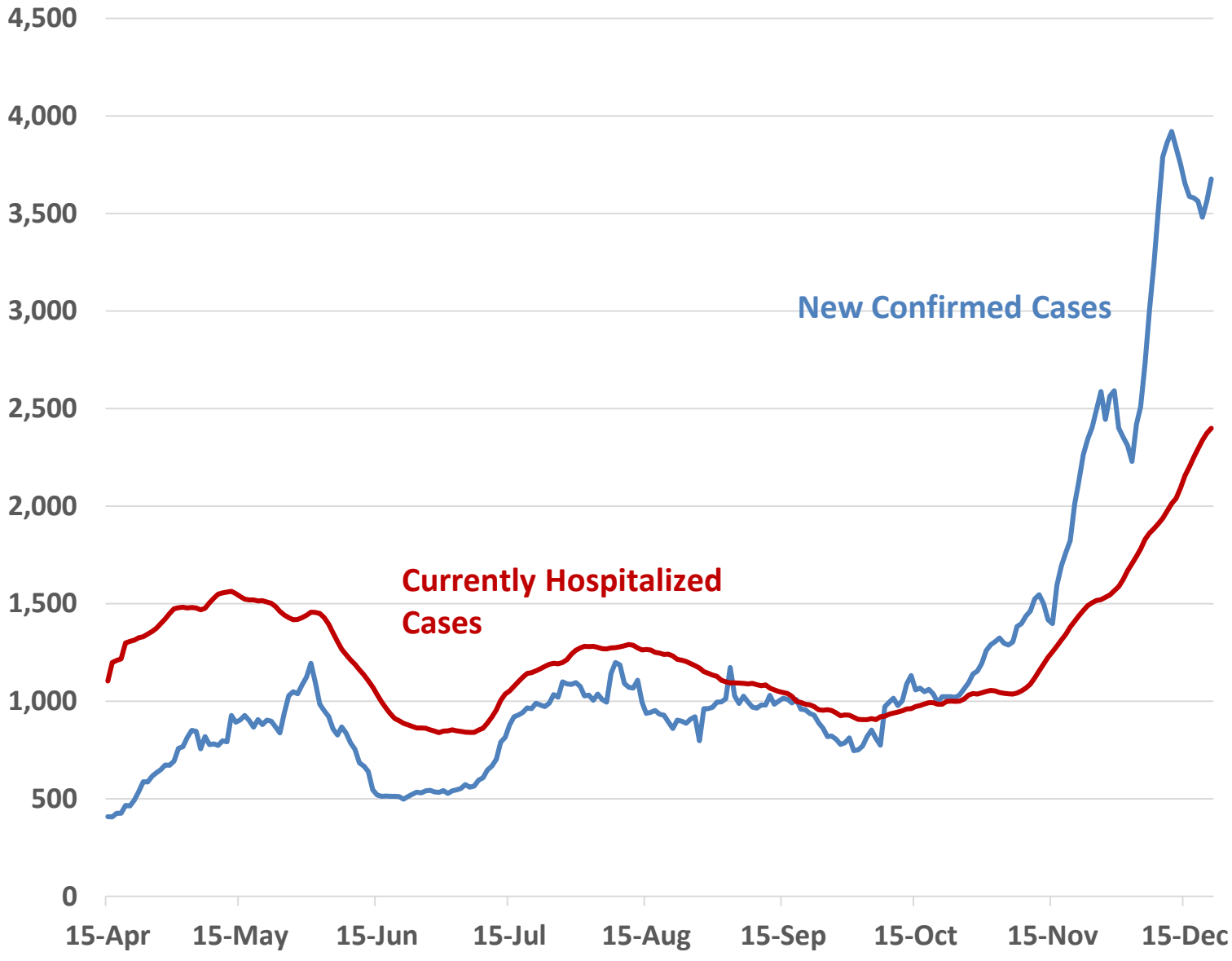
Cheaper, faster testing or a vaccine could reduce the spread upon widespread deployment

Model forecasts may be less accurate because behavior is driving growth

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

Disruptions in testing from the holidays are likely to make it difficult to accurately track case rates until early January

Cases remain high and hospitalization is growing rapidly



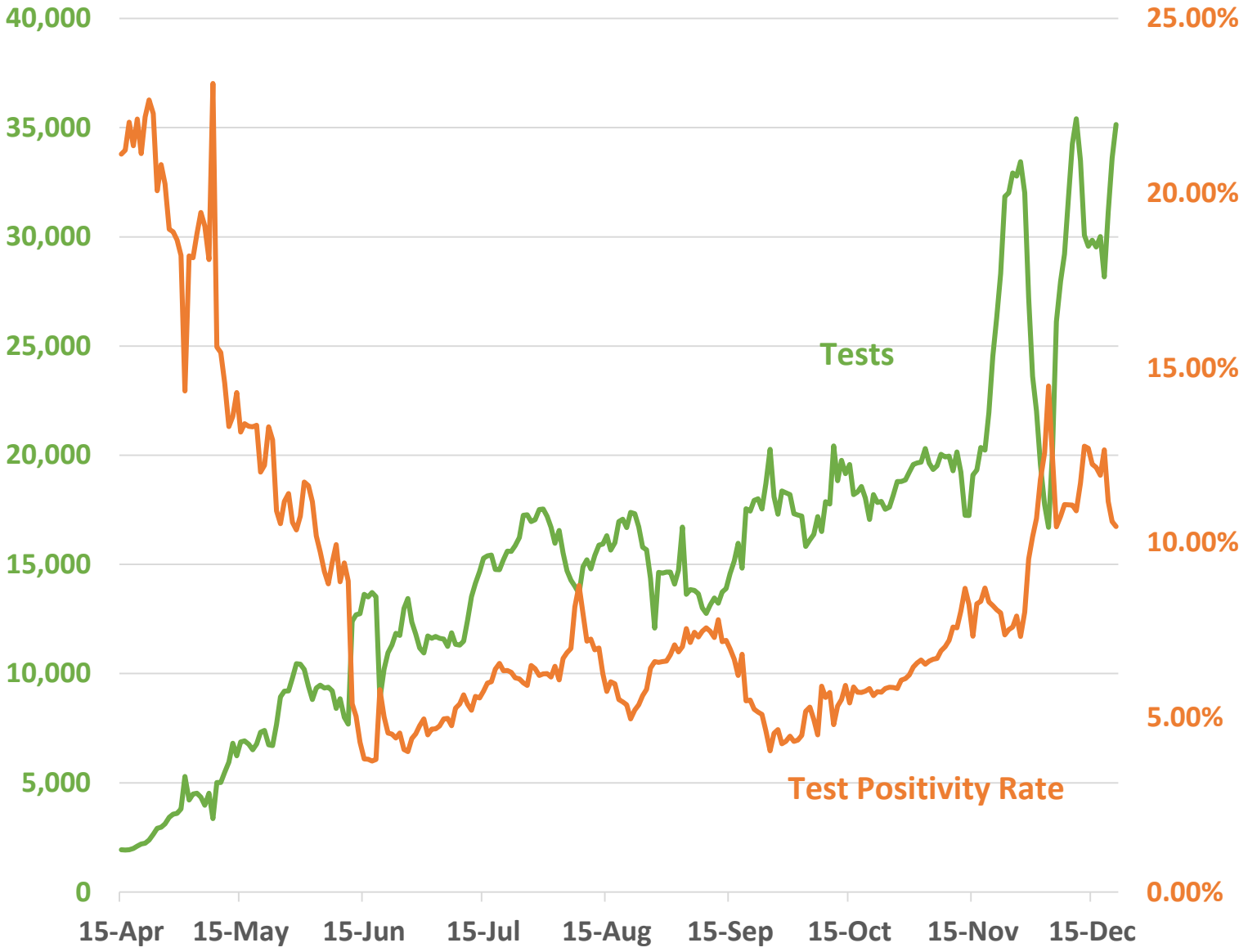
New confirmed cases are above 3,500/day on average

- The secondary spread may not have been as bad as the spread over Thanksgiving weekend
- There may be a dip in the confirmed cases for a couple of weeks due to a lack of testing over the holidays

Currently hospitalized cases have risen above 2,400

- If the confirmed case trend is accurate, hospitalizations are likely to have a small increase (around 10%) in the next week or two
- January trends will depend on holiday activities now

Testing remains high



Tests per day have remained over 30,000

- If there is a dip at the end of December, the case data will be less reliable until the first week of January

The test positivity rate is around 10.5 percent

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

Case levels remain high statewide

CASE COUNT

Source: VDH

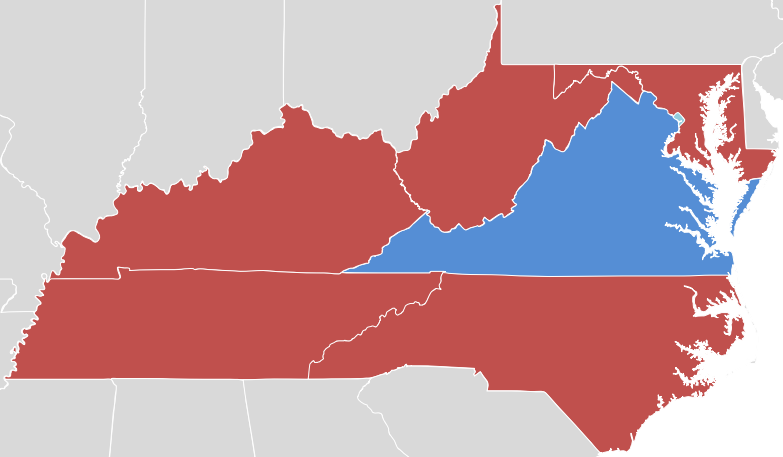
Yellow indicates at least 60 cases per 100,000

Case levels across the Commonwealth were generally stable

These data were updated December 22nd and represent a seven-day average of the previous week

The spread has stabilized in most neighboring states

Over the last 7 days, Virginia had 43.1 (-1% from last week) new confirmed cases per day per 100,000



Very high case loads (>20):

- Tennessee (136.6 new cases per 100k, +18% from last week)*
- West Virginia (71.3, +8%)*
- Kentucky (62.1, -13%) *
- North Carolina (57.6, +1%)*
- Maryland (38.1, -5%)
- District of Columbia (34.5, -1%)

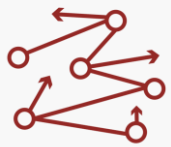
*Test positivity rates above 10%

High case loads (10-20): None

Lower case loads (<10): None

These data were updated December 22nd and represent a seven-day average of the previous week

We've been monitoring recent, relevant literature



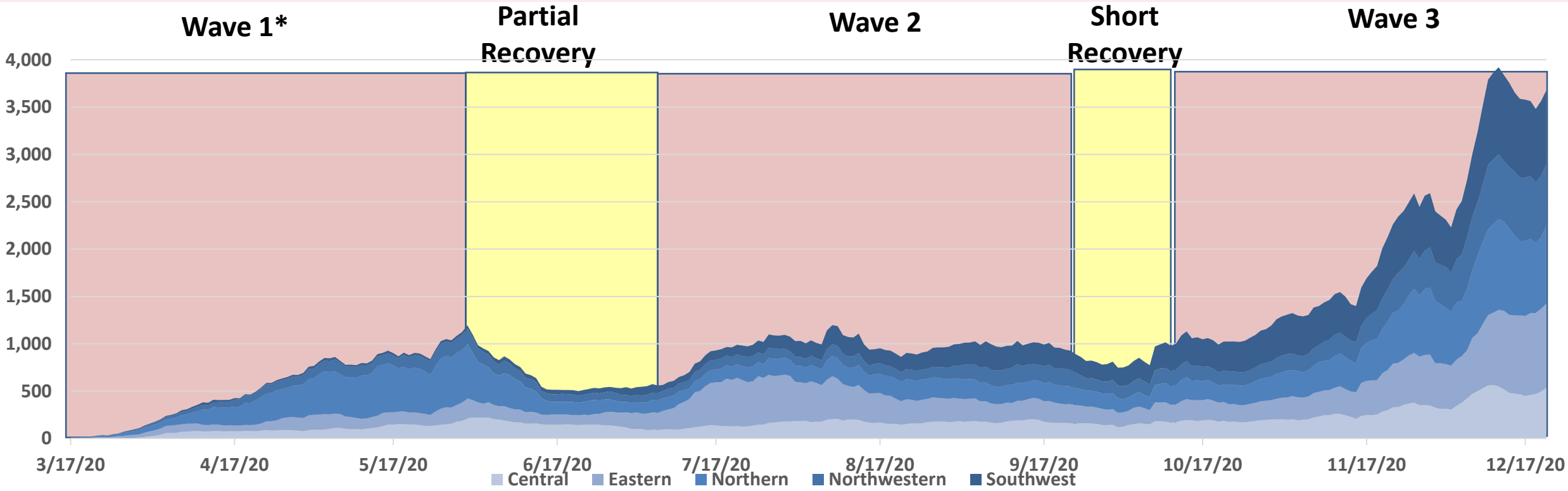
Dan et al. looked to assess the duration of the immunological response to COVID-19

- They examined antibodies and other biological factors in 185 COVID-19 cases including 41 cases that were more than 6 months after the date of infection
- Based on their sample, they estimate the immunological protection will typically last more than 6 months
- Relatedly, Saad-Roy et al. modeled the implications of different vaccination rates and antibody decay rates on the population immunity rate and the likelihood of recurrence over the next five years
- A high vaccination take-up rate will be important to preventing recurrences in the future

CDC personnel released several relevant studies in the last week

- Rice et al. estimated the cost to implement the CDC recommended mitigation strategies for Pre-K through 12 public schools and, for Virginia, the range was $363-440 per student
- Romero et al. looked at testing patterns at health centers by race/ethnicity and found that, for Virginia, the test positivity rate among Hispanics (20%) was more than double that of whites (8%) and Blacks (9%), indicating possible inequity in access to testing
- Rubenstein et al. studied the spread among poultry workers in Maryland and noted the importance of culturally and linguistically specific messaging about COVID-19
- Swedo et al. found a significant decline in the number of child abuse/neglect cases reported and also an increase in the average severity of related ER visits, which indicates the need for alternative reporting approaches while schools and similar organizations are closed for in-person activities

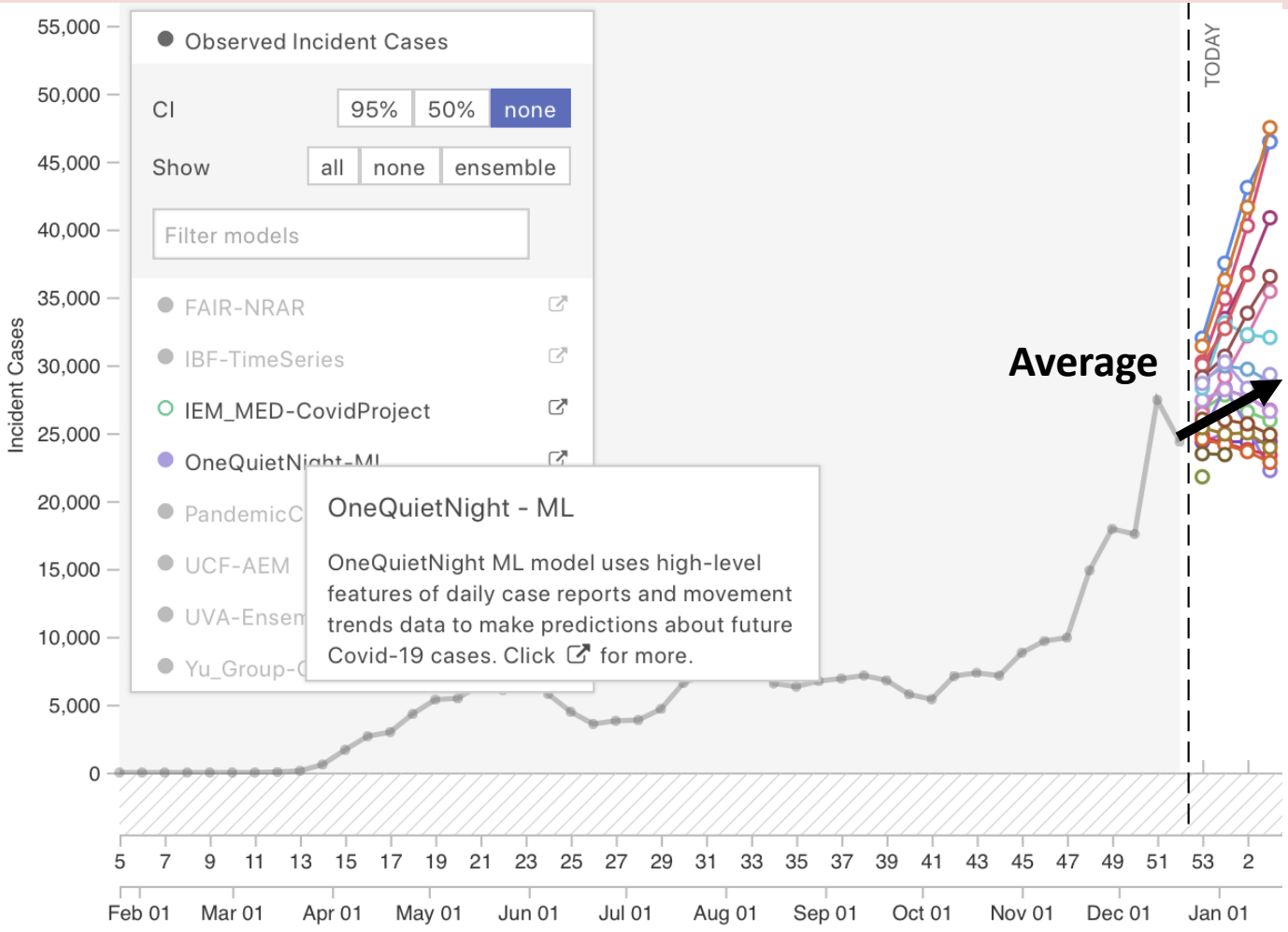
Each wave of cases has been centered in different parts of the Commonwealth



- The initial wave was concentrated in the Northern region*
- There was a partial recovery when cases in the Northern region dropped
- In mid-July, cases grew first in the Eastern region and then, beginning in August, statewide
- Statewide levels declined slightly, with a dip in the Eastern region in late September
- A new wave began in the Southwest region early in October, and previous highs have been surpassed in each region

*Testing was insufficient for accurate counts during the first wave

Forecasts for cases vary, but average to a small increase



Note: SEIR-type models have been cut from this figure due to poor fit
Source: COVID-19 Forecast Hub, https://viz.covid19forecasthub.org/
Accessed December 22nd

There is substantial variation in the case forecasts

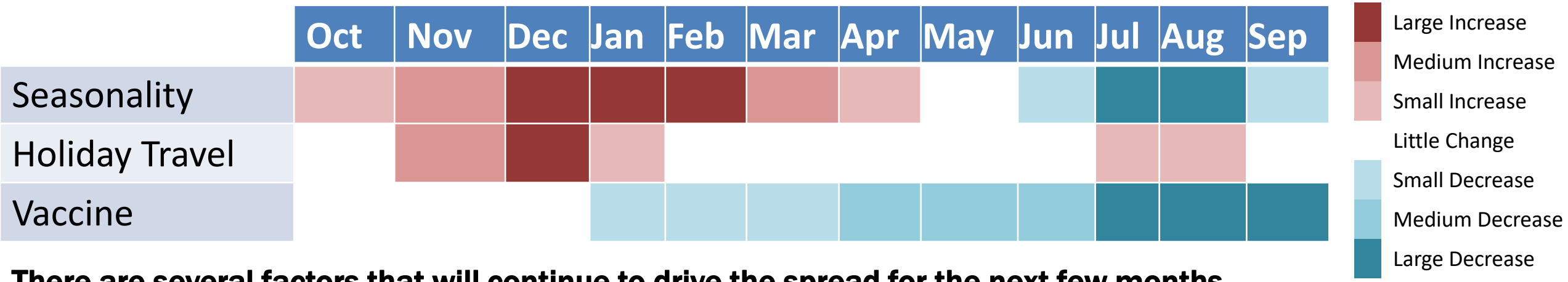
- The model "average" is for a small increase for the coming weeks

The mechanisms driving the spread at this stage are very different than in the early stage

- Initially, people did not change their behavior, so COVID spread exponentially
- Increased tele-work, changing weather, the return of in-person instruction, and other factors changed the pattern of spread
- These new patterns require the models to evolve

These models don't typically account for events such as Thanksgiving, Christmas, or New Years and the related changes to behavior patterns

There are several triggers that could lead to increased spread



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

- Seasonal effects for COVID-19 appear to be driving spread as it gets colder
- Holiday activities appear to have increased spread
- The vaccines are becoming available but not in quantities to meaningfully reduce the spread

There are likely to be long-term repercussions that need planning and preparation to mitigate

- 311,000 Virginians have had confirmed COVID cases, and it could be more than a million by the end of 2021
- 17,000 Virginians have been hospitalized due to COVID; analysis from Arnold (2020, Nature News) found that is frequently associated with delirium (55% of COVID ICU patients), which can increase risk of dementia in the long-term according to Arnold
- Mental health problems may persist, particularly among medical professionals and those directly affected
- Following the 1918 pandemic, there were higher rates of disability, mental illness, and other conditions

The risk of spread during holiday gatherings will vary by region and group size

Estimated likelihood at least one person has COVID by group size and region

Size	Central	Eastern	Northern	Northwestern	Southwest
5	10.8%	11.7%	12.4%	15.0%	18.4%
***10**	20.5%	22.1%	23.2%	27.8%	33.5%
15	29.1%	31.2%	32.7%	38.6%	45.7%
20	36.8%	39.2%	41.1%	47.8%	55.7%
****25**	43.6%	46.4%	48.4%	55.6%	63.9%
30	49.7%	52.6%	54.8%	62.3%	70.5%

We used the regional COVID prevalence to estimate the risk that at least one person would show up to a holiday gathering infected with COVID depending on the number of attendees

- Cross-border travel could raise the risk

In the Southwest, more than half of events with 20 people would be expected to have at least one attendee with COVID

- The odds are slightly lower for most of the rest of the Commonwealth

Note: Assumes risk is based on 14-day case rate where only 25% of cases are detected and group members are randomly sampled from the region

*Current limit on size for social gatherings

**Previous limit on size for social gatherings

Source: Author's calculations using data from COVID-19 Forecast Hub, https://viz.covid19forecasthub.org/ Accessed December 22nd

Thanksgiving appears to have substantially increased the spread of COVID nationally and in Virginia

The recent restrictions should slow the rate of spread to the extent that they are followed

- Mask mandates and limits on social gatherings have been shown to be effective in the literature
- Efforts to monitor and improve compliance may increase efficacy
- These limits should remain useful for the next month or more

The post-Thanksgiving spike was significant, but the secondary infection rate seems to have been slower

- The secondary infections from Thanksgiving weekend have been appearing in the data for the last week
- Hospitalizations from Thanksgiving have likely peaked, but the hospitalizations from the secondary spread will continue to rise for the rest of the month
- At current case levels, holiday gatherings can lead to many more cases

Holiday gatherings may increase spread similar to Thanksgiving weekend, but over two weeks

- Testing is likely to be interrupted until the first week in January, which means that we will not really be able to assess how bad the spread from the holidays will be until around January 7th or 8th
- Increased testing, particularly among the most vulnerable populations, could restrict the secondary spread

Options here reflect the author's views, and listing on this slide does not imply endorsement or recommendation by any agency or office of the Commonwealth of Virginia

Discussion and Questions