

WHITE PAPER

# COVID-19 Delta Variant:

Implications for colleges and universities  
and the return to campus



The SARS-CoV-2 mutation that now plagues the world is the B.1.617.2 variant, known as the Delta variant. The Delta variant has spread through many countries and is now the dominant variety of COVID-19 virus in the United States.

As of July 20, the Delta variant represented 83 percent of new infections and will likely be almost 100 percent in a week or two.\* This prevalence is likely to have implications for return-to-campus plans this fall.

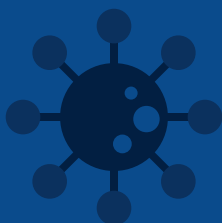
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## Epidemiology and clinical impact

The Delta variant is a model of viral mutation — different small changes in the molecular structure<sup>1</sup> that occur as a result of random variation and create selection pressure for more “successful” models. It is 60 percent more transmissible than the previously dominant Alpha variant, which in turn was at least 60 percent more transmissible than the original SARS-CoV-2 strain.

The “load” of virus, or the number of copies a person harbors early in infection, is likely at least 1,000 times greater than the amount harbored by those originally infected with SARS-CoV-2.<sup>2</sup> In very real terms, whereas the original SARS-CoV-2 strain carrier would infect 2.5 people, the Delta carrier likely infects up to 6 people.<sup>3</sup>

Not only more transmissible, Delta is also considered more virulent, in that it causes worse disease. A study in Scotland suggested that people infected with Delta were 85 percent more likely to be hospitalized than people infected with Alpha.<sup>4</sup> The mortality differences are not yet known, but public officials are very worried.



**The Delta variant is now the dominant variety of COVID-19 virus in the United States.**

# COVID-19 rates of transmission

## SARS-CoV-2<sup>3</sup>

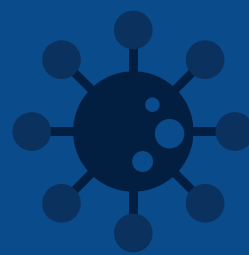


1 person → 2.5 people

## Delta variant



1 person → up to 6 people



## COVID-19 Delta variant

**83%**  
of new  
infections

**60%**  
more  
transmissible

**1,000x**  
viral load

## The role of vaccinations

The key solution to this phase of the pandemic is vaccination, preferably with messenger RNA (mRNA) vaccines.

Many of those who are vaccinated will be able to completely resist the virus and, if vaccinated people do become infected, they are unlikely to get sick or be hospitalized.<sup>5</sup> Moreover, vaccinated individuals will have much lower viral loads and represent less risk to others.

### **Those who remain unvaccinated face substantial risk of severe illness and will contribute significantly to ongoing spread of the virus.**

There is also evidence that Delta may be more likely to evade some vaccine protection. While original reports<sup>6</sup> suggested that protection from the Johnson & Johnson (J&J) vaccine was similar for Alpha and Delta, results emerged on July 20 that seem to suggest the J&J vaccine is less protective against Delta.<sup>7</sup> The mRNA vaccines from Pfizer and Moderna appear to guard against hospitalization and severe infection, but more viral-positive, previously vaccinated people with mild disease are being reported — and they likely can infect others.

**COVID-19 cases across the United States have significantly increased since early June and continue to trend upward, especially in areas with lower vaccination rates.**



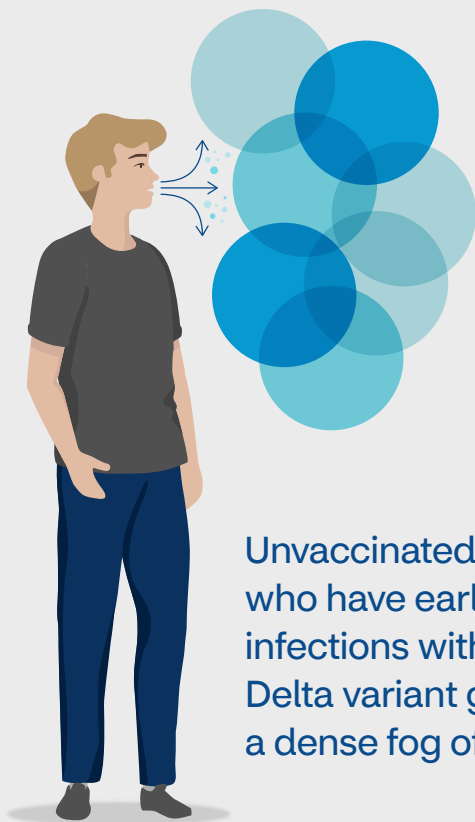
## Viral density of the Delta variant

Perhaps the easiest way to look at this is to think about *viral density*.

Vaccination in any metropolitan area decreases viral density. Towns and cities with high vaccination rates have much lower rates of virus present. But metropolitan areas that have low rates of vaccination have much higher rates of virus present, and even vaccinated people are at risk for infection.

Unvaccinated people are at risk for serious illness and death. Further, unvaccinated people who have early infections with the Delta variant give off a dense fog of virus, compared to the wisps of virus observed in March of 2020 with the original SARS-CoV-2 strain.

**As a result, in a city with a low vaccination rate, a carrier of the Delta variant who goes indoors to a classroom or a restaurant puts everyone there at risk.**



Unvaccinated people who have early infections with the Delta variant give off a dense fog of virus.



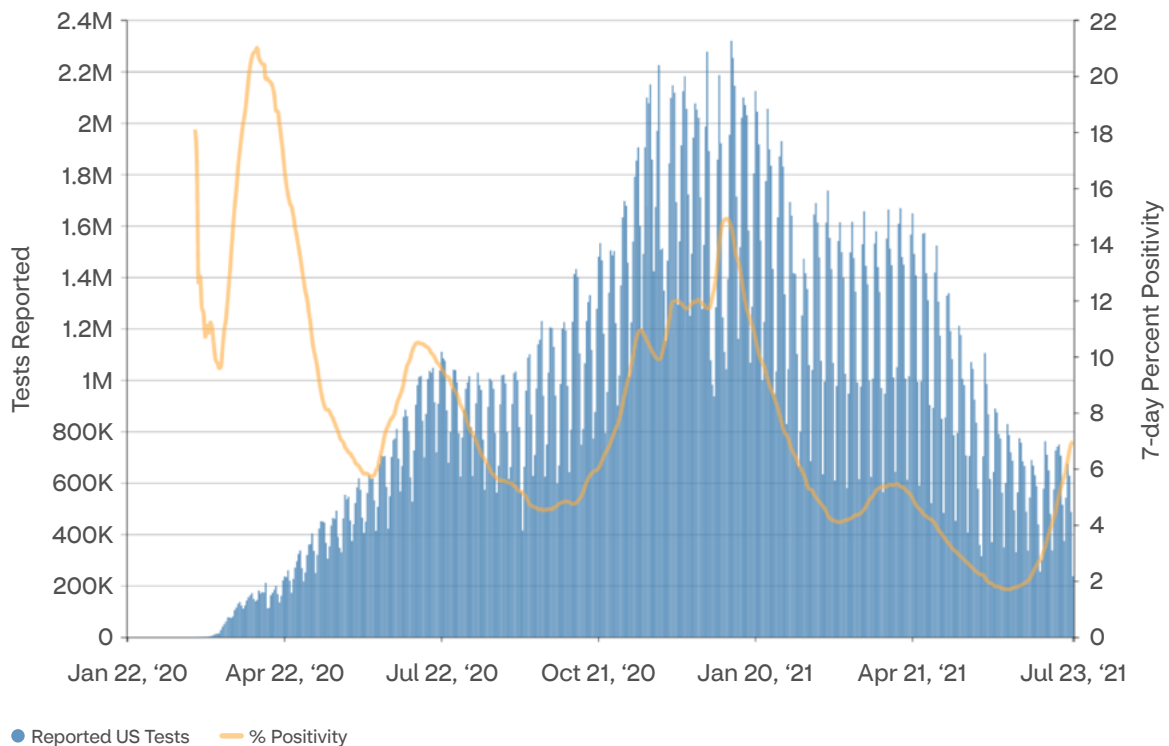
By contrast, people infected with the original SARS-CoV-2 strain gave off wisps of virus.

## Testing trends

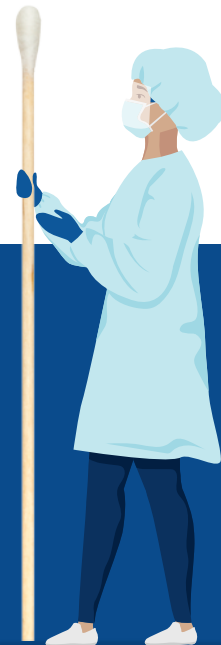
Our recent epidemiological analyses demonstrate this case. **Figure 1** illustrates that rates of positive tests are rising dramatically. Despite the hopes shared by many in early summer that the pandemic would fade away, it is back — and unfortunately there is a chance that an even more infectious mutant could replace the Delta variant.

Figure 1

### Total US incremental testing and case trends



Testing positivity  
has explosively  
increased to almost **7%**





## COVID-19 is back, especially in areas with low vaccination rates

**Figure 2** compares rates of known infection in various states for June 6 with rates today. In Missouri and Arkansas, for example, rates of infection have risen eight-fold, with overall low rates of protected individuals. With this rise in infections is a concomitant increase in hospitalization rates, as shown in **Figure 3**.

Based on what we know, the worst-case scenario is not being played out today, but could be a few weeks from now if the Delta variant spreads unobstructed in an unvaccinated population.

Ultimately, this kind of biological phenomenon can eventually help overwhelm vaccine opposition.

As **Figure 4** shows, rates of new vaccinations in Arkansas this week are more than double those in Massachusetts. In addition, those who survive infection will have some immunity which, like vaccination, protects the rest of the population.

**The overall pace of vaccinations is still slow despite cases significantly surging nationwide.**

## COVID-19 Hospitalization Trends

Current State vs. June 6, 2021

State	Avg. Daily COVID-19 Beds Used Last 7 Days per 1 M Pop.	% Change vs. 7 Days Ending 7/24	Vaccination Rate
Nevada	323	+327%	53%
Florida	273	+163%	57%
Missouri	272	+150%	48%
Arkansas	267	+259%	45%
Louisiana	183	+188%	41%
Mississippi	154	+147%	39%
Alabama	143	+94%	42%
Texas	141	+97%	51%
Oklahoma	139	+138%	47%
Kansas	127	+190%	53%
Georgia	118	+51%	45%
Arizona	117	+60%	52%
Wyoming	116	+51%	41%
Alaska	104	+255%	51%
Kentucky	95	+33%	51%

States with the 15 highest hospitalization rates all have vaccination rates **below 57%\*\***

## Implications for colleges and universities

For campuses across the country, the Delta variant will force us to redraw the map of how to return to the classroom. In the optimistic days of early June, going back to campus and life as normal in the fall seemed guaranteed; we now see that it is not.

### Vaccination requirements

For those who want to return to “normal” in-person classes, a reasonable option for administrators to consider from a clinical perspective is to allow only vaccinated individuals to enter the classroom.

Those who have not been vaccinated may increasingly be asked to attend remotely, or, perhaps in highly vaccinated areas, be allowed to return to campus only with full-time N-95 mask coverage. As the Delta variant progresses, administrators may wish to consider recommending N-95 masks even for vaccinated individuals. Otherwise, there is the risk that the unvaccinated could infect even some of those who are vaccinated, who in turn can infect others, especially children who are not yet qualified for vaccination.

### Periodic testing

More frequent testing will also be necessary. Low-cost, very accurate tests are available today that can detect the Delta variant and ongoing viral mutations. In some cases, administrators may decide that everyone coming on campus should be tested periodically.

### Mask mandates

As we approach inclement weather that drives people inside, we will likely see another upswing in infections. Masks indoors for all could very well be the default approach by year-end, as we try to get to a more completely immune population, which would eventually decrease the overall viral density and the opportunity for the virus to mutate toward more infectious variants.



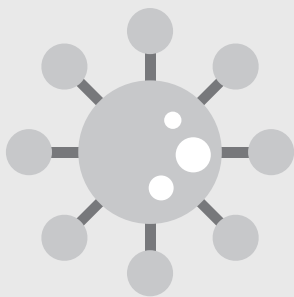
**It is not a pretty picture, but prudent administrators should start to consider their next steps with these considerations in mind.**



## Looking ahead

The Delta variant will spread widely in the coming weeks and months. Ideas that were once thought to be off the table, such as vaccine mandates for students and faculty, may increasingly appear reasonable and necessary. Wider use of masks likely will return, as will testing.

At the beginning of this pandemic, wise epidemiologists were unanimous that this would be a three- to four-year struggle, and they are appearing especially prescient. Hopefully, this reality will wear down vaccination hesitance and antipathy to public health, which would help us overcome this pattern of recurring upswings in viral prevalence. Colleges and universities can help take the lead.



### **Troy A. Brennan, MD**

Executive Vice President and  
Chief Medical Officer, CVS Health

### **Sree Chaguturu, MD**

Senior Vice President, CVS Health and  
Chief Medical Officer, CVS Caremark

### **Kyu Rhee, MD, MPP**

Senior Vice President, CVS Health and  
Chief Medical Officer, CVS Aetna

Figure 2

## COVID-19 Case Trends

### Current State vs. June 6, 2021

State	Avg. Daily Cases per 1M Pop. (vs. 7 Days Ending 6/6)	Avg. Daily Cases per 1M Pop., 7 Days Ending 6/6
Arkansas	605 (+1080%)	51
Louisiana	519 (+636%)	71
Florida	487 (+507%)	80
Missouri	394 (+649%)	53
Mississippi	306 (+715%)	38
Alabama	305 (+380%)	64
Nevada	276 (+262%)	76
Alaska	269 (+428%)	51
Oklahoma	237 (+748%)	28
Kansas	187 (+423%)	36
Wyoming	180 (+50%)	119
Texas	178 (+272%)	48
Arizona	175 (+166%)	66
Utah	169 (+135%)	72
California	164 (+616%)	23
Georgia	158 (+364%)	34
Kentucky	151 (+122%)	68
Tennessee	149 (+394%)	30
Hawaii	142 (+280%)	37
South Carolina	140 (+385%)	29
North Carolina	123 (+158%)	48
Washington	116 (+47%)	79
Idaho	115 (+84%)	63
Puerto Rico	100 (+357%)	22
Oregon	97 (+44%)	67
Indiana	91 (+50%)	61
Illinois	90 (+123%)	40
New Mexico	88 (+99%)	44
Montana	79 (+31%)	60
New Jersey	77 (+170%)	28

#### Notes:

1. Historical values may have slightly changed since first reported due to retroactive reporting changes by states.
2. Top 30 states by cases / population are shown in the chart.
3. Data as of July 25, 2021.

Figure 3

## COVID-19 Hospitalization Trends

### Current State vs. June 6, 2021

State	Avg. Daily COVID-19 Beds Used Last 7 Days per 1M Pop. (vs. 7 Days Ending 6/6)	Avg. Daily COVID-19 Beds Used Last per 1M Pop., 7 Days Ending 6/6
Nevada	323 (+327%)	76
Florida	273 (+163%)	104
Missouri	272 (+150%)	109
Arkansas	267 (+259%)	74
Louisiana	183 (+188%)	63
Mississippi	154 (+147%)	62
Alabama	143 (+94%)	74
Texas	141 (+97%)	72
Oklahoma	139 (+138%)	59
Kansas	127 (+190%)	44
Georgia	118 (+51%)	78
Arizona	117 (+60%)	73
Wyoming	116 (+51%)	77
Alaska	104 (+255%)	29
Kentucky	95 (+33%)	71
Utah	94 (+119%)	43
Tennessee	87 (+22%)	72
Indiana	81 (-16%)	96
District of Columbia	76 (-54%)	164
Idaho	72 (+12%)	64
Washington	71 (-20%)	88
Colorado	70 (-19%)	86
California	69 (+105%)	34
North Carolina	69 (+21%)	57
Rhode Island	67 (-21%)	85
Montana	67 (+12%)	60
Iowa	66 (-1%)	67
Ohio	65 (-29%)	91
South Carolina	65 (+61%)	40
West Virginia	59 (-46%)	110

#### Notes:

1. Hospitalization data is updated weekly; data as of July 24, 2021.
2. Top 30 states by COVID-19 hospitalizations / population are shown in the chart.

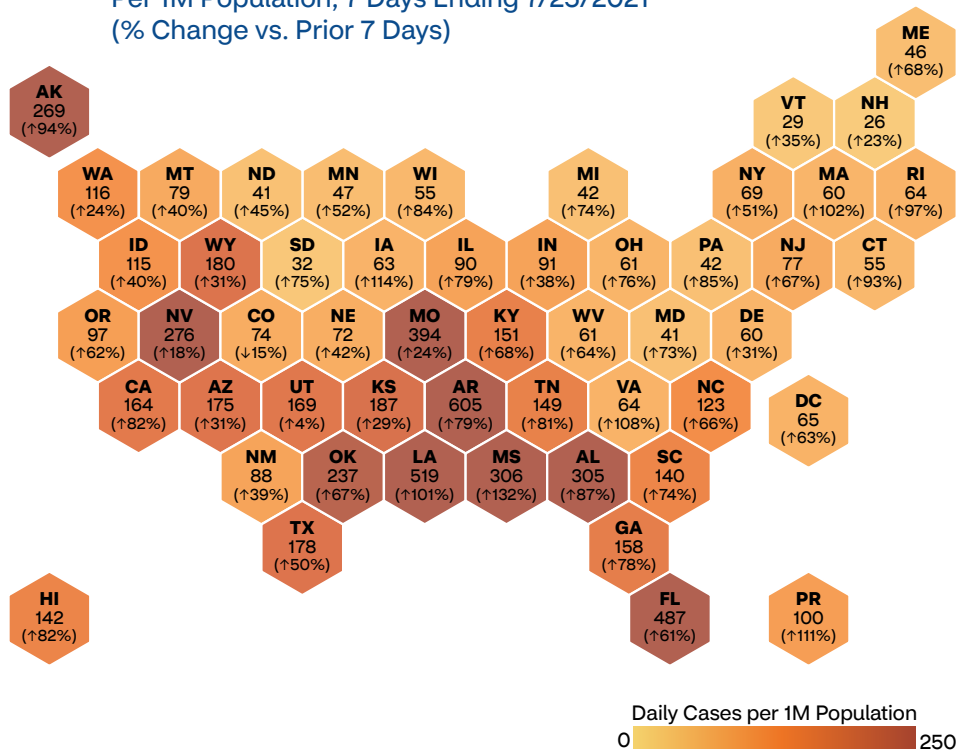
## APPENDIX

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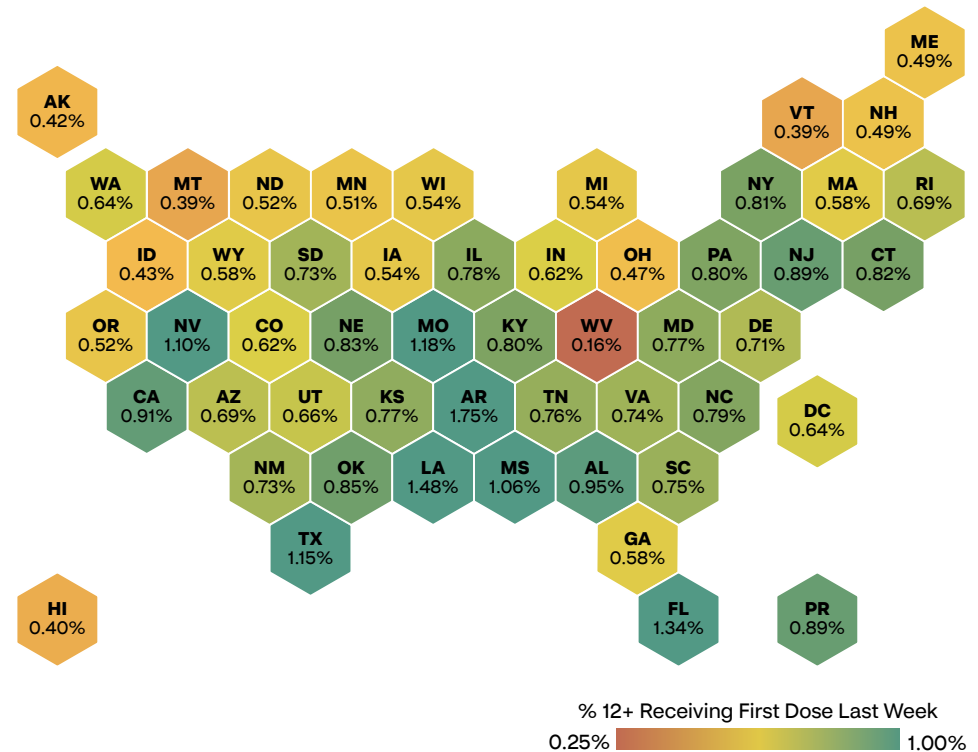
Figure 4

### Incremental Cases vs. State Vaccination Rates

**Average Daily New COVID-19 Cases by State**  
Per 1M Population, 7 Days Ending 7/25/2021  
(% Change vs. Prior 7 Days)



**Vaccination Active States Last Week**



Last Refresh Date:  
07/25/2021

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\*COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University

\*\*COVID-19 Reported Patient Impact and Hospital Capacity by State Timeseries dataset, U.S. Department of Health and Human Services

1. [https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-info.html?CDC\\_AA\\_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fcases-updates%2Fvariant-surveillance%2Fvariant-info.html](https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-info.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fcoronavirus%2F2019-ncov%2Fcases-updates%2Fvariant-surveillance%2Fvariant-info.html).
2. <https://www.medrxiv.org/content/10.1101/2021.07.07.21260122v1>.
3. <https://www.forbes.com/sites/williamhaseltine/2021/07/13/the-delta-dilemma-loosening-covid-19-controls-at-a-time-of-increased-danger/?sh=45471e222750>.
4. [https://www.thelancet.com/journals/lancet/article/PIIS0140-6736\(21\)01358-1/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)01358-1/fulltext).
5. <https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/fully-vaccinated-people.html>.
6. <https://www.gov.uk/government/news/vaccines-highly-effective-against-b-1-617-2-variant-after-2-doses>.
7. <https://www.nytimes.com/2021/07/20/health/coronavirus-johnson-vaccine-delta.html>.

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