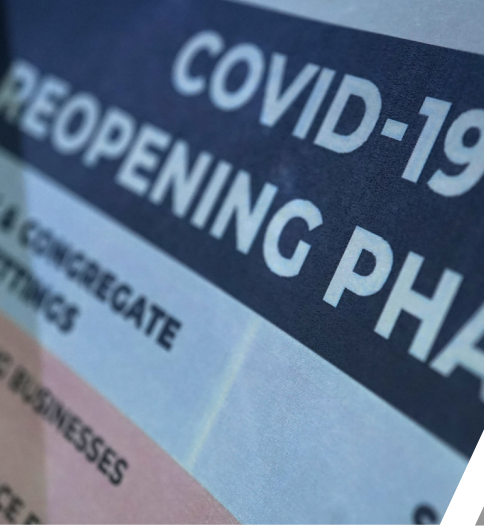

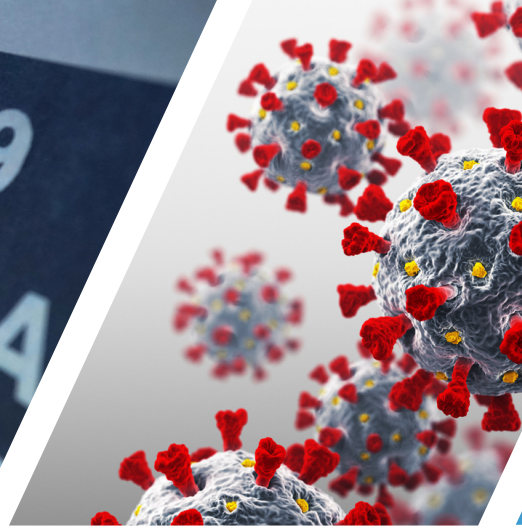

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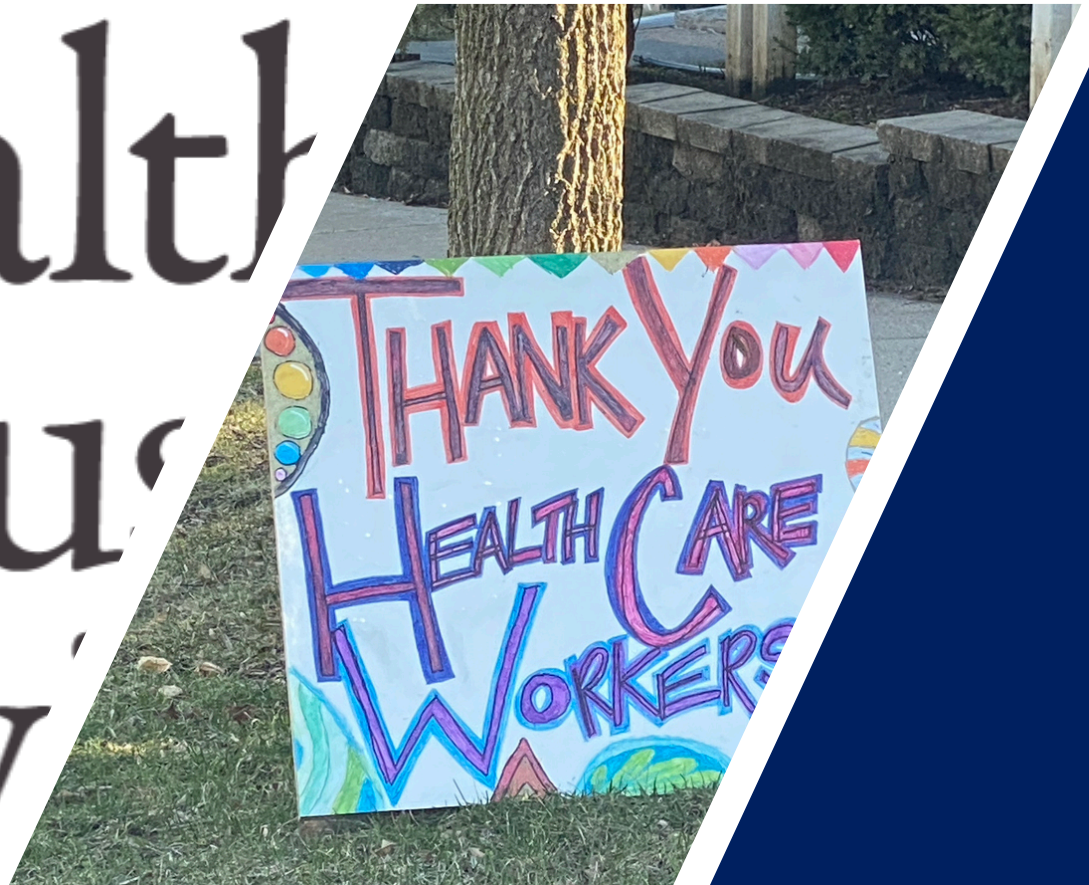


Issue # 227

Thursday, December 3, 2020

COVID-19 Report

Highlights

- Assessing new case trends in the U.S. requires close inspection, due to the delays in case reporting around the Thanksgiving holiday. Nonetheless, there are a few observations that are emerging:
  - **Newly-detected cases per capita have declined since the holiday. However, much of this can be attributed to reporting (and, testing) delays**
  - **This post-holiday pattern mirrors the experience around the Labor Day holiday - with a dip-and-rebound patten. We should anticipate new cases per capita to increase again in the next few days, if only due to the catch-up in reporting**
  - On a week-over-week basis, new cases declined just prior to Labor Day, then began increasing 8-9 days later. Currently, this rate has been declining since November 13 (longer than the pre-Labor Day decline); Will it follow a similar pattern as with the post-Labor Day period, and begin increasing again within 2-3 days? Or will it continue to decline, as it did post-the 4th of July?
- **Testing volumes since Thanksgiving have remained low by recent standards. Also, test-positive rates have increased in this time and the ratio of tests performed-to-new cases detected has declined. Do these suggest that only more highly-symptomatic people have sought testing this week?**
- **Estimates of the reproduction rate suggest that the virus is still spreading in most of the country, although at a slower rate than recently experienced in many states (Rt is declining, if not yet <1)**
  - **Only fourteen states have an Rt<1 (indicating that cases should be declining). These states include several large states (Florida, Illinois, New Jersey and Texas), as well as several states that were recently hardest-hit by the virus (Iowa, North Dakota, South Dakota and Wisconsin)**

- **With the upcoming vaccine rollout, we provide updated estimates of true infections from MIT data scientist, Youyang Gu. Gu now places his mean estimate at 16.2% of the U.S. population having been already infected with the virus, with a range of 10.8%-24.3%**
  - South Dakota has the highest mean estimate, 36.2%; Vermont the lowest 2.2%
- **There were 100,000 people hospitalized in the U.S. yesterday with Covid-19. These patients now occupy just less than 32% of all inpatient beds in the U.S.**
  - For the first time in several weeks, the rate at which new cases were in the hospital was stable yesterday, not increasing
  - The % of these patients that were on ventilators has also been stable for the past four days, after increasing the prior two weeks
  - **The % of these patients that were in the ICU has remained lower throughout November and December than it was at any other time during this pandemic**
- Deaths with the coronavirus are rising again, following a brief pause around the holiday (due to reporting delays?)
  - The case fatality rate - deaths per case, with an assumed two-week lag from reported detection-to-death, has been stable for a month-and-a-half

State-By-State Scorecard

Designed to reflect five critical measures of a state's current experience with Covid-19

At his point, we have elected not to provide an overall score – in our view, different audiences would assign different priorities to each of the five measures

For example, health systems might weigh the Covid-19 census as a % of available beds; A community might weigh the deaths per case highest

Worse ← → Better

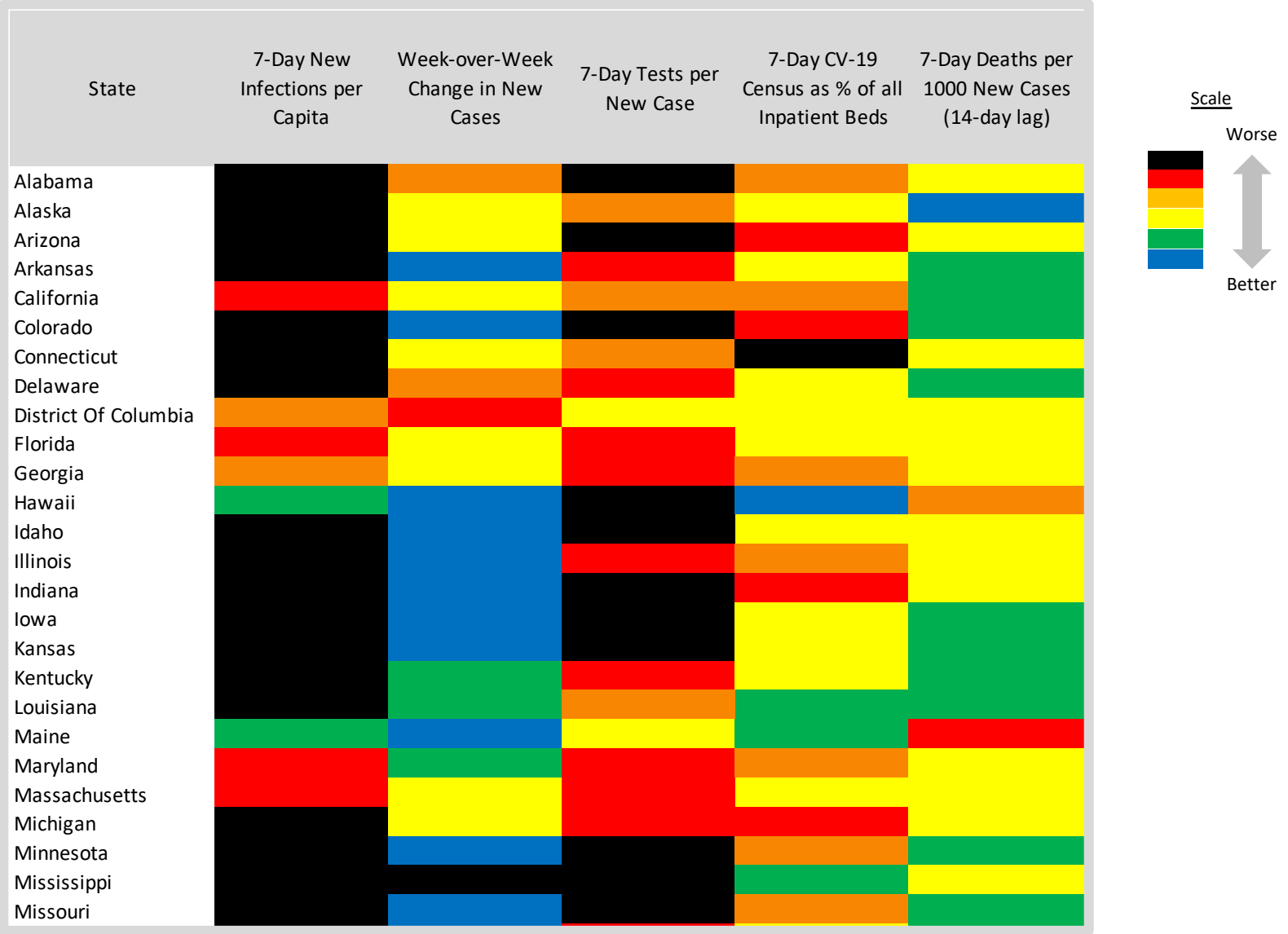
Metric		Black	Red	Orange	Yellow	Green	Blue
7-Day Average New Daily Reported Infections per Capita	Greater than	450	350	250	150	50	0
Week-over-Week Change in Newly Reported Cases	Greater than	30%	20%	10%	0%	-10%	N/A
7-Day Average Viral Tests per 7-Day Average Newly Reported Cases	Less than	5	10	25	50	75	N/A
Covid-19 Inpatient Census as % of All Inpatient Beds	Greater than	50%	40%	30%	20%	10%	0%
7-Day Deaths per 1000 New Cases (14-day lag)	Greater than	25	20	15	10	5	0

Note: this week, we tightened the criteria for the Covid-19 census and death per case measures. In our view, this represent two of our most significant short- to mid-term challenges. These tightened criteria are intended to better reflect the stress on the healthcare system ad the rising number of deaths in the U.S.

Health Industry Advisor, llc

Page 1 of 2

Several states are challenged with high and increasing infection rates, inadequate testing and high Covid-19 hospital occupancy: Alabama, Alaska, Arizona, California, Connecticut, Delaware, Florida, Georgia, Massachusetts and Michigan



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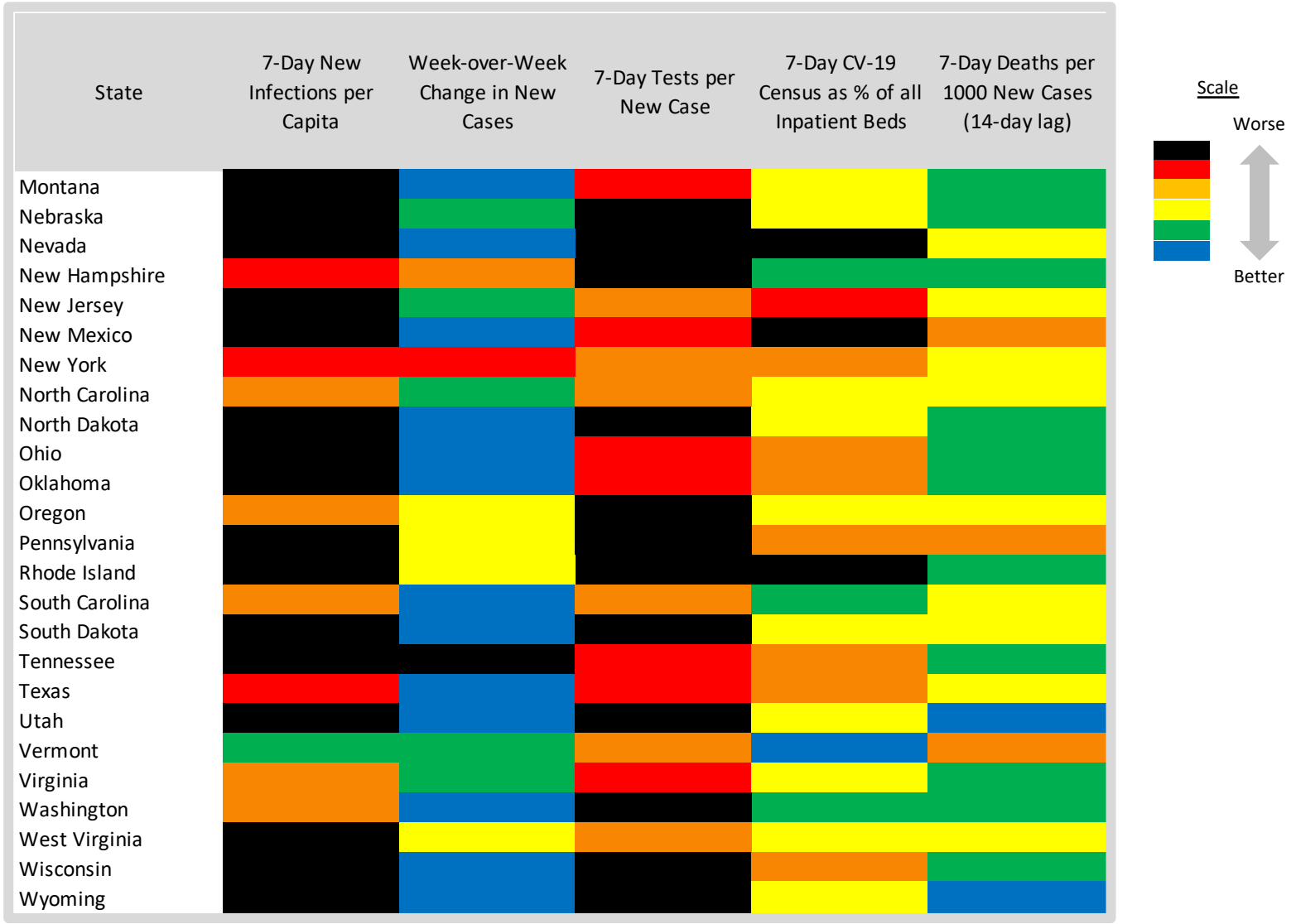
Several states are challenged with high and increasing infection rates, inadequate testing and high Covid-19 hospital occupancy: New York, Oregon, Pennsylvania, Rhode Island, Tennessee and West Virginia



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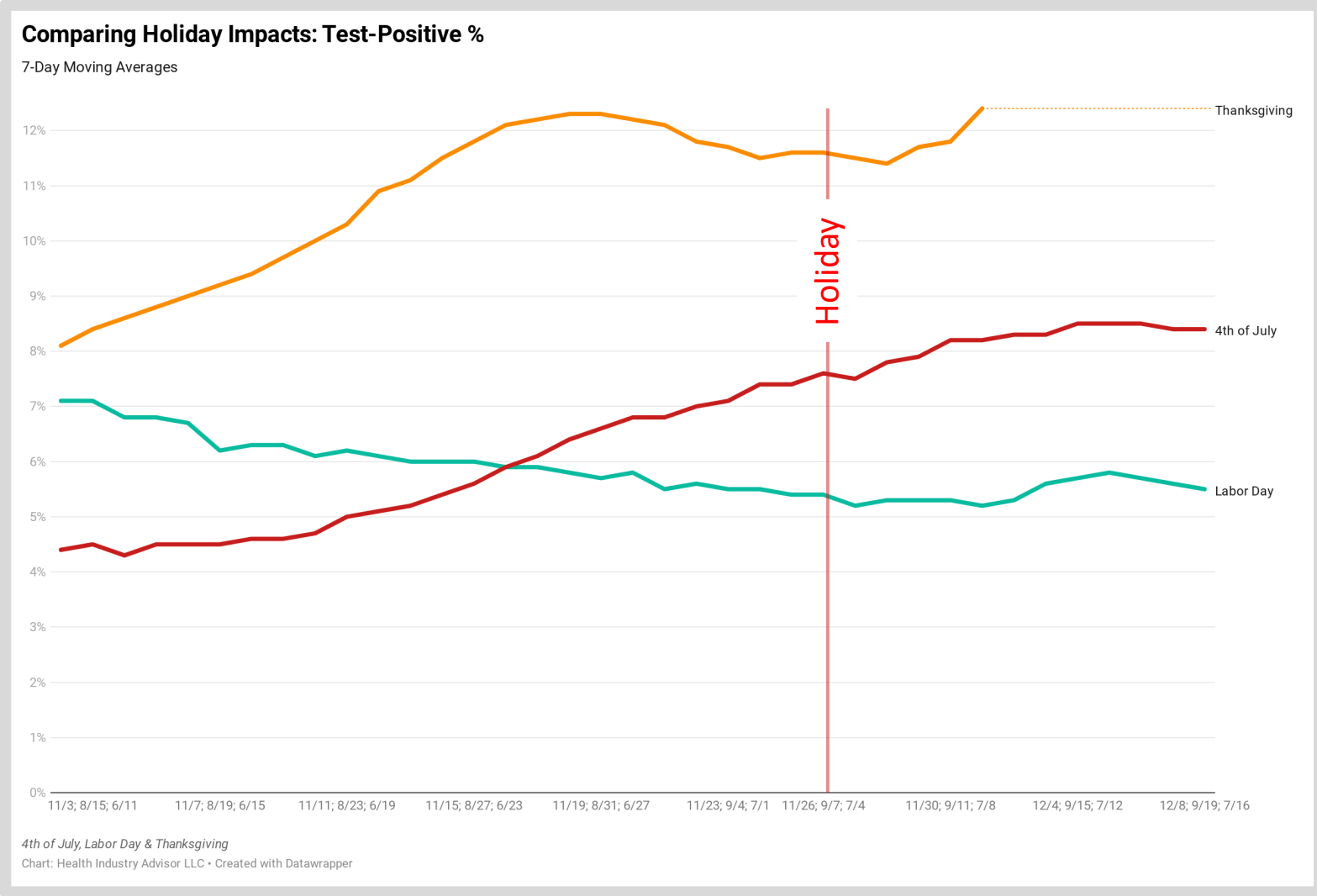
Comparing Holiday Impacts:

Heading into the Thanksgiving holiday, the U.S. was experiencing significantly higher test-positive rates than heading into the 4th of July and Labor Day holidays

This rate had been declining prior to Thanksgiving but, has increased since



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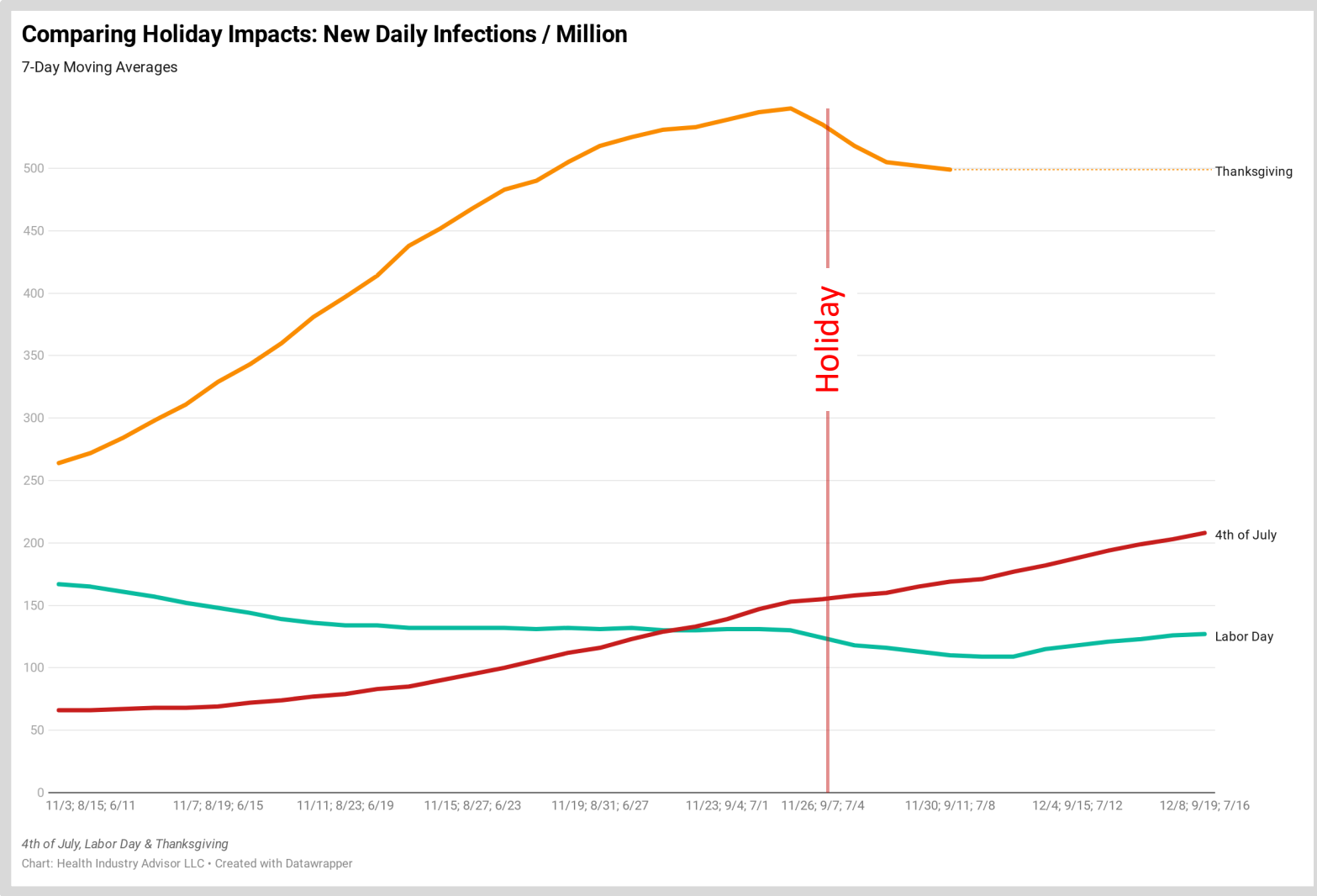
Comparing Holiday Impacts:

Entering the Thanksgiving holiday, the U.S. had been experiencing dramatically higher new infection rates than leading into the 4th of July and Labor Day holidays

This rate was increasing leading into the 4th of July and continued increasing following the holiday

This rate was declining leading into Labor Day; continued to decline for a short period afterward before beginning to increase



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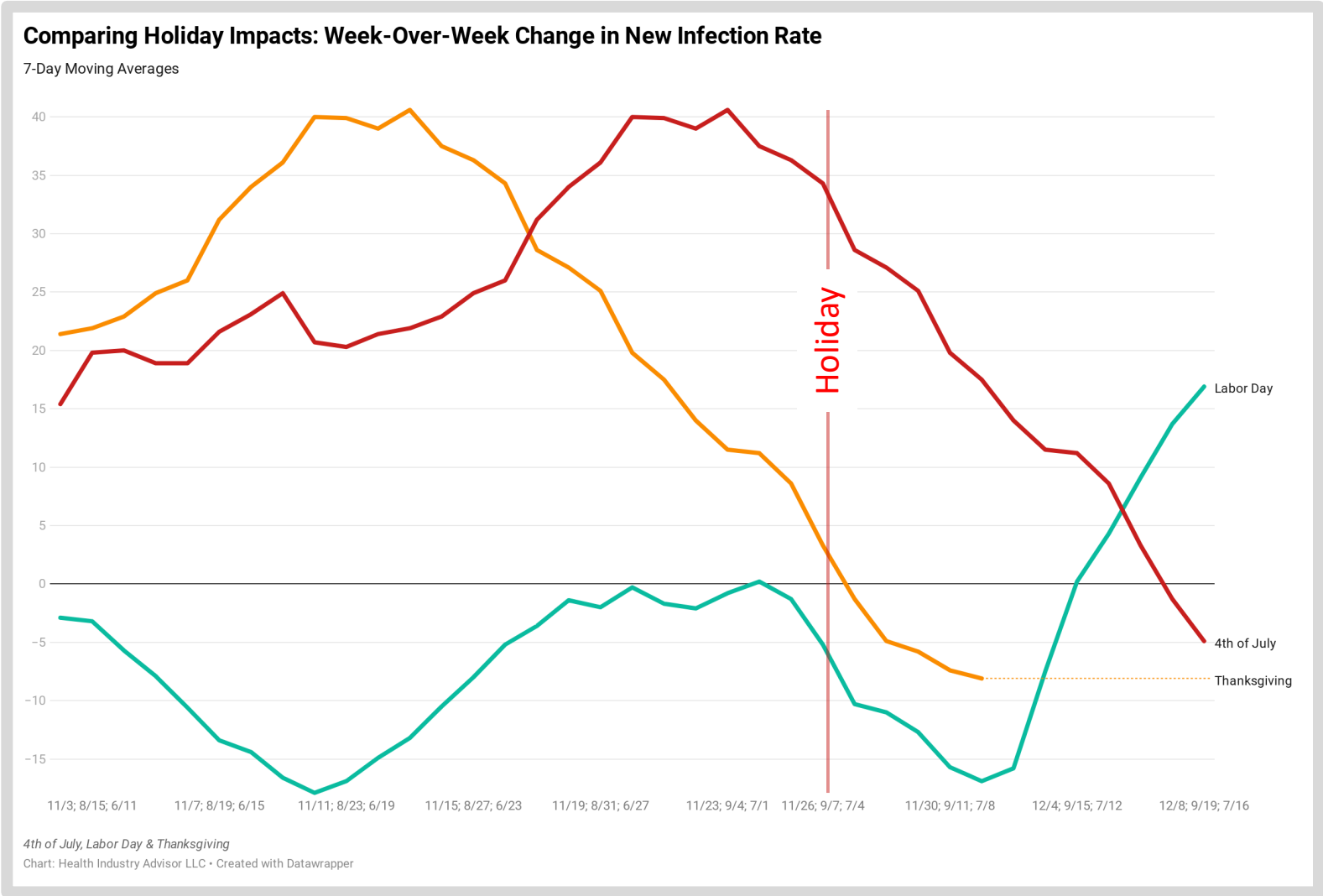
Comparing Holiday Impacts:

Prior to Labor Day new cases were beginning to increase on a week-over-week basis ; the Holiday paused this increase only temporarily

Prior to the 4th of July, new cases were beginning to decline on a week-over-week basis; the holiday did not alter this pattern

Prior to Thanksgiving, this metric was further along in the pattern shown prior to the 4th of July (Note that it was already near zero growth prior to Thanksgiving; it did not reach this point until two weeks after the 4th of July)



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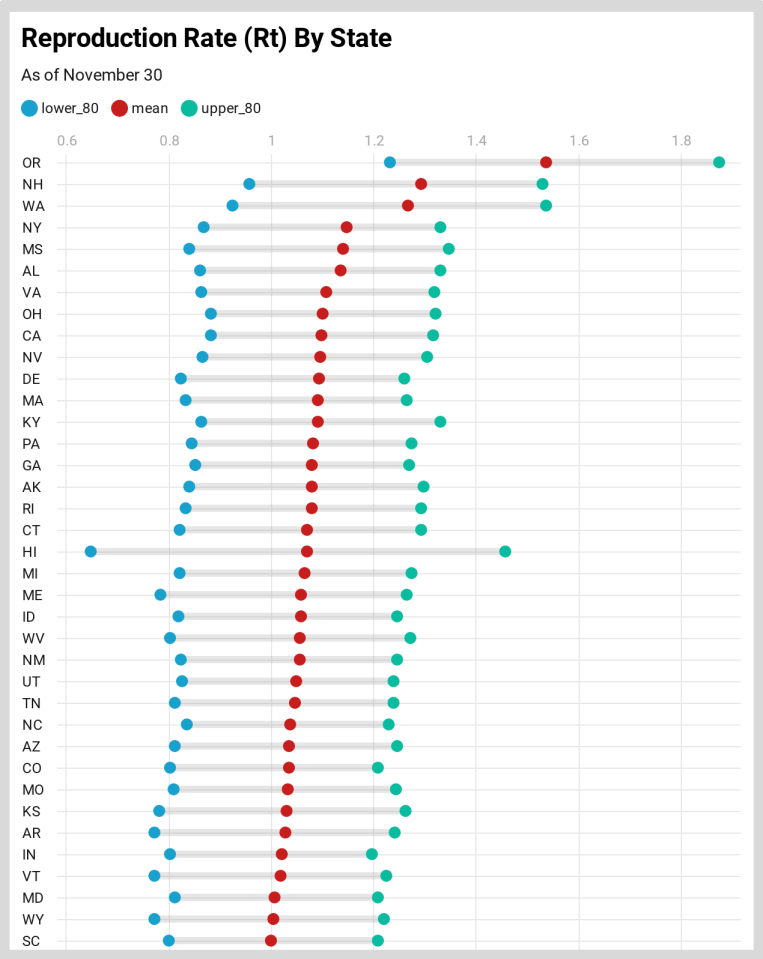
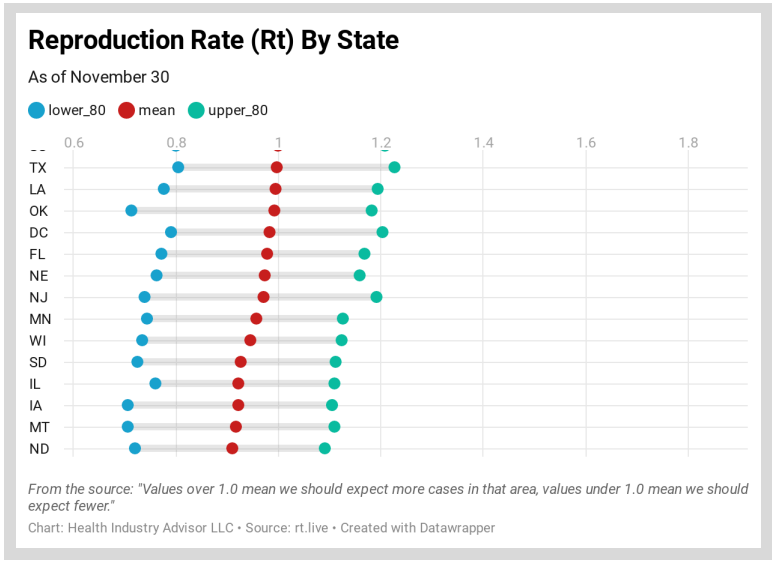
Reproduction Rate (R_t) – An indication of whether the virus spread is increasing (R_t>1), or decreasing (R_t<1)

As of Monday, the mean estimate R_t was >1 for most states; it is <1 for several states recently hardest-hit: Iowa, North Dakota, South Dakota and Wisconsin, as well as for large states Florida, Illinois, New Jersey and Texas

States with mean estimate R_t >1



States with mean estimate R_t < 1



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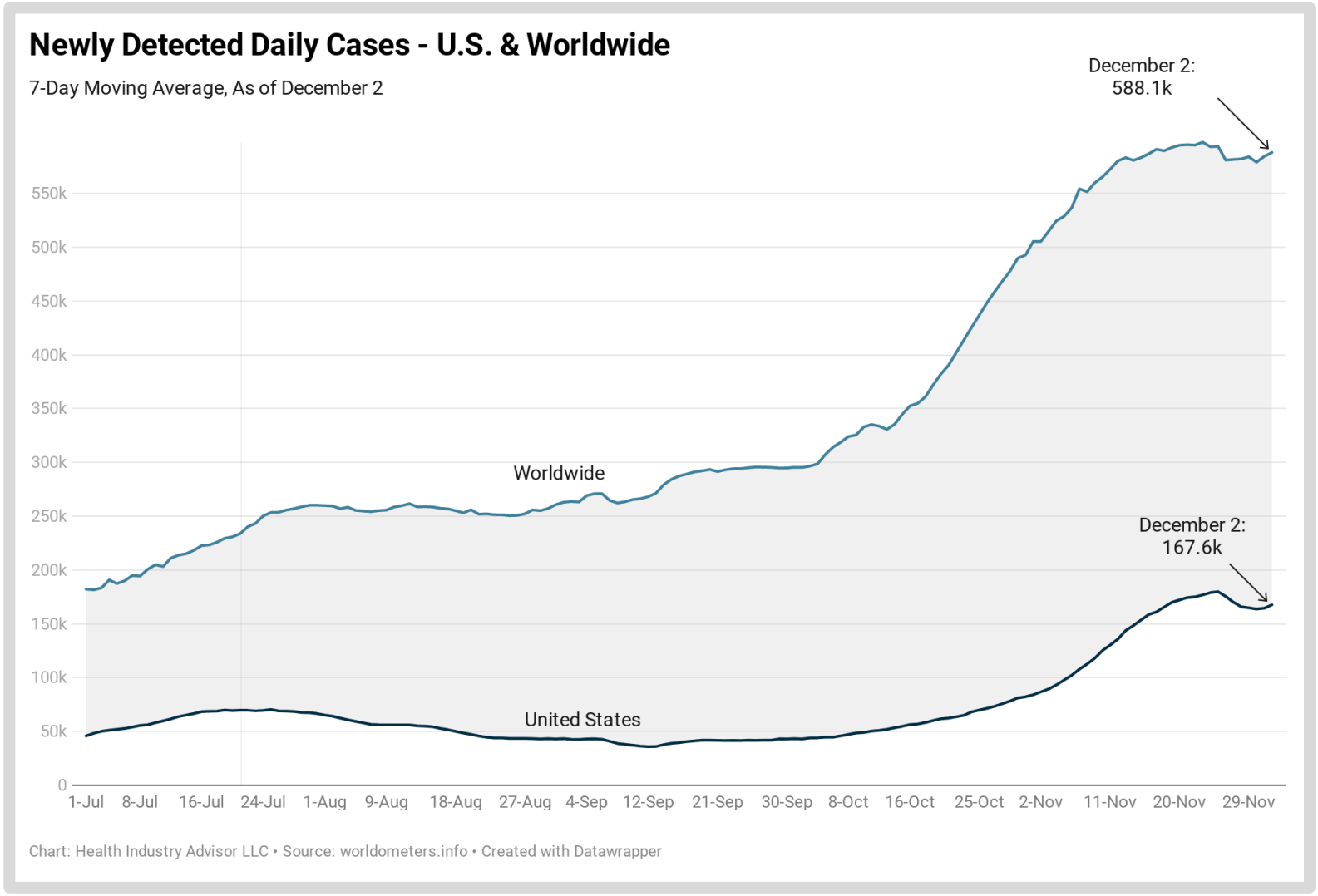
The Thanksgiving holiday caused a decline in new cases, both worldwide and in the United States

On a 7-day moving average basis, new cases worldwide we already plateauing prior to the Thanksgiving holiday, while they were slowing in the United States

There were ~588.1k new cases worldwide each day, as of Wednesday

The United States is averaging ~167.6k new cases each day

* - 7-day moving average basis



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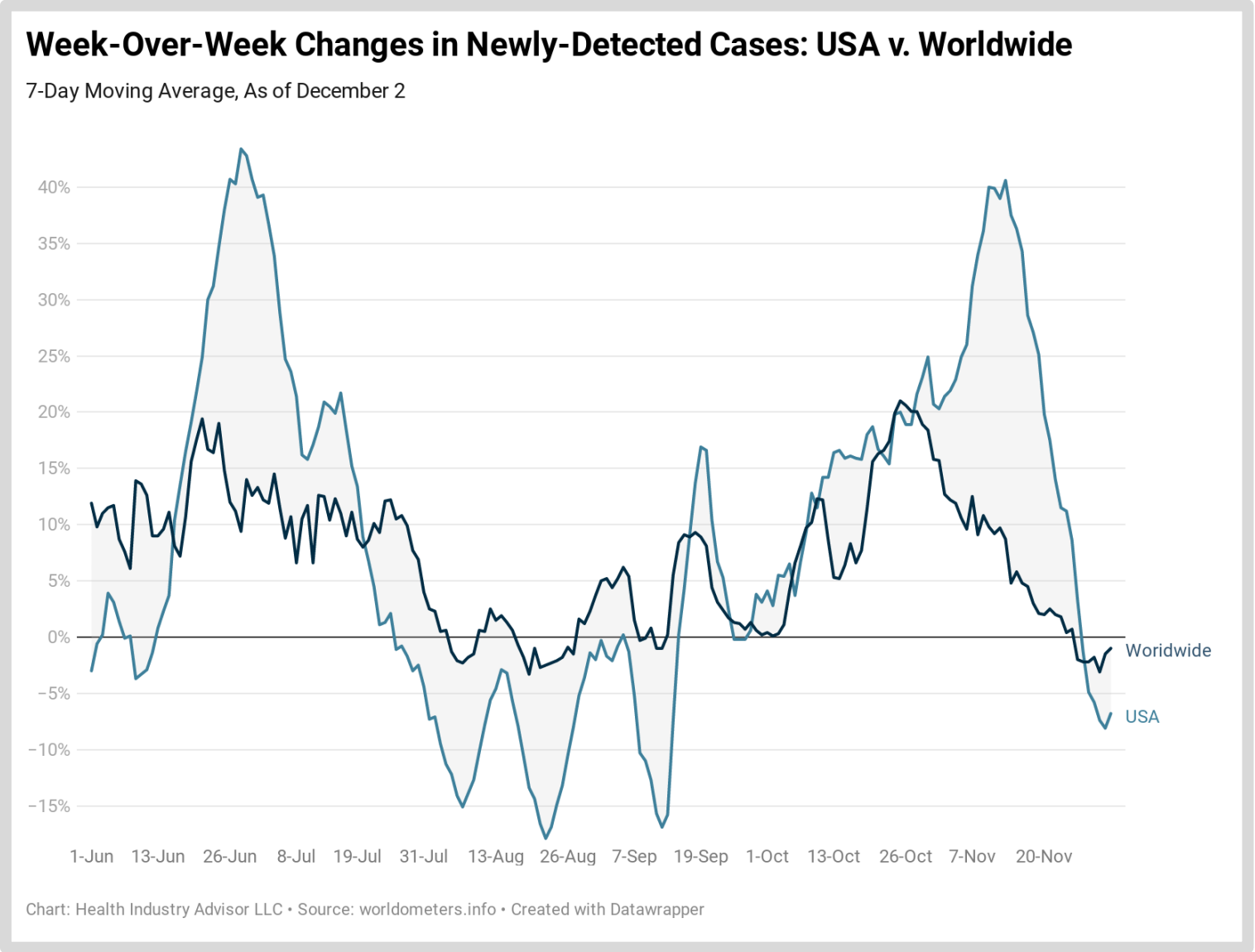
The rate of increase in new cases, both worldwide and in the United States, has been easing for an extended period

The Thanksgiving holiday caused this rate to go negative

This rate may be starting to turn back up as the backlog of unreported cases caused by Thanksgiving is diminishing



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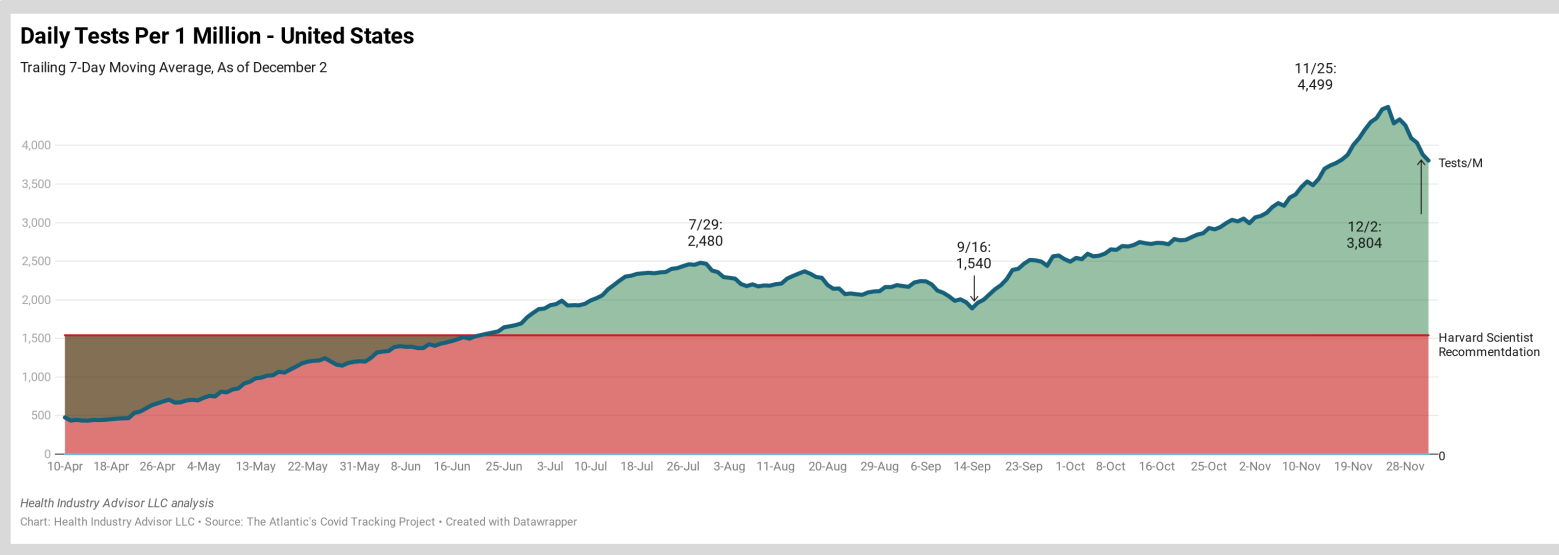
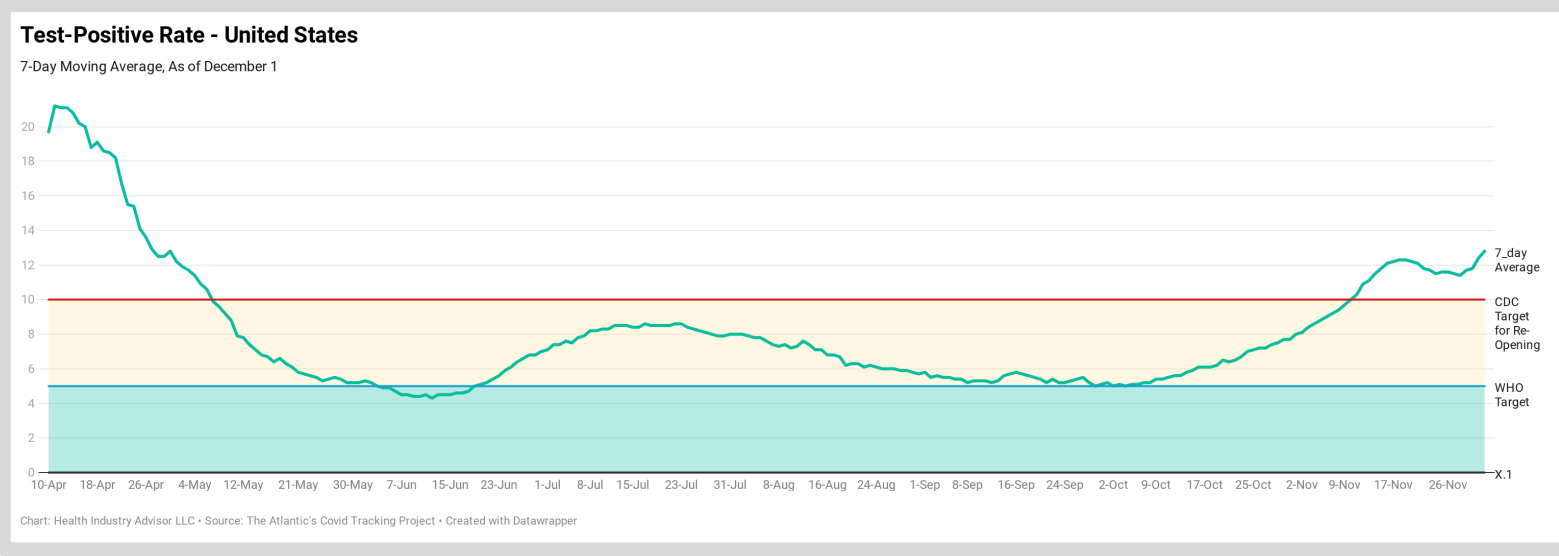
The 7-day test volume declined over the past several days, as a result of slow testing/reporting on and following the Thanksgiving holiday

Coincident with this reduced testing, the test-positive rate has been increased recently

Does this suggest that only people with more severe symptoms are seeking testing?

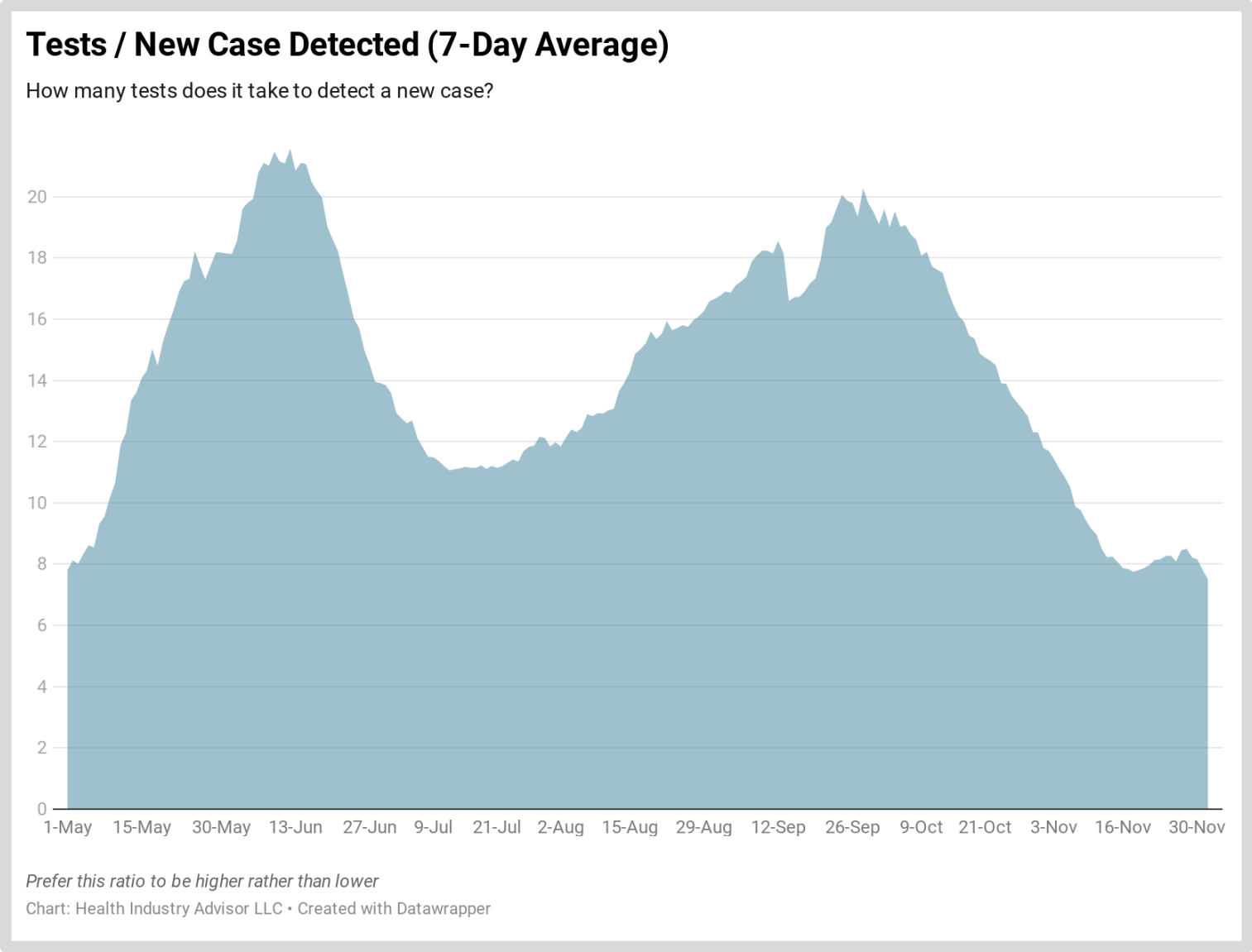




A measure of the effectiveness of testing is the ratio of tests performed to newly-detected cases

This rate had been in a free-fall since mid-September, indicating that the increasing test volumes were insufficient to keep up with rising new infections

This decline in this rate this week, in conjunction with the low test and high test-positive rates, suggest that only people with more severe symptoms have been seeking testing this week



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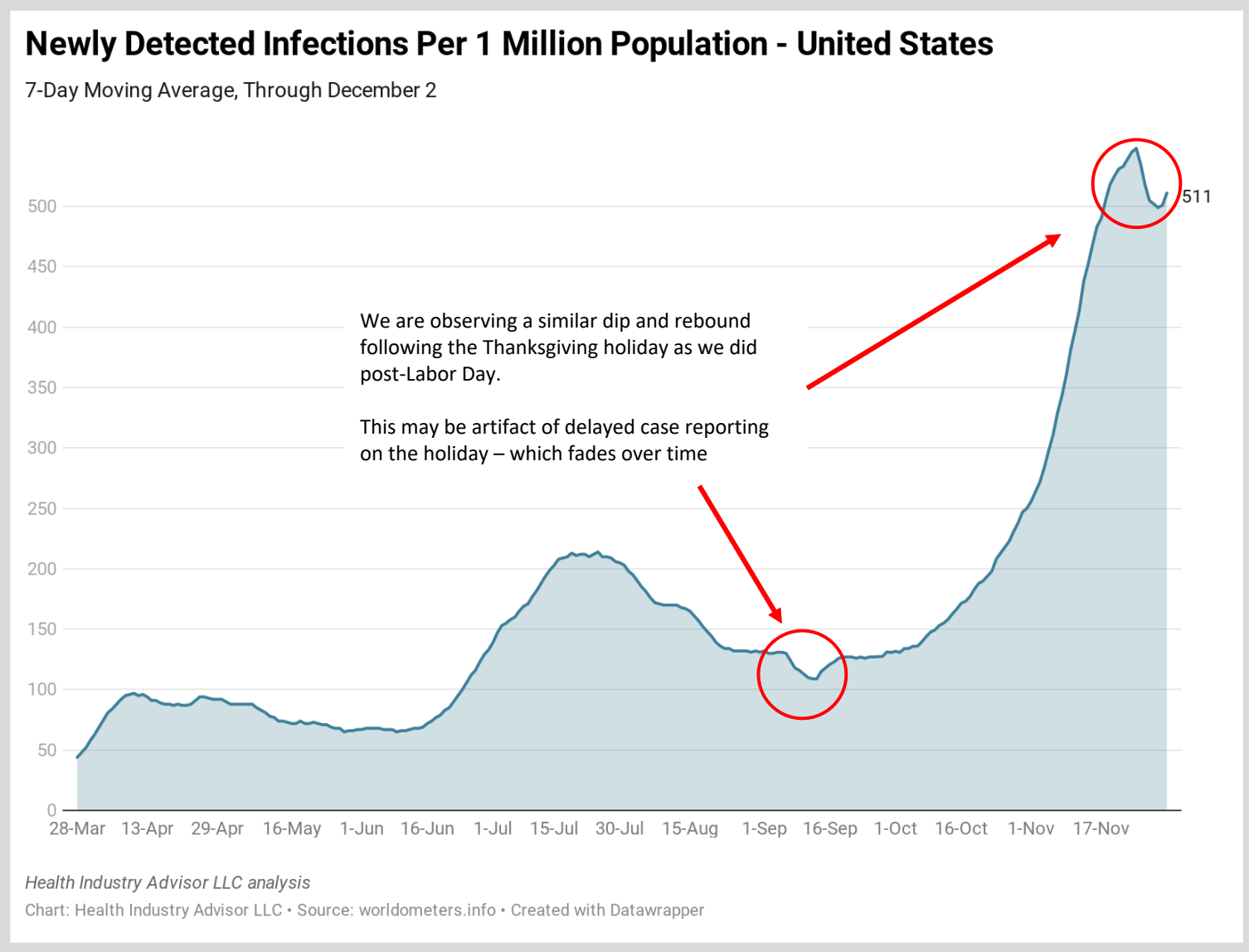
The rate of new infections per capita* are showing a dip-and-rebound pattern like that observed around Labor Day (tied to reporting delays)

This pattern should continue to for the next several days; after that, the trend in this measure will begin to illustrate whether increased social interaction around the holiday has increased the infection rate . . . and to what degree

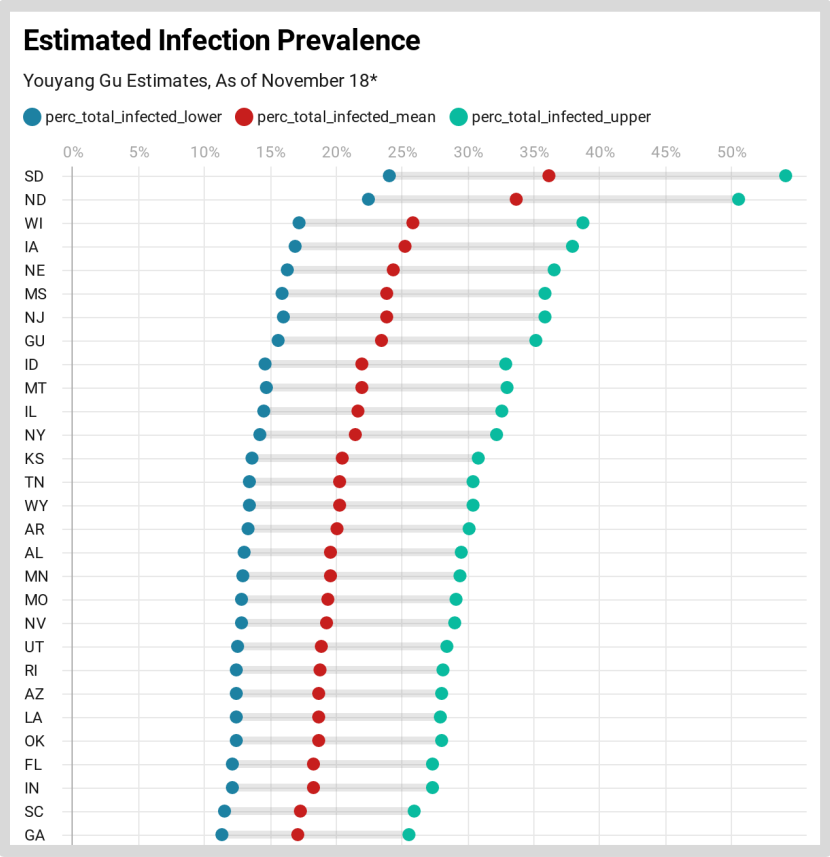
* - 7-day moving average basis

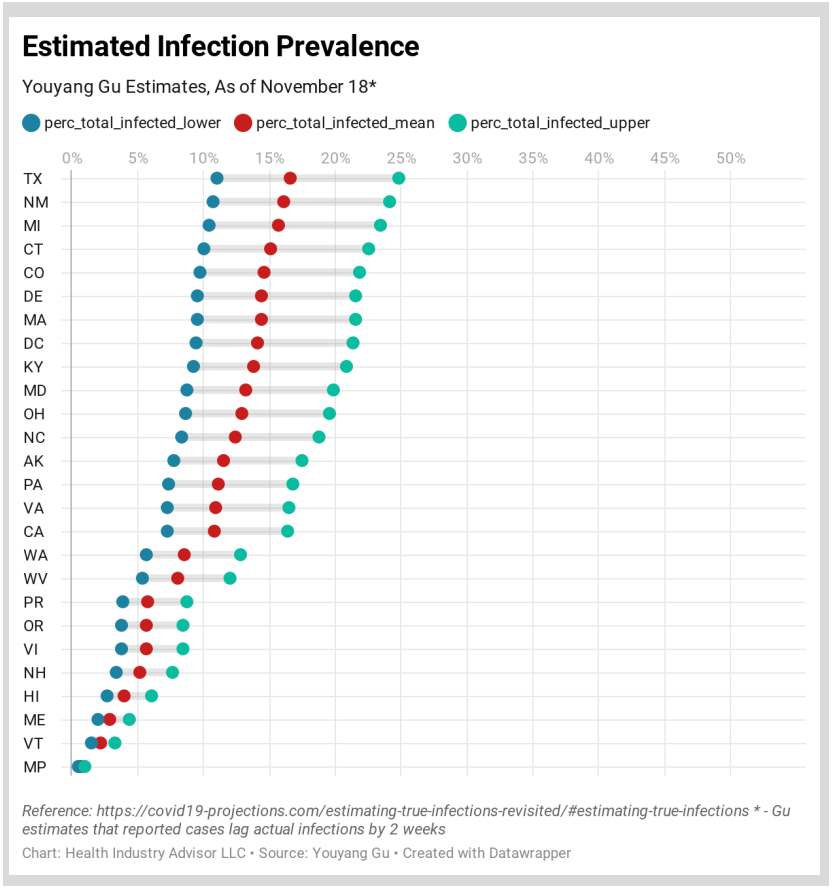


Estimated Infection Prevalence

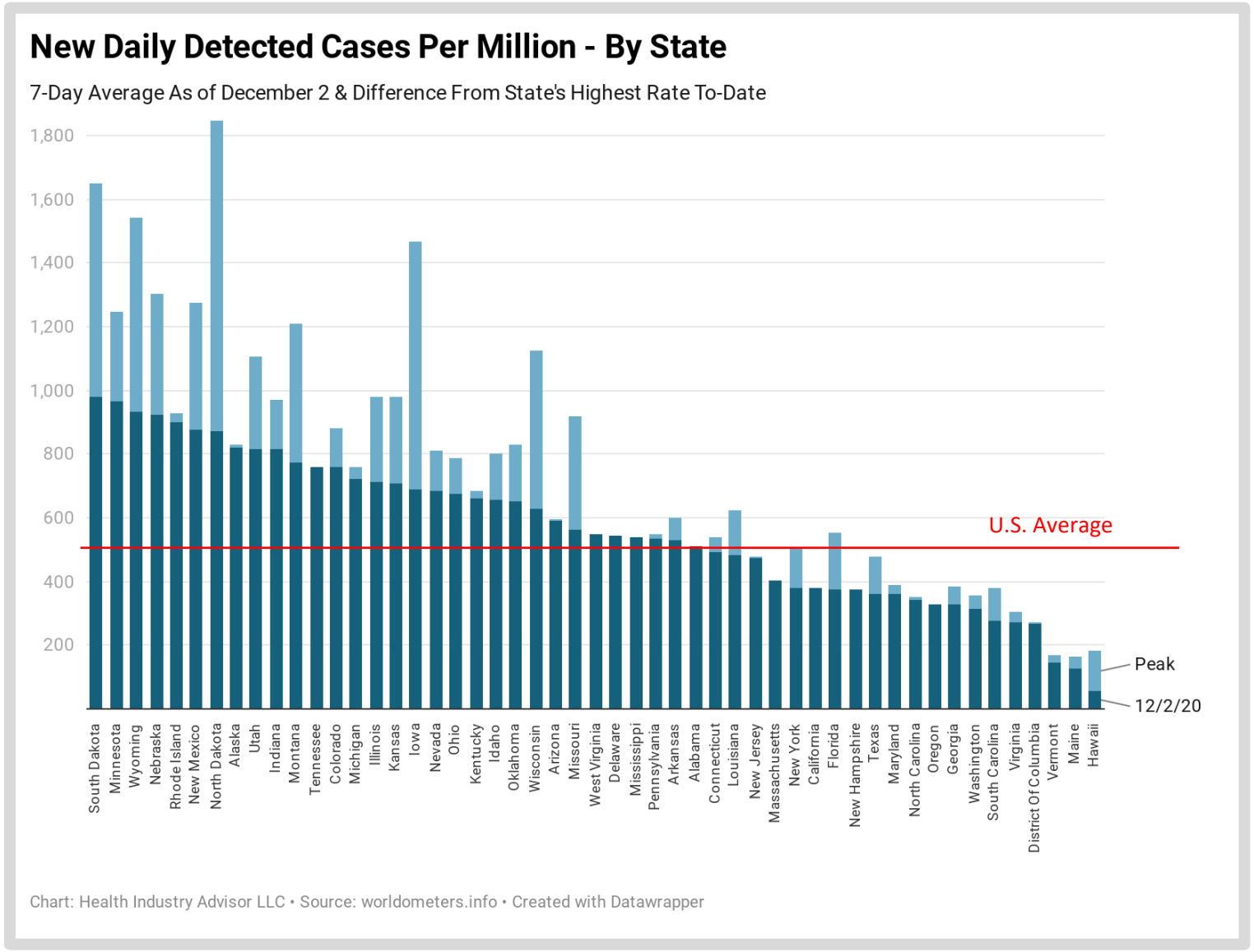
Detected cases undercount the number of true infections. One source of actual infection estimates, Youyang Gu, suggests that 16.2% of the U.S. population had been infected with Covid-19, as of November 10 (best guess; the high-end estimate is 24.3%; the low-end, 10.8%)

Best estimates of infection prevalence range from a low of 2.2% of Vermont's population to a high of 36.2% of South Dakota's (Gu places the high-end estimate for South Dakota at 54.2% of its population)





Six of the seven states with the highest infection rates per capita over the past seven days have nonetheless seen these rates decline significantly from earlier peaks



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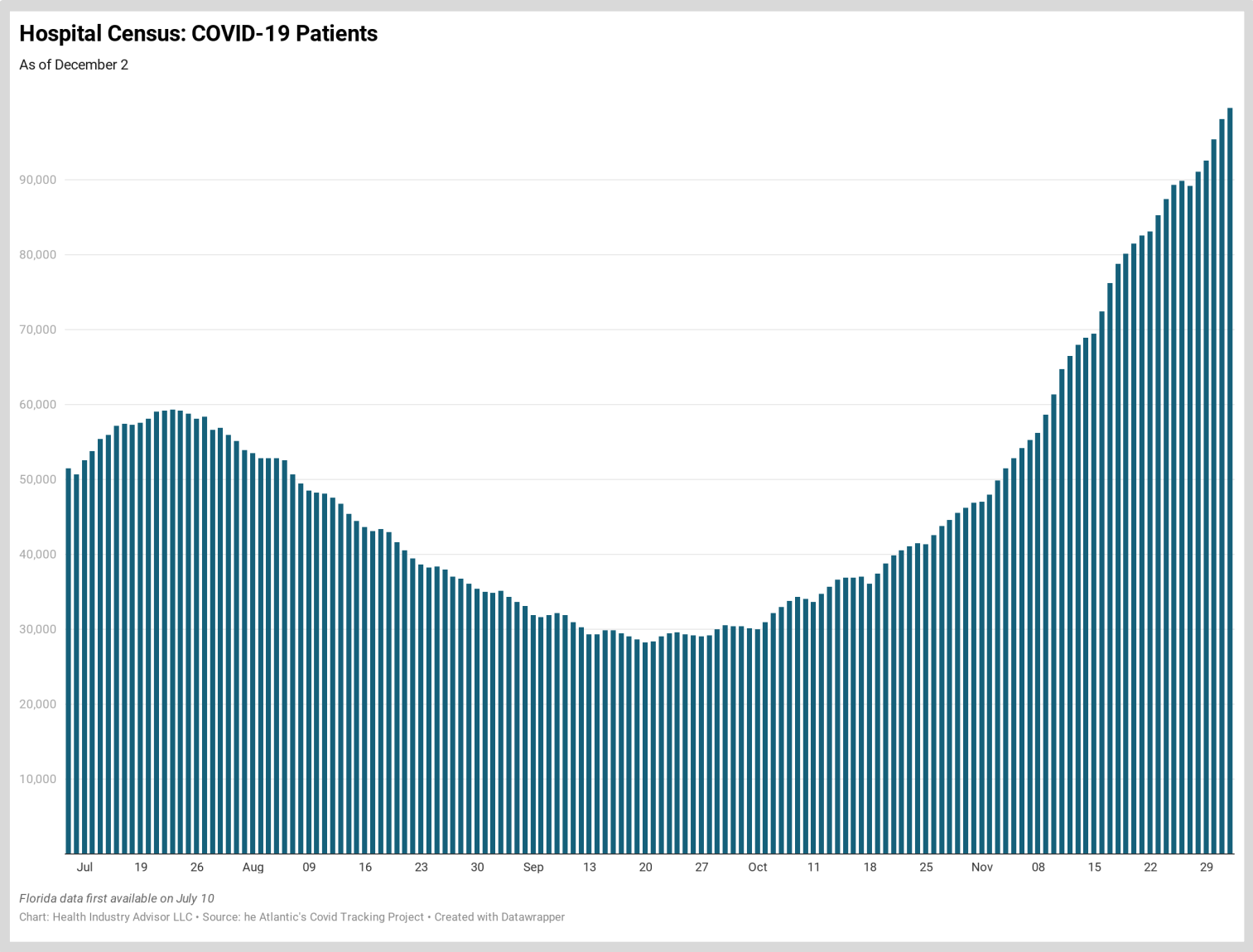
There were more than 100,000 Covid-19 patients in U.S. hospitals yesterday

On a same-day, prior-week basis, inpatient Covid-19 census increased on all except one day since September 23

The mild flu season, however, may be helping somewhat. Typically flu cases place a heavy strain on hospital beds in the Winter



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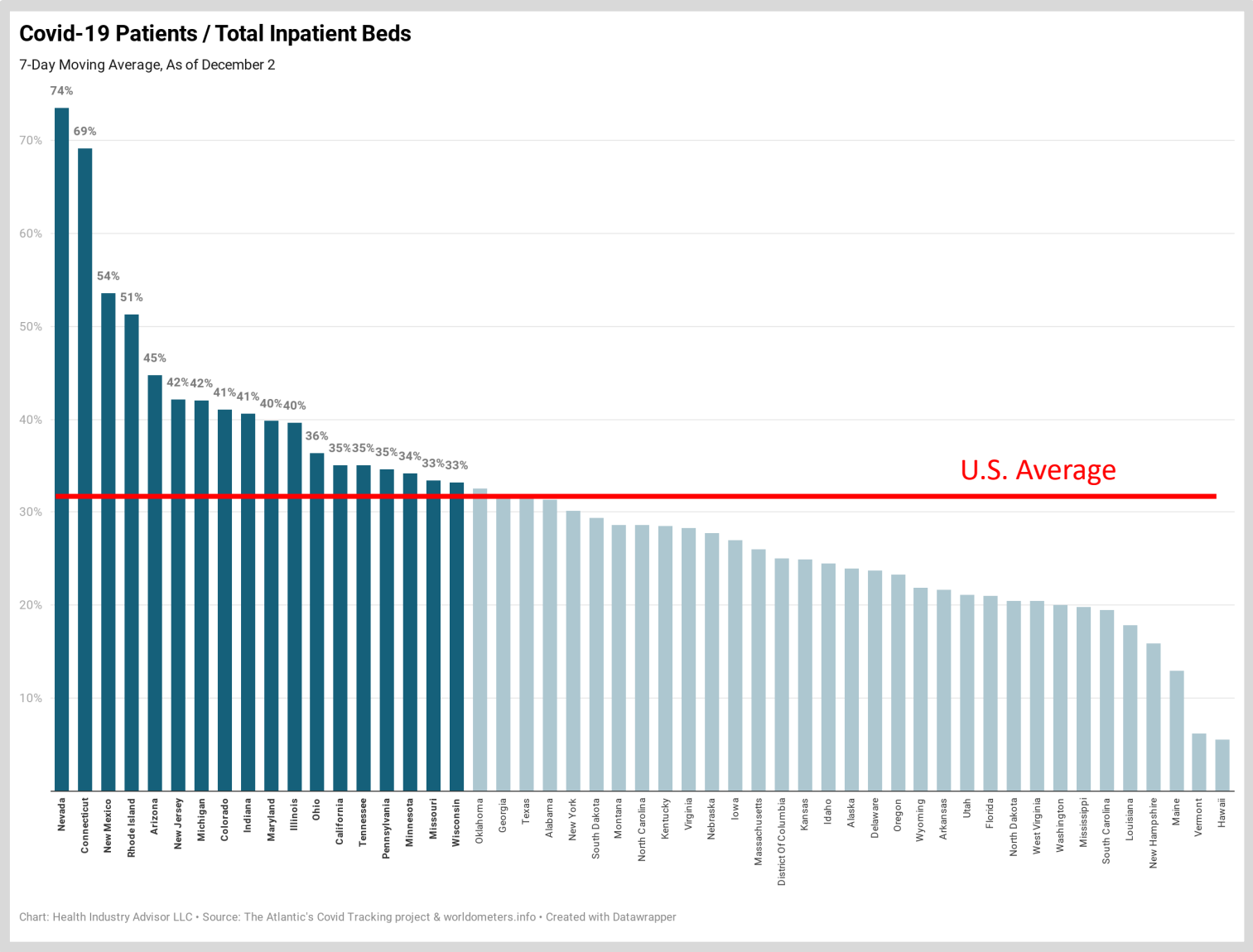
In Nevada, 74% of all inpatient beds are occupied by Covid-19 patients; In Connecticut, its 69%; and in New Mexico and Rhode Island, it's just above 50%

In Arizona, Colorado, Illinois, Indiana, Maryland, Michigan and New Jersey, 40% of inpatient beds

For the U.S. overall, its just less than 32%



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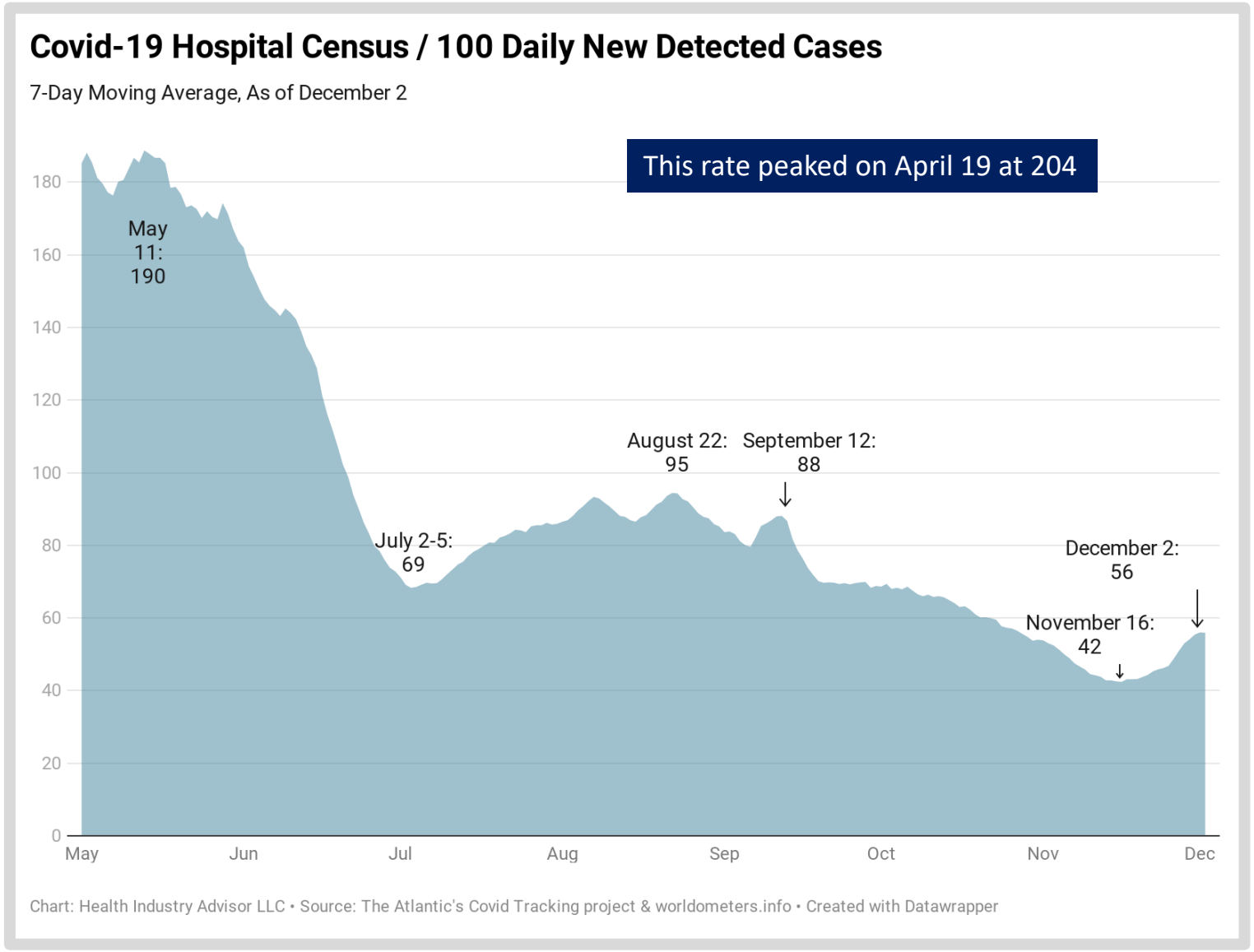
The average Covid-19 census per 100 new-cases was stable yesterday, after increasing each day since mid-November



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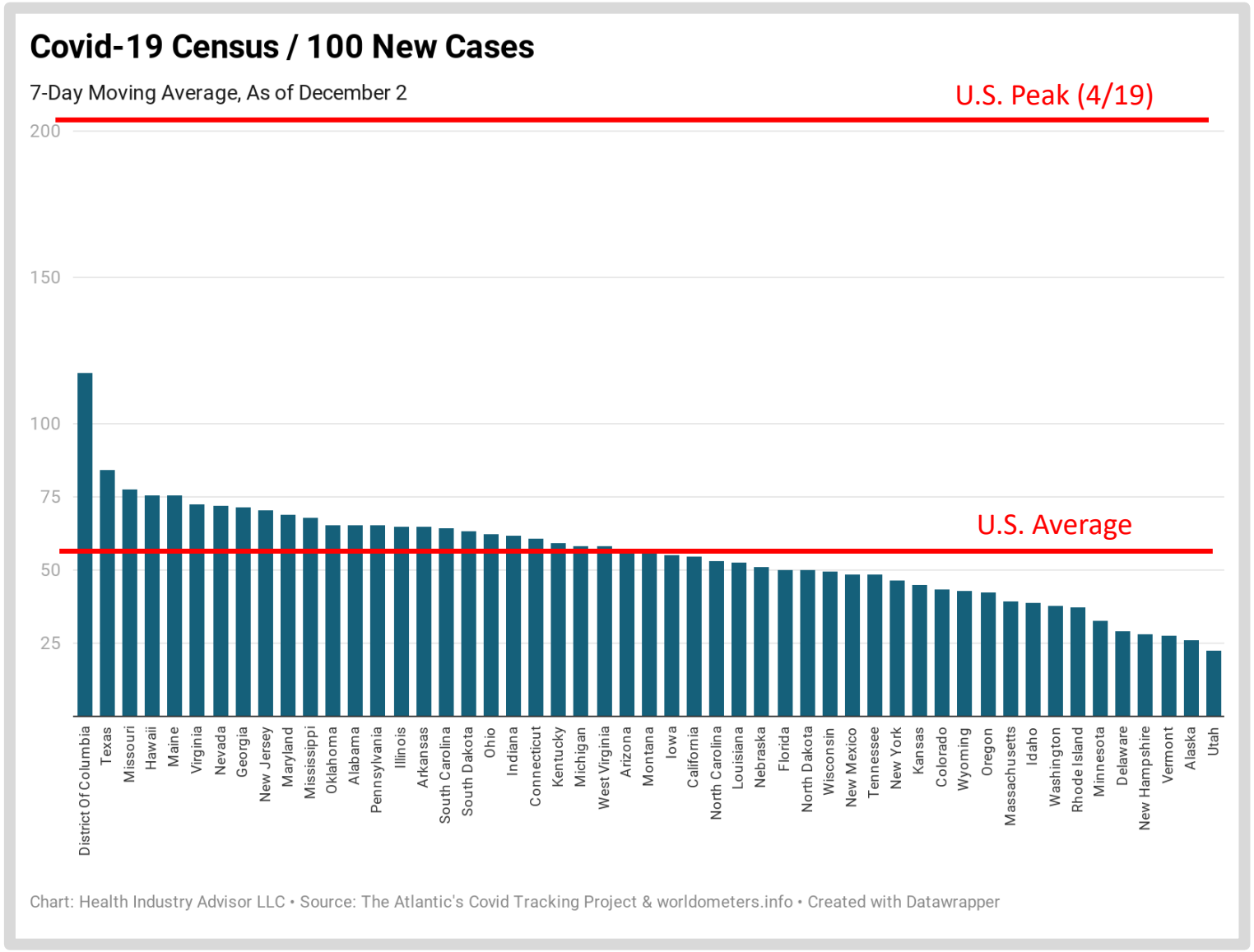
The highest average census per new case is currently experienced in the District of Columbia, Texas, Missouri, Hawaii and Maine

The lowest rates are found in Utah, Alaska, Vermont, New Hampshire and Delaware

Contrast these rates to those experienced in selected hard-hit states during earlier surges:

- Arizona: 305 (4/20)
- California: 416 (4/17)
- Connecticut: 293 (4/29)
- Massachusetts: 475 (6/21)
- Michigan: 422 (4/21)
- New York: 330 (5/22)



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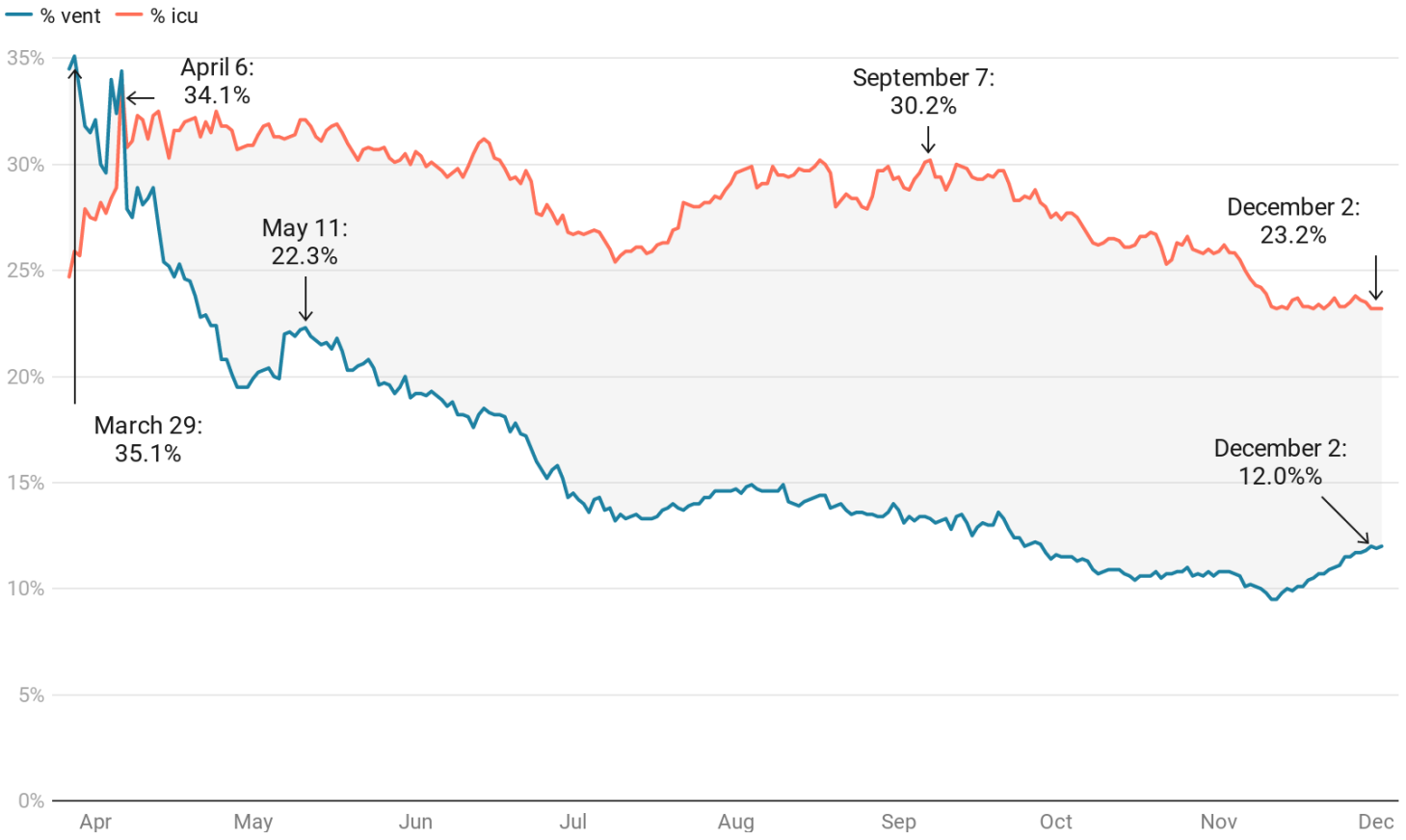
The likelihood of a hospitalized Covid-19 patient would require ICU care has been lower throughout November than at any time during the pandemic

The likelihood of a hospitalized Covid-19 patients would be on a ventilator, after increasing for two weeks, has now been stable for the past four days

Severity of Hospitalized Patients

% of patients on ventilators and in the ICU, As of December 2



Health Industry Advisor LLC analysis

Chart: Health Industry Advisor LLC • Source: The Atlantic's Covid Tracking Project • Created with Datawrapper

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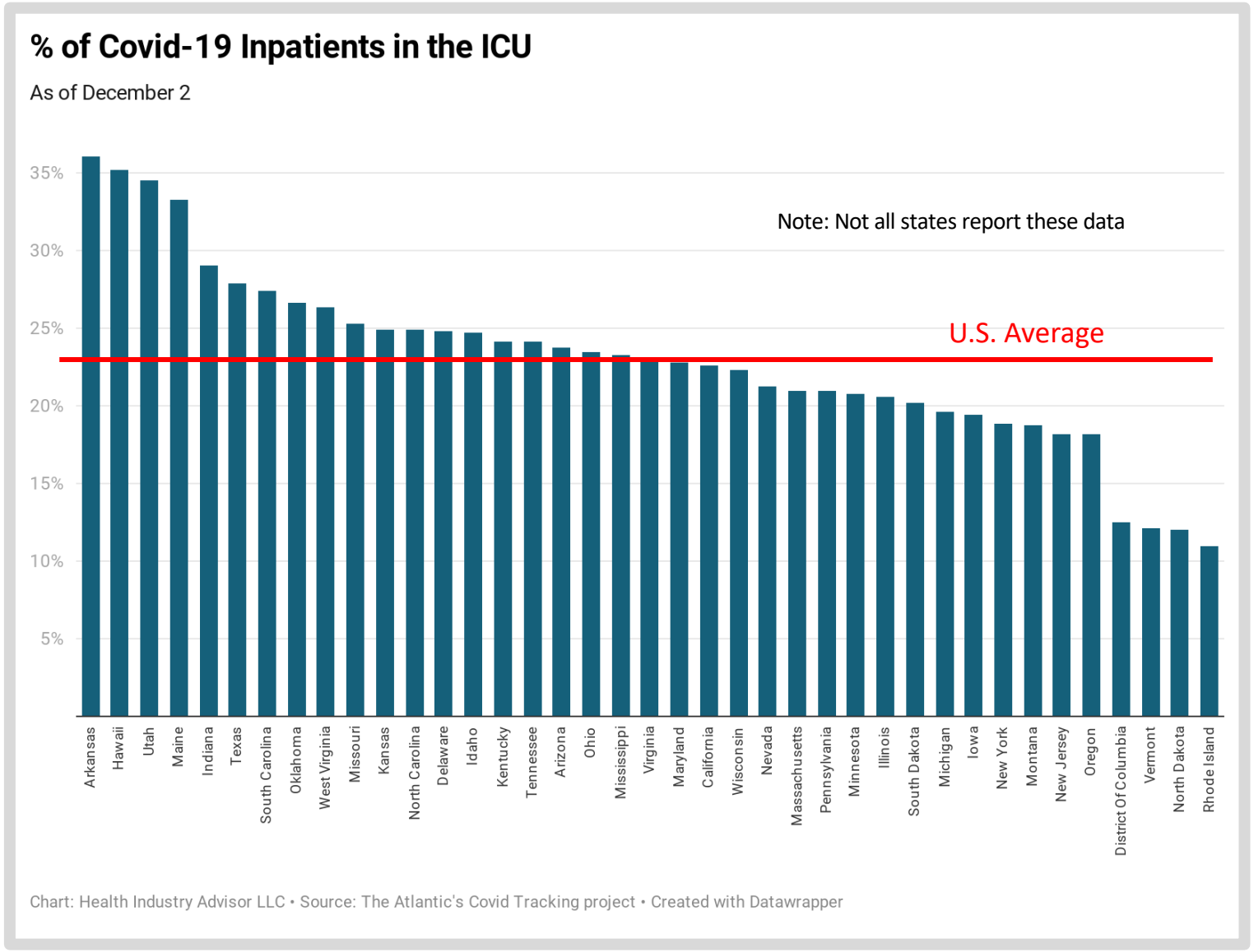
On average, less than 1-in-4 Covid-19 inpatients are in the ICU

Rates are highest in Arkansas, Hawaii, Utah and Maine where more than 1-in-3 Covid-19 inpatients are in the ICU



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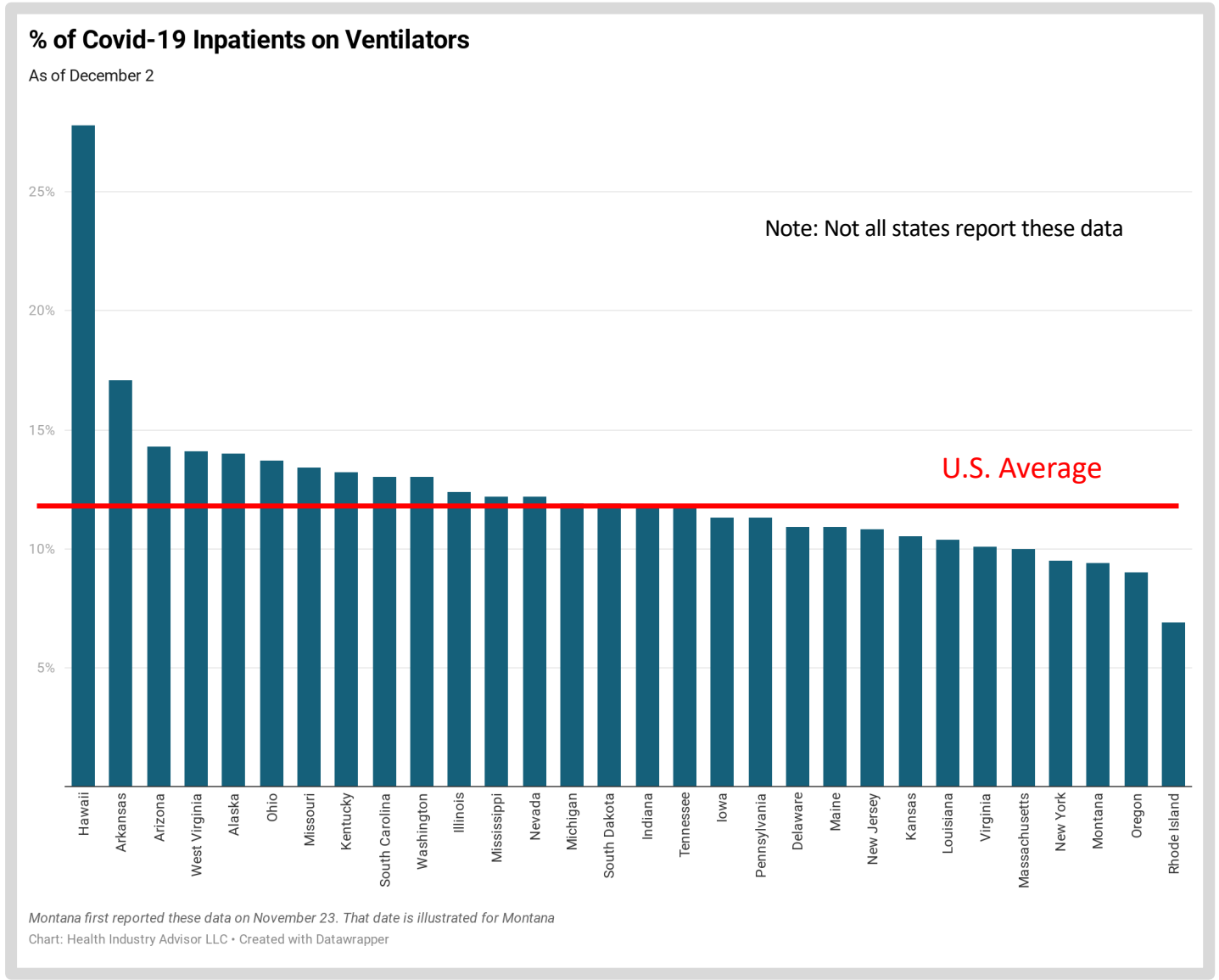
Hawaii and Arkansas re experiencing significant changes in the % of Covid-19 patients on ventilators?



Health Industry Advisor, llc

The % of ER visits for COVID-19-like illnesses (CLI) seems to have waned since the week before Thanksgiving

The rate of influenza visits remains low given where we are in the flu season

% of ER Visits For Covid-19-Like Illnesses (CLI); Influenza-Like Illnesses (ILI); Shortness-of-Breath (SoB) and Pneumonia

As of November 29

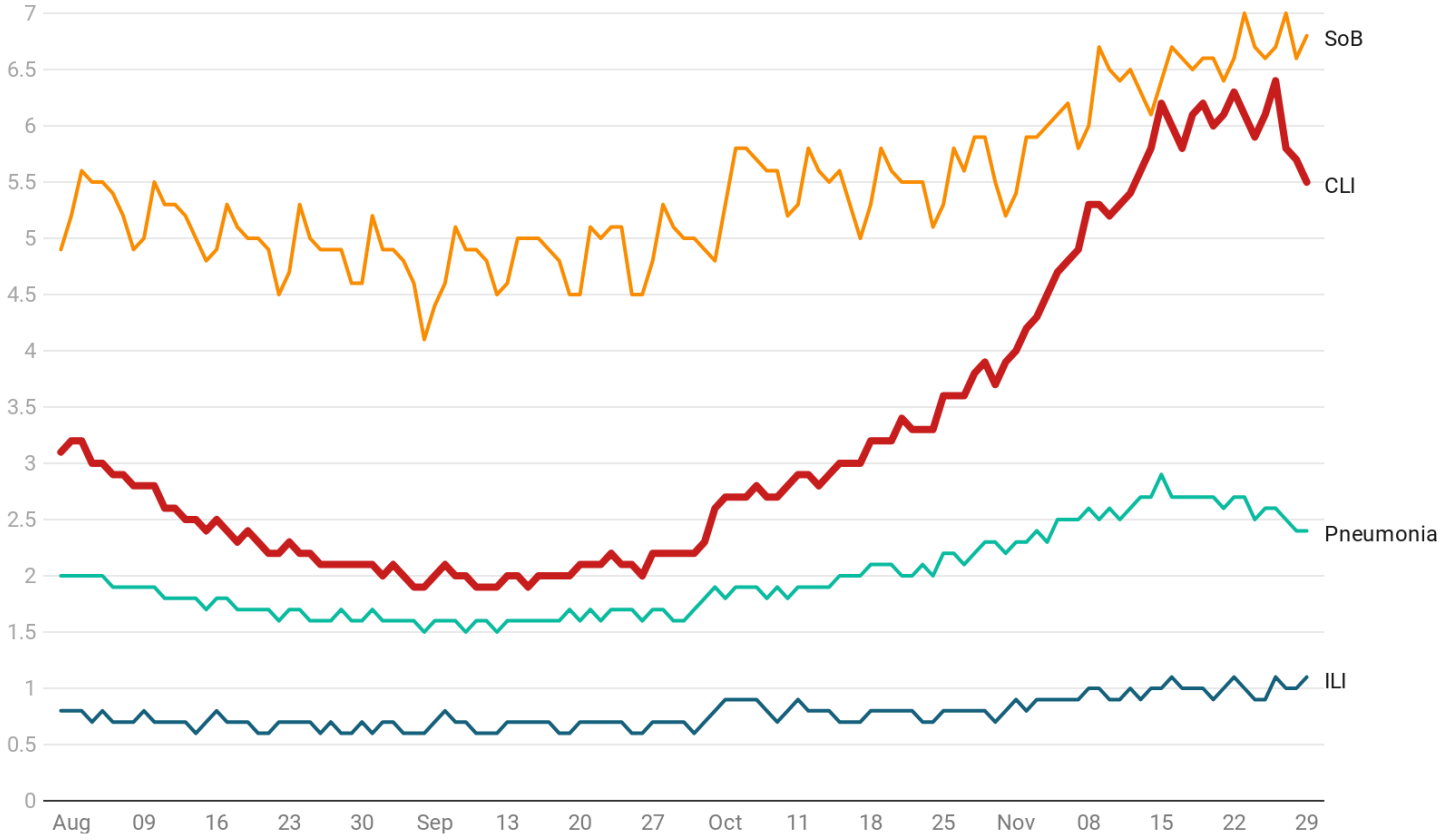


Chart: Health Industry Advisor LLC • Source: CDC • Created with Datawrapper

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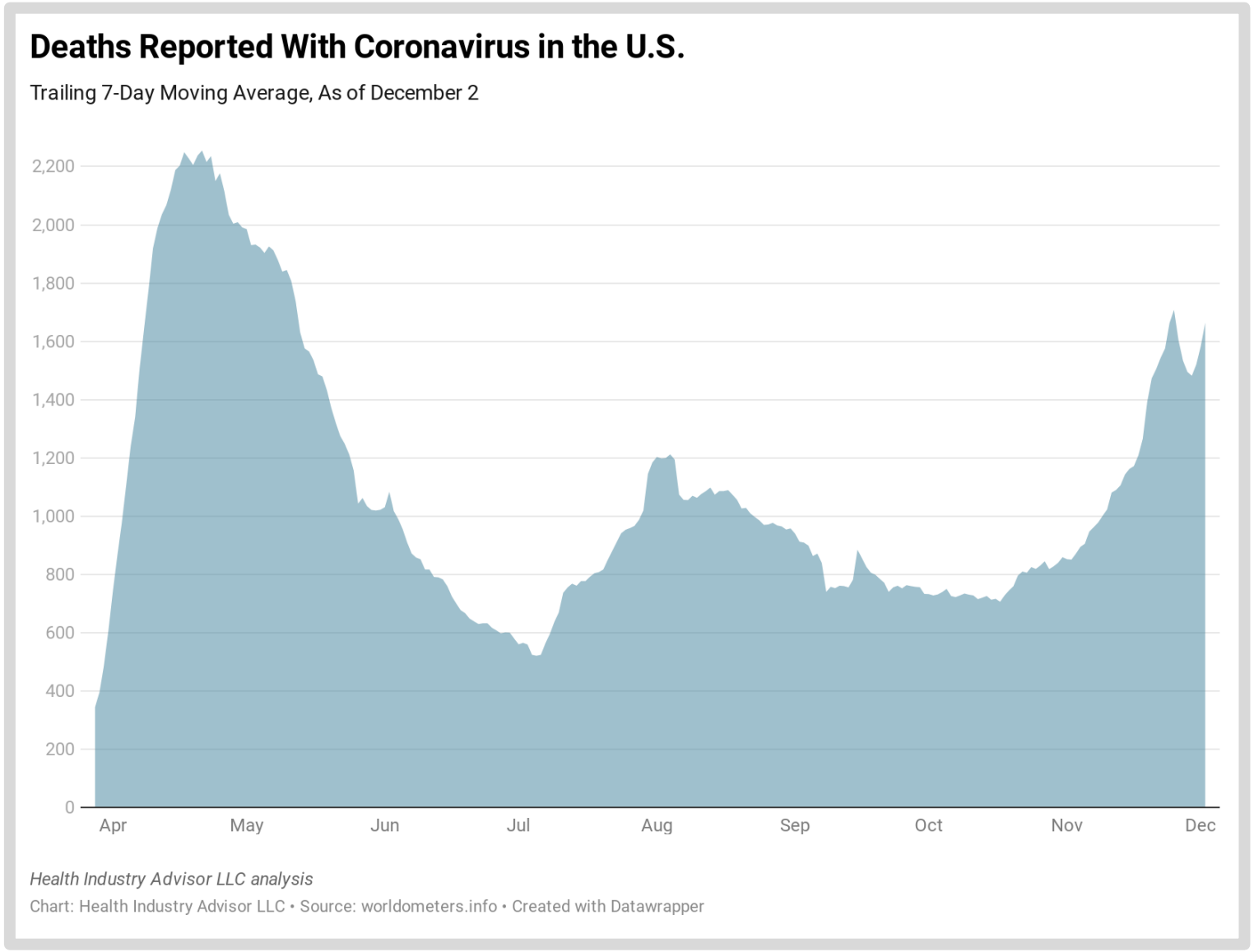
After a relative respite in the 7-day average deaths since Thanksgiving Day, these increased each day this week



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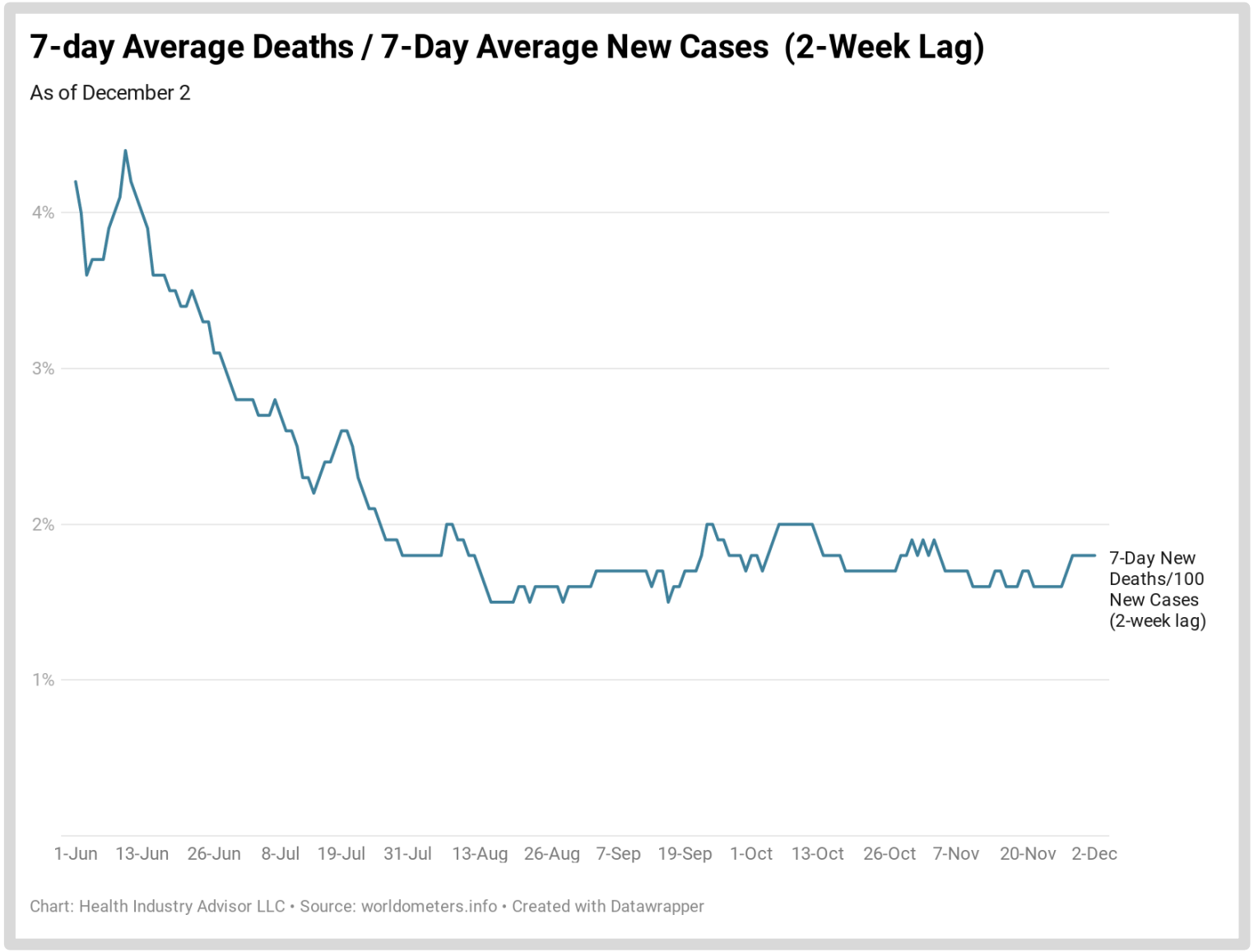
Deaths with coronavirus, relative to new detected cases (lagged 2 weeks) have remained in a narrow range (1.6-1.9%) since October 13



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State-By-State Comparisons

As of December 2

State	Cases per 1M Population	Deaths per 1 Million Population	Tests per 1M Population Past 7 days	Test-Positive % (7-Day Moving Average)	New Daily Cases Per 1M Population (7-Day M.A.)	Tests / New Case	Covid-19 Census % of All Beds	Week-Over-Week Change in New Cases	7-Day Deaths /1000 New Cases , 14-Day Lag
Alabama	52.4k	757	1,570	32.5%	510	3	31%	11%	12
Alaska	44.5k	165	13,741	6.0%	819	17	24%	7%	1
Arizona	46.8k	926	2,603	22.7%	591	4	45%	9%	12
Arkansas	53.5k	836	3,482	15.3%	532	7	22%	-11%	8
California	32.1k	492	5,021	7.3%	379	13	35%	8%	6
Colorado	41.9k	554	2,930	25.9%	758	4	41%	-10%	8
Connecticut	34.1k	1,428	9,790	5.0%	492	20	69%	1%	13
Delaware	37.7k	800	2,916	18.6%	543	5	24%	14%	8
District Of Columbia	30.9k	978	10,374	2.6%	268	39	25%	26%	12
Florida	47.4k	874	2,059	17.7%	376	5	21%	0%	11
Georgia	45.4k	901	2,247	10.8%	326	7	32%	0%	14
Hawaii	12.7k	172	58	100.0%	55	1	6%	-29%	17
Idaho	58.4k	553	1,522	44.9%	656	2	25%	-18%	10
Illinois	59.1k	1,057	6,708	10.6%	712	9	40%	-20%	12
Indiana	52.1k	887	2,243	36.4%	816	3	41%	-13%	11
Iowa	74.4k	776	1,240	41.5%	688	2	27%	-37%	6
Kansas	56.3k	576	1,569	44.6%	706	2	25%	-26%	9
Kentucky	41.8k	443	4,587	14.4%	660	7	29%	-4%	8

State-By-State Comparisons

As of December 2

State	Cases per 1M Population	Deaths per 1 Million Population	Tests per 1M Population Past 7 days	Test-Positive % (7-Day Moving Average)	New Daily Cases Per 1M Population (7-Day M.A.)	Tests / New Case	Covid-19 Census % of All Beds	Week-Over-Week Change in New Cases	7-Day Deaths /1000 New Cases , 14-Day Lag
Louisiana	51.9k	1,398	6,385	7.6%	482	13	18%	0%	7
Maine	9.1k	162	5,447	2.3%	126	43	13%	-22%	21
Maryland	33.6k	780	2,379	15.1%	359	7	40%	-7%	15
Massachusetts	33.7k	1,558	2,467	16.4%	404	6	26%	5%	12
Michigan	40.3k	985	5,285	13.7%	722	7	42%	2%	13
Minnesota	58.1k	665	4,071	23.8%	967	4	34%	-19%	7
Mississippi	52.7k	1,294	2,225	24.2%	539	4	20%	36%	13
Missouri	52.6k	697	1,282	41.0%	561	2	33%	-24%	8
Montana	60.2k	667	4,776	16.2%	772	6	29%	-28%	7
Nebraska	67.3k	558	2,334	39.6%	924	3	28%	-10%	8
Nevada	51k	715	1,888	36.2%	684	3	74%	-12%	11
New Hampshire	16.4k	395	1,762	21.2%	374	5	16%	18%	9
New Jersey	39.9k	1,946	4,926	9.2%	471	10	42%	-1%	10
New Mexico	48.2k	777	7,112	12.3%	876	8	54%	-27%	16
New York	36.2k	1,785	9,077	4.1%	379	24	30%	30%	11
North Carolina	35.4k	512	3,997	8.5%	342	12	29%	-2%	11

State-By-State Comparisons

As of December 2

State	Cases per 1M Population	Deaths per 1 Million Population	Tests per 1M Population Past 7 days	Test-Positive % (7-Day Moving Average)	New Daily Cases Per 1M Population (7-Day M.A.)	Tests / New Case	Covid-19 Census % of All Beds	Week-Over-Week Change in New Cases	7-Day Deaths /1000 New Cases , 14-Day Lag
North Dakota	105.2k	1,268	1,652	52.8%	873	2	21%	-43%	8
Ohio	37.5k	571	4,410	15.3%	674	7	36%	-14%	8
Oklahoma	51.1k	458	3,978	16.3%	650	6	33%	-21%	7
Oregon	18.5k	226	620	52.8%	327	2	23%	9%	12
Pennsylvania	29.8k	846	1,752	30.3%	533	3	35%	4%	16
Rhode Island	55.7k	1,313	2,940	30.7%	902	3	51%	4%	9
South Carolina	42.9k	863	3,461	8.0%	276	13	20%	-13%	12
South Dakota	92.9k	1,125	2,291	42.7%	979	2	29%	-19%	15
Tennessee	56.2k	686	5,237	14.5%	759	7	35%	60%	7
Texas	44.8k	776	3,019	11.4%	360	8	32%	-24%	12
Utah	63.1k	283	2,383	34.3%	816	3	21%	-16%	3
Vermont	7.1k	119	1,683	8.6%	145	12	6%	-5%	16
Virginia	28.4k	482	2,364	11.5%	271	9	28%	-7%	9
Washington	23.3k	377	304	100.0%	316	1	20%	-12%	10
West Virginia	27.9k	435	7,221	7.6%	548	13	21%	1%	14
Wisconsin	67.9k	601	1,829	38.2%	629	3	33%	-32%	7
Wyoming	59.7k	397	3,313	27.9%	932	4	22%	-31%	3

Table: Health Industry Advisor LLC • Created with Datawrapper

Data Sources

The following data sources are accessed on a daily or weekly basis:

- The Atlantic's Covid Tracking Project: https://covidtracking.com
- Worldometers.info: https://www.worldometers.info/coronavirus/
- Centers for Disease Control, National, Regional, and State Level Outpatient Illness and Viral Surveillance https://gis.cdc.gov/grasp/fluview/fluportaldashboard.html
- Centers for Disease Control, COVID-19 Laboratory-Confirmed Hospitalizations https://gis.cdc.gov/grasp/COVIDNet/COVID19_5.html
- Centers for Disease Control, COVID Data Tracker https://www.cdc.gov/covid-data-tracker/index.html#mobility
- Institute for Health Metrics and Evaluation, COVID-19 estimate downloads http://www.healthdata.org/covid/data-downloads
- New York Times, Covid-19 data https://github.com/nytimes/covid-19-data
- COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University https://github.com/CSSEGISandData/COVID-19
- COVID-19 Projections Using Machine Learning, https://covid19-projections.com
- Oliver Wyman Pandemic Navigator, https://pandemicnavigator.oliverwyman.com/forecast?mode=country&region=United%20States&panel=mortality