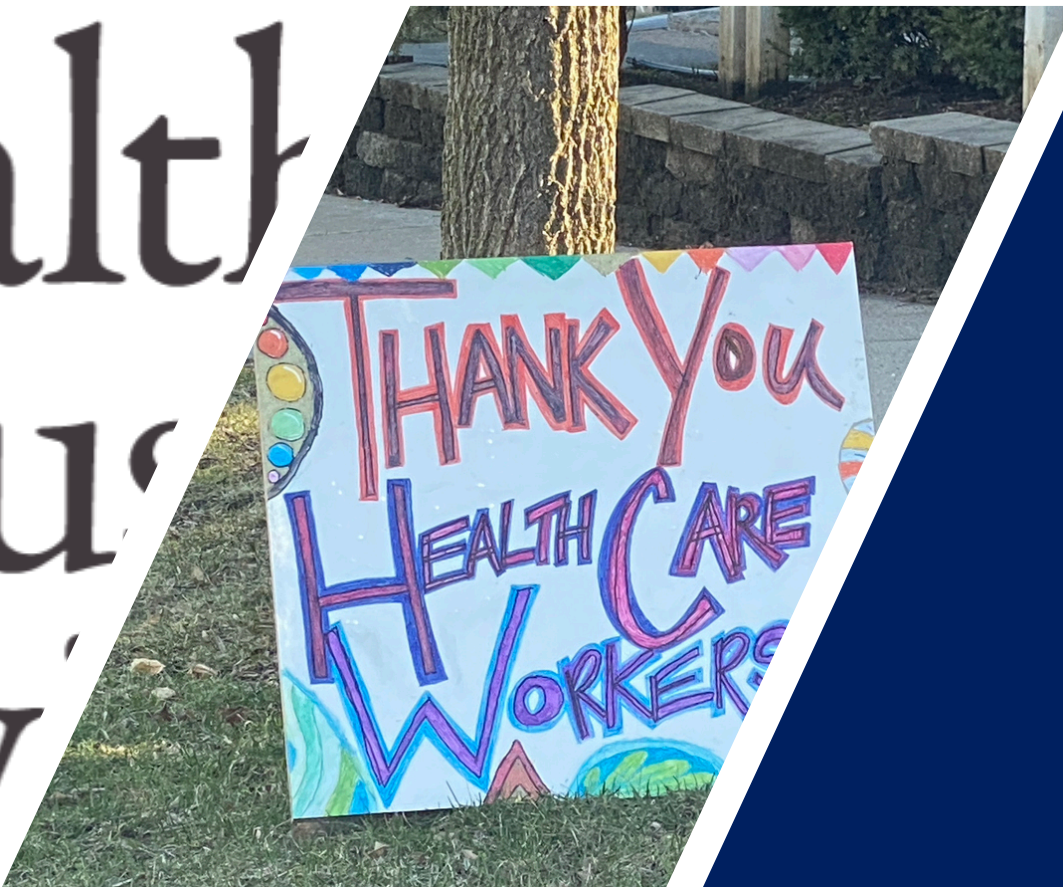




Health
Industry
Adv



Issue # 237
Tuesday, December 15, 2020
COVID-19
Report

Highlights

- With a special thanks to Bill Wise of Karl Storz Endoscopy. Karl asked the question on all of our minds - **when can we expect the opportunity to receive the vaccine?** At Karl's urging, I ran a few scenarios
 - When all interested persons can be vaccinated depends on a host of variables:
 - Which vaccines will be approved, and when?
 - How quickly will approved vaccines be administered?
 - How many people are willing to be vaccinated?
 - Will children (15 years old) and younger be vaccinated?
 - Will those previously infected be vaccinated?
 - **The U.S. government has contracted for 800 million doses (sufficient for at least 400 million people, presuming that each vaccine will require two doses, as with the earliest vaccines). The U.S. is in discussion with Pfizer for another 100 million doses. Of course, each vaccine requires separate authorization**
 - Of these, only Pfizer (initial 100 million doses) is approved for emergency use; Moderna (also, 100 million doses) could be approved later this week
 - JNJ (100 million doses) and Novavax (100 million doses) are both nearing completion of Phase 3 clinical trials and could be approved for emergency use early in 2021
 - AstraZeneca (300 million doses) - once the early front-runner - has encountered challenges in its clinical trial, raising questions about how soon its vaccine could be approved
 - GlaxoSmithKline (100 million doses) has reported disappointing results in its Phase 3 trial, causing it to modify its formulation and delaying expected availability until late 2021
 - A recent Gallup survey reported that 63% of Americans would be willing to be vaccinated, up from 50% earlier this summer. Positive reports from initial vaccinations could drive this willingness rate higher
 - **Considering each of these variables, we estimate that all interested persons in the U.S. could receive their initial vaccination shot sometime between the end of March and the end of July** (refer to chart today's report to see the impact of various assumptions)

- In yesterday's report, we began to analyze whether the anticipated post-Thanksgiving infection surge had taken root. We update this analysis today (and will continue to so through the full holiday season)
 - **The Reproduction Rate (R_t) - that is, the number of people that a single infected person infects - is an indication of whether the infection rate is increasing or decreasing**
 - [Youyang Gu](#) uses Covid-19 related deaths to estimate actual infections and R_t
 - Because he uses deaths as his starting point, his model works backwards to estimate infections and R_t two weeks earlier; thus, his latest estimates are for November 30 - the Monday following Thanksgiving
 - If indeed infections surged post-Thanksgiving, R_t should be increasing from that date forward
 - Instead, **Gu estimates that R_t declined on seven consecutive days, beginning on the Monday before Thanksgiving through November 30** (the last date for which he provides an estimate)
 - **It is important to note that although it is declining, R_t remains >1 . Thus, infections are still on the rise; they are slowing, however, not surging**
 - **Pre-Thanksgiving, new infections per capita were increasing; the rate of increase however was slowing. If the holiday caused a surge in new infections, we would expect to observe an increasing rate of infections**
 - This analysis is complicated by reporting interruptions during the Thanksgiving weekend (many states closed their offices, delaying reporting until the following week)
 - These interruptions caused a "dip-and-rebound" in the reported infection rate
 - To filter-out the "noise" of this impact, we extrapolated the pre-Thanksgiving trend and compared this trend to the actual infection rate experience
 - **Through yesterday, the actual infection rate experience post-Thanksgiving is trending below the pre-Thanksgiving trend - discounting the presumption that Thanksgiving would lead to surge in new infections**

The U.S. has contracted for up to 800M vaccine doses, from six manufacturers, with an additional 100M being negotiated with Pfizer

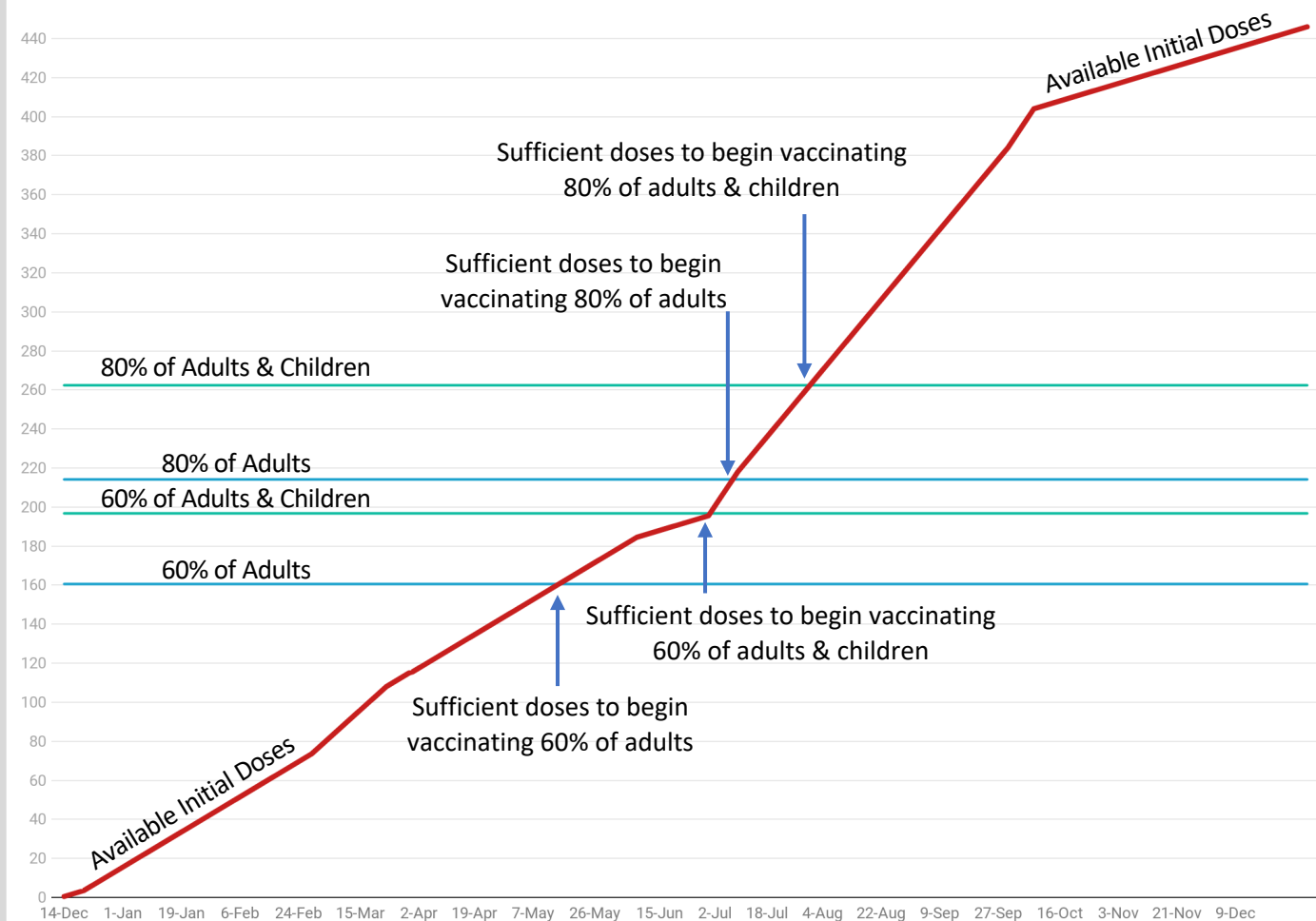
If and when each of these vaccines become available is key to estimating when all interested persons could begin receiving vaccines

Base Case Assumptions (Doses, launch)

- Pfizer 100M 12/14/20
- Pfizer (additional) 100M 7/1/21
- Moderna 100M 12/21/20
- JNJ 100M 3/31/21
- Novavax 100M 5/1/21
- AstraZeneca 300M 7/1/21
- GlaxoSmithKline 100M 10/1/21
- All vaccines presumed 2 doses
- Initial doses administered uniformly over 100 days
- People with known infections will be vaccinated

Note: For illustrative purposes only. Actual experience is highly dependent on which vaccines are approved, when vaccinations begin and the pace of vaccinations

Cumulative Initial Vaccinations - U.S. (Millions)



Provided for illustration only. Based on assumptions about when doses are available and pace of availability
Chart: Health Industry Advisor LLC • Created with Datawrapper

Q. When could all interested persons have access to an initial vaccine shot?

A. Perhaps, in Q2 or early in Q3 2021

The answer depends on whether children will be vaccinated; how many people are willing to be vaccinated; and when each vaccine candidate is approved and becomes available

Estimated Date When Milestone is Met				
	Vaccinate Adults Only		Adults & Children	
Scenario	60% Willing	80% Willing	60% Willing	80% Willing
Base Case (see assumptions on previous page)	May 15	July 8	July 1	July 31
2 nd Pfizer Tranche available 4/1 (v. 7/1/21)	April 30	June 15	May 24	July 9
AstraZeneca vaccine available 3/1/21 (v. 7/1/21)	March 31	April 21	April 14	May 10

Health Industry Advisor LLC analysis

For illustrative purposes only

Dates highly dependent on assumptions on this and previous page

Did Thanksgiving lead to a surge in infections in the U.S.?

Perhaps not . . . based on Gu's* estimates of the reproduction rate (R_t)

Gu uses deaths to estimate actual infections and the reproduction rate (R_t), using a machine learning model

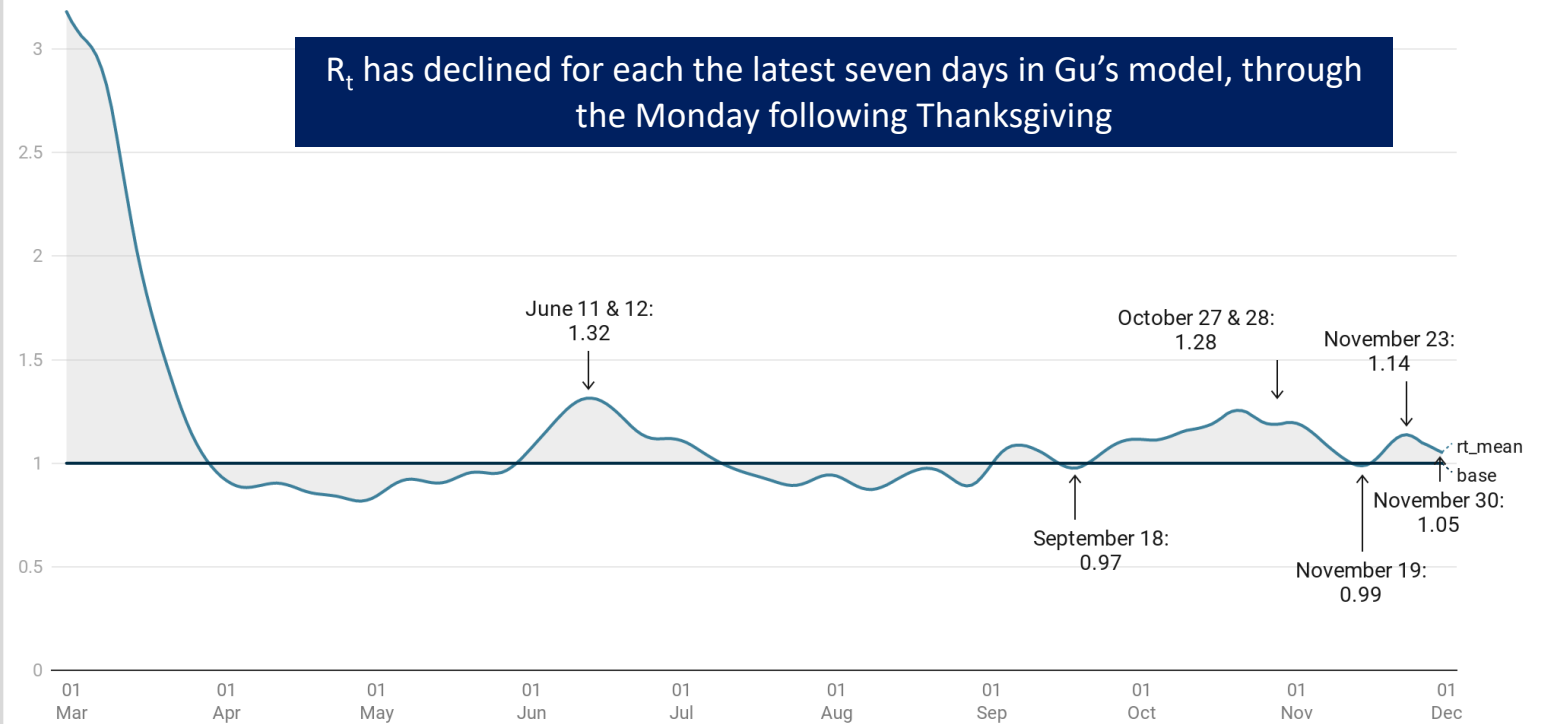
Gu backdates two weeks from the death date to estimate when an infection likely occurred

Using this model, the reproduction rate rose from November 19 to November 23, then declined each of the next seven days

* - Youyang Gu: Covid-19projections.com

Reproduction Rate (R_t) - U.S.

Youyang Gu Estimate, Through November 30



R_t is an estimate of how many additional people a single person will infect

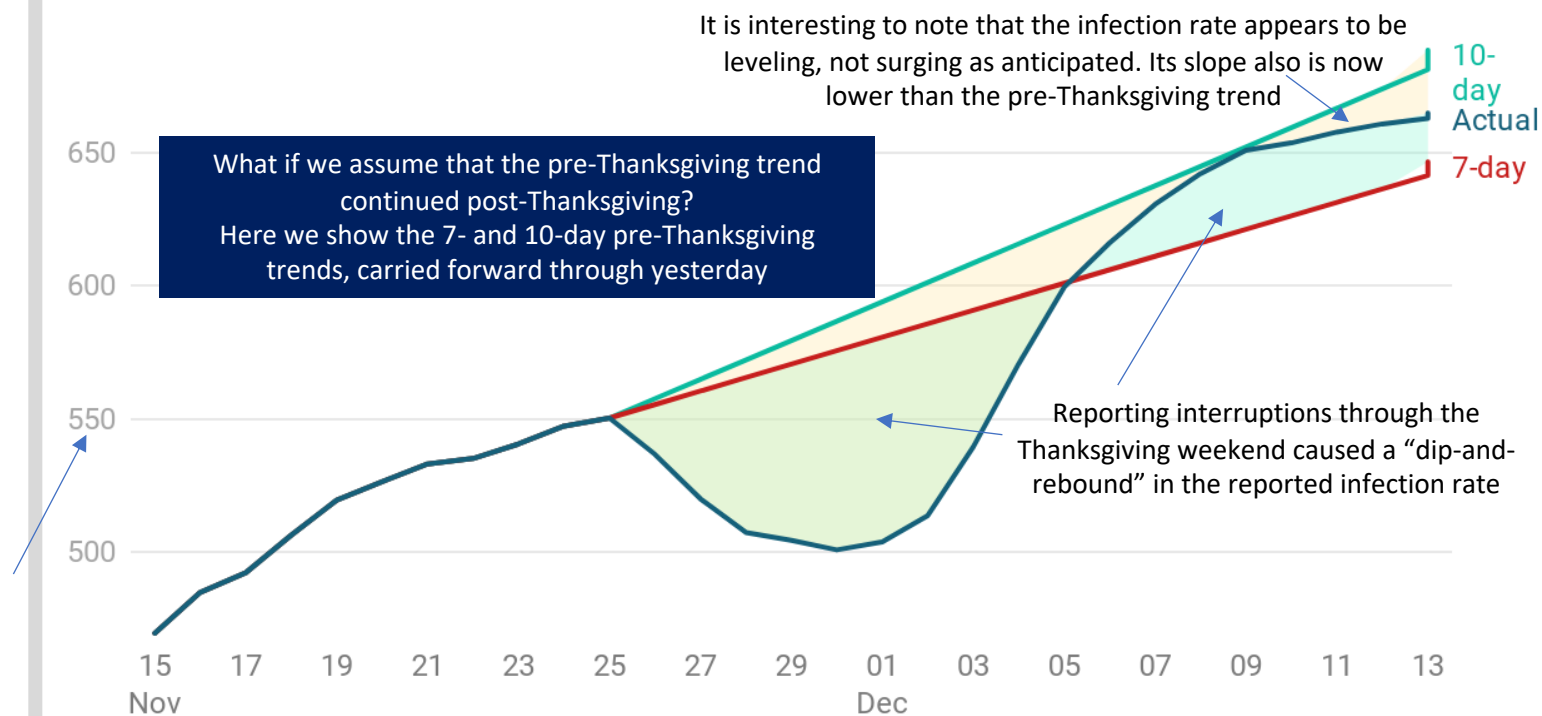
Chart: Health Industry Advisor LLC • Source: Youyang Gu • Created with Datawrapper

What have we observed with infection rates since Thanksgiving?

Sorting through the “noise” caused by reporting interruptions during Thanksgiving weekend, it appears that the post-Thanksgiving trend is returning to the 7-day pre-Thanksgiving trend (and, below the 10-day pre-Thanksgiving trend)

New Infections / Million

7-Day Moving Average v. Pre-Thanksgiving Trends



7- & 10-day trends are extrapolation of trends leading up to Thanksgiving Day

Chart: Health Industry Advisor LLC • Created with Datawrapper

We are averaging ~632k new cases worldwide each day, as of Sunday

The United States is now averaging 218k new cases each day

Outside the U.S. newly-detected cases have been declining since November 10

* - 7-day moving average basis

Newly Detected Daily Cases - U.S. & Worldwide

7-Day Moving Average, As of December 14

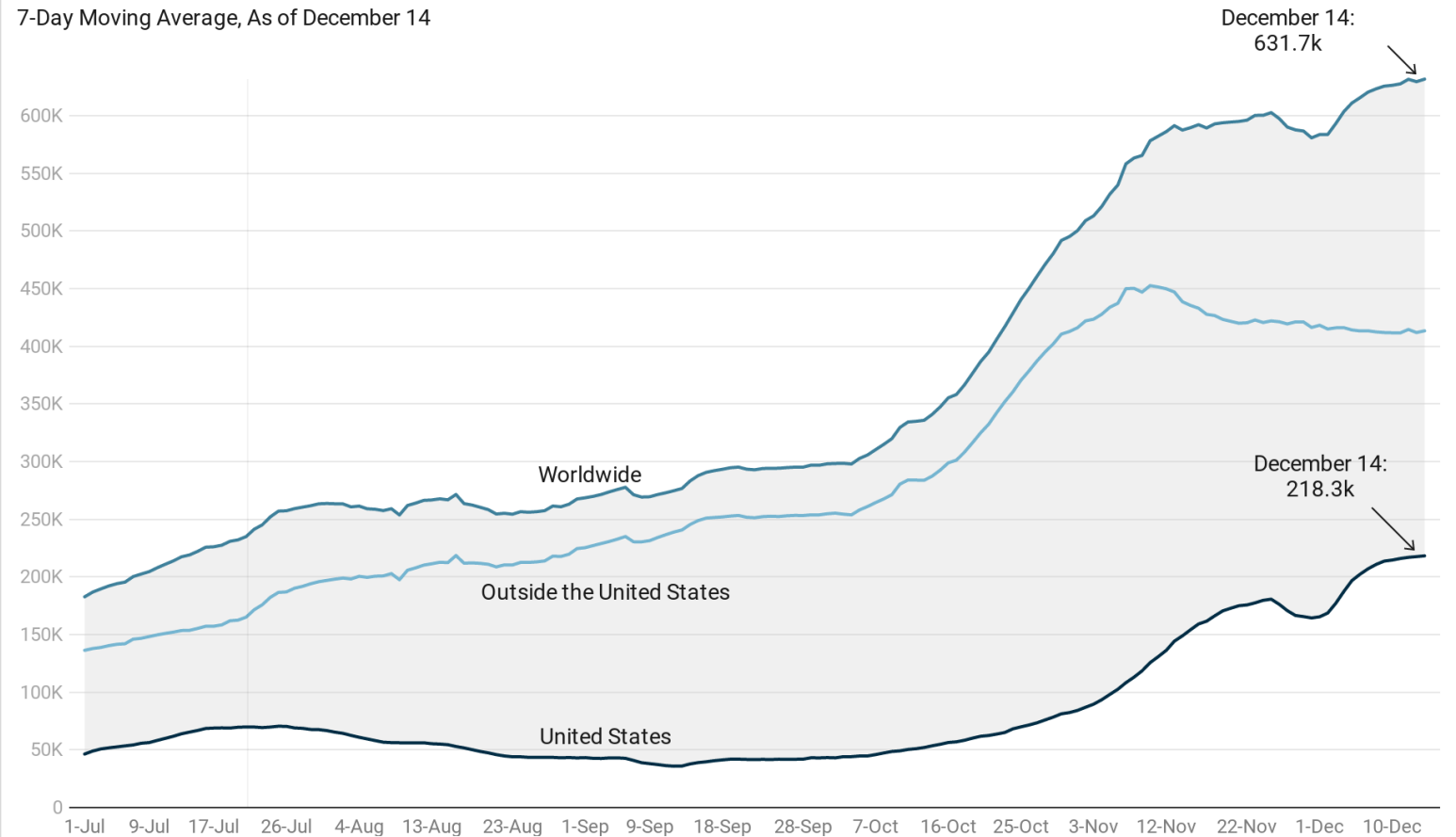


Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

Reporting interruptions around the Thanksgiving holiday caused the week-over-week change in new cases to first go negative during the Thanksgiving week; increase sharply the following week; and now sharply decline, then spike

These recent trends are largely due to reporting interruption, rather than changes in infection rates

Week-Over-Week Changes in Newly-Detected Cases: USA v. Worldwide

7-Day Moving Average, As of December 12

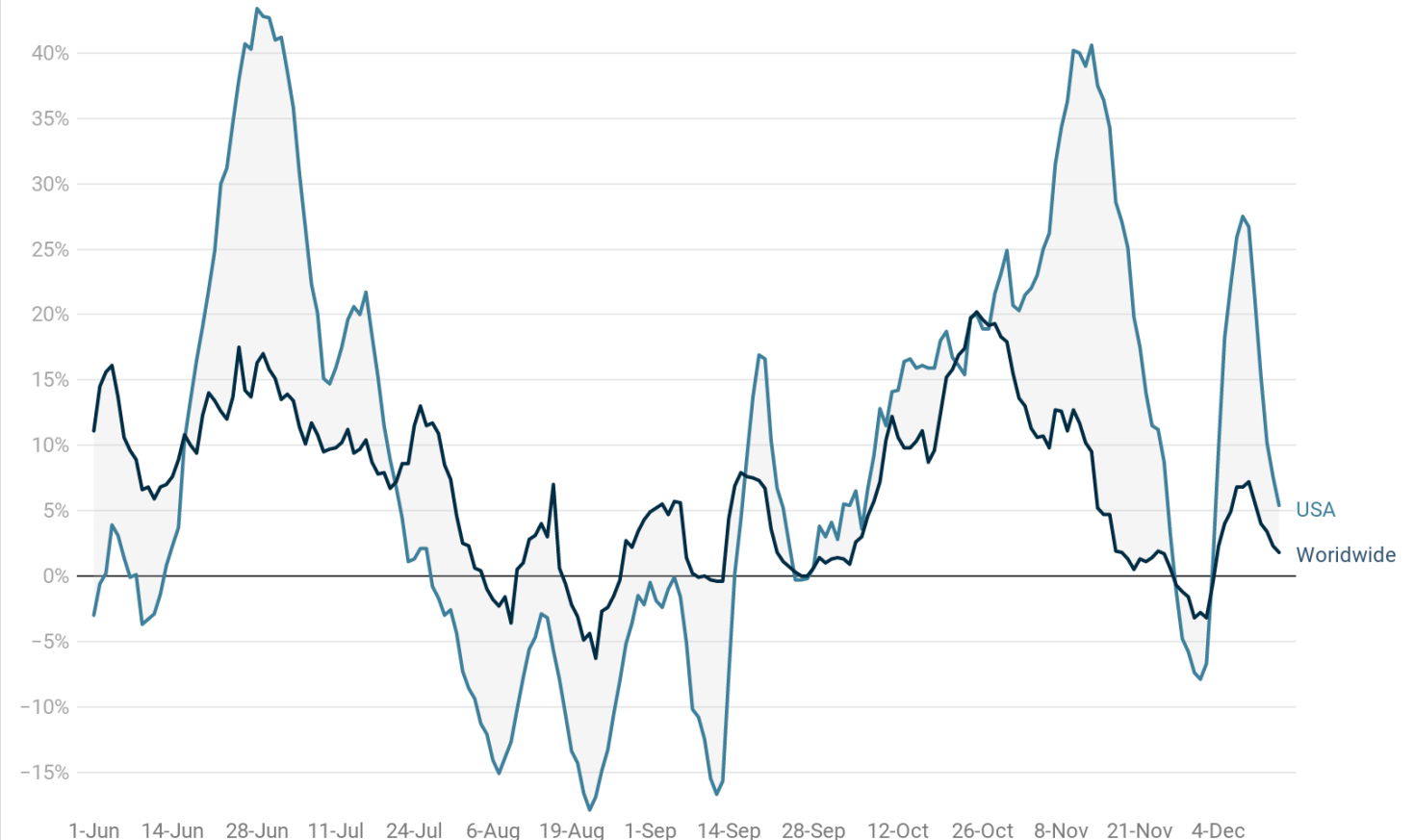


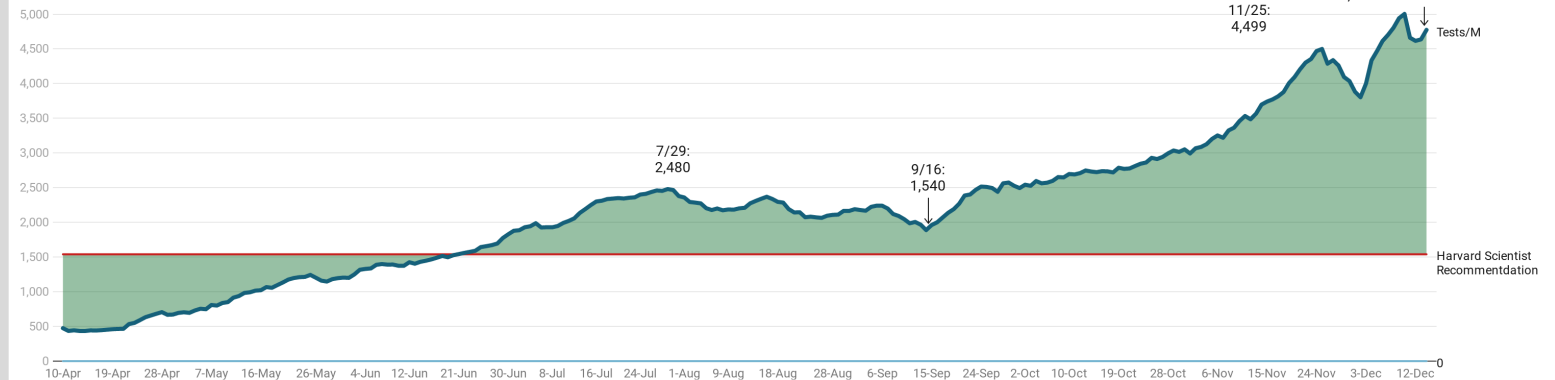
Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

Testing volumes have receded from recent record levels

The test-positive rate increased recently – although this seems to be related to a significant definitional change in positive tests by the state of Texas, resulting in a surge in older positives reported on December 12

Daily Tests Per 1 Million - United States

Trailing 7-Day Moving Average, As of December 14



Health Industry Advisor LLC analysis

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

Test-Positive Rate - United States

7-Day Moving Average, As of December 14

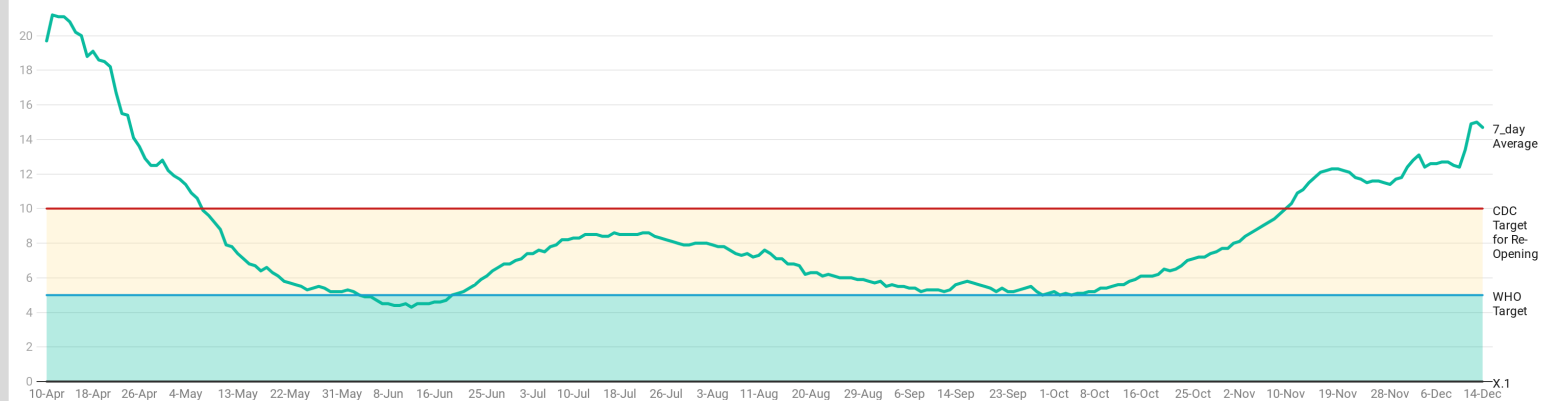


Chart: Health Industry Advisor LLC • Source: The Atlantic's Covid Tracking Project • Created with Datawrapper

Each of the eight states (ND, SD, WY, IA, MN, NE, NH and AK) with the highest peak infection rates per capita have seen these rates recede significantly from these peaks

The highest rates are now being experienced in Tennessee, Rhode Island, Arizona and Ohio, in order

New Daily Detected Cases Per Million - By State

7-Day Average As of December 14 & Difference From State's Highest Rate To-Date

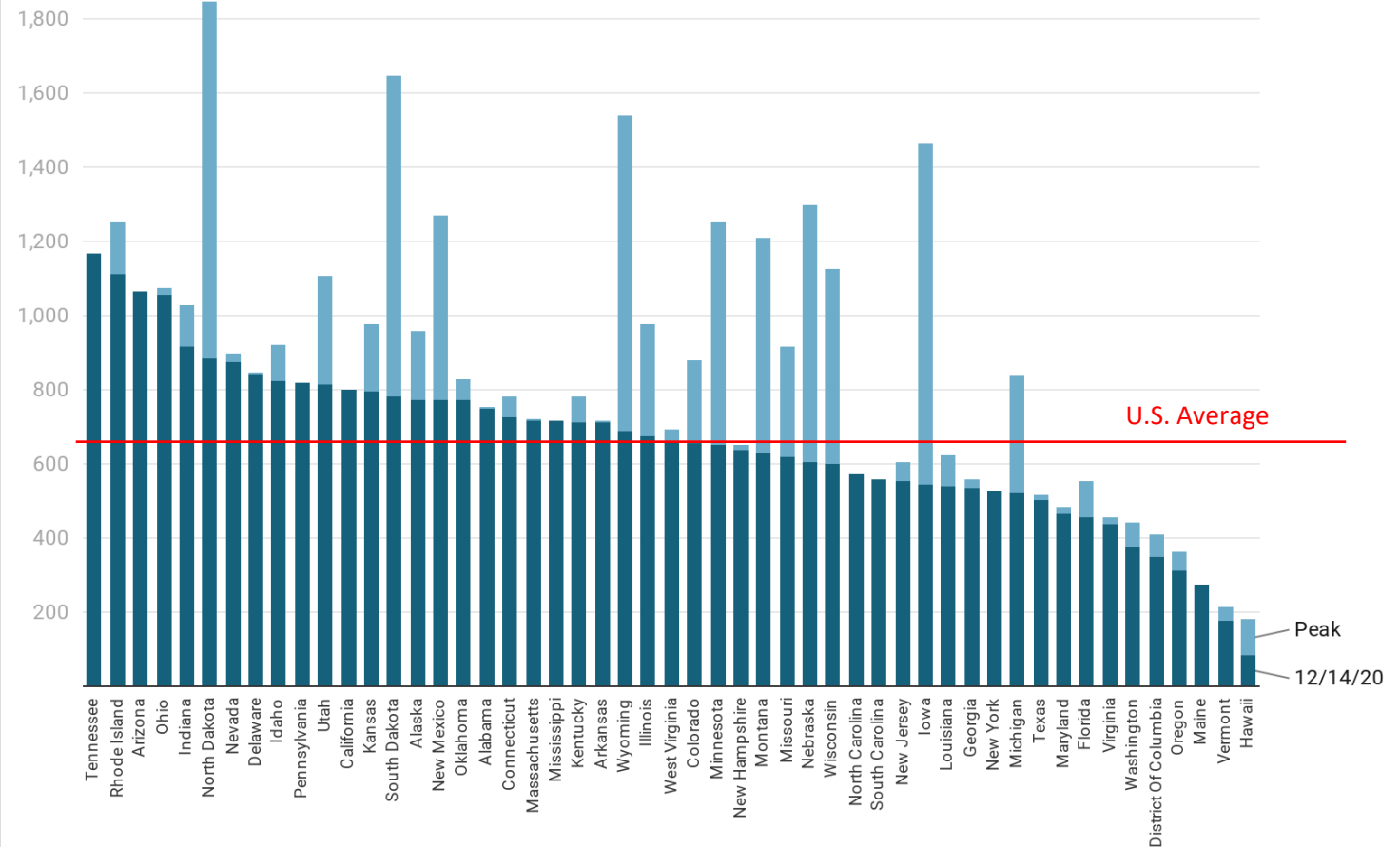
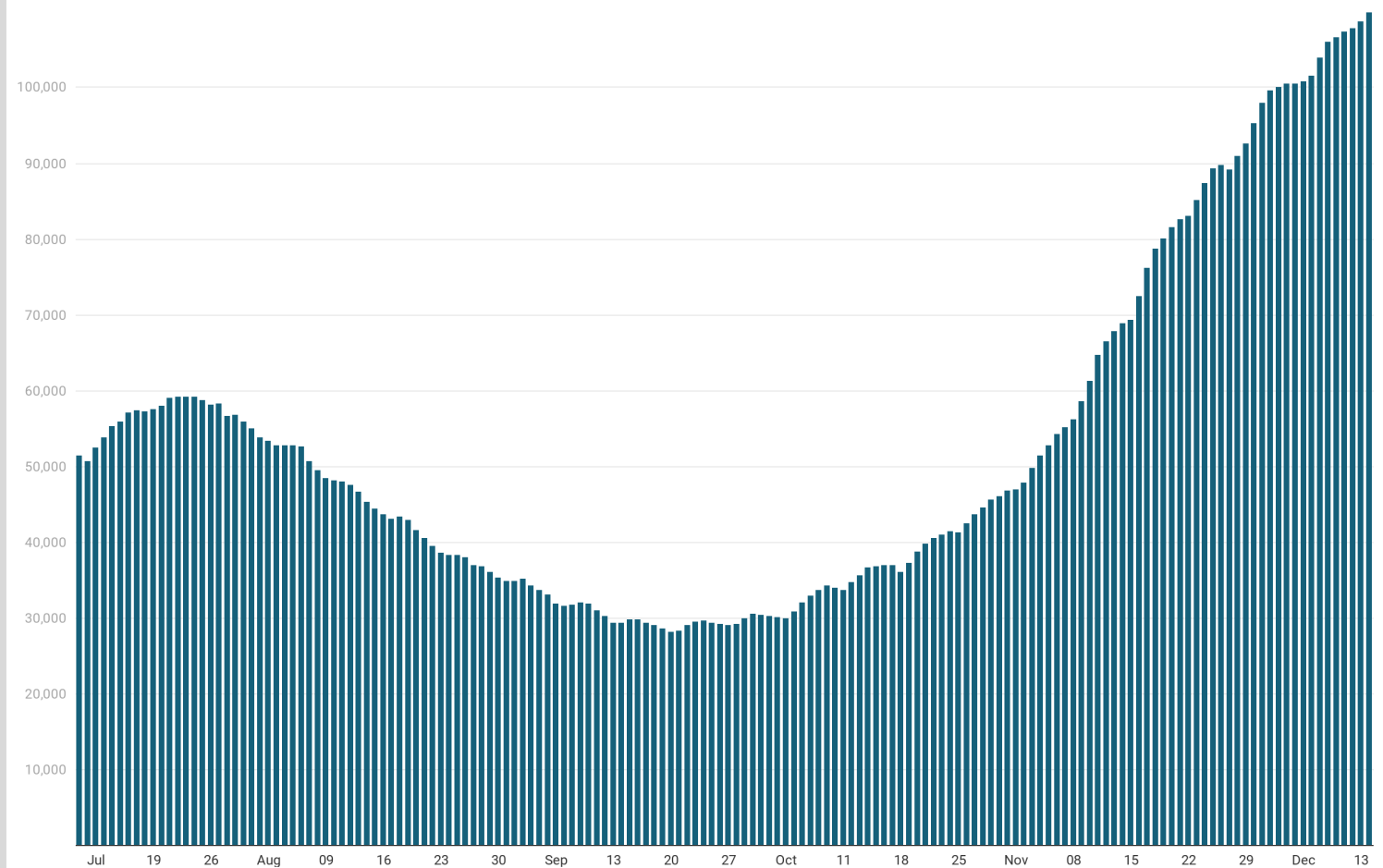


Chart: Health Industry Advisor LLC • Source: worldometers.info • Created with Datawrapper

There just fewer than
110,000 Covid-19
patients in U.S. hospitals
yesterday

Hospital Census: COVID-19 Patients

As of December 7



Florida data first available on July 10

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

Covid-19 census increased yesterday, to 35.2% of all inpatient beds

Nevada now has Covid-19 patients occupying 90% of its inpatient beds; in Connecticut, its 72% and in Arizona its 61%.

In California and Rhode Island, its more than 50%

Covid-19 Patients / Total Inpatient Beds

7-Day Moving Average, As of December 14

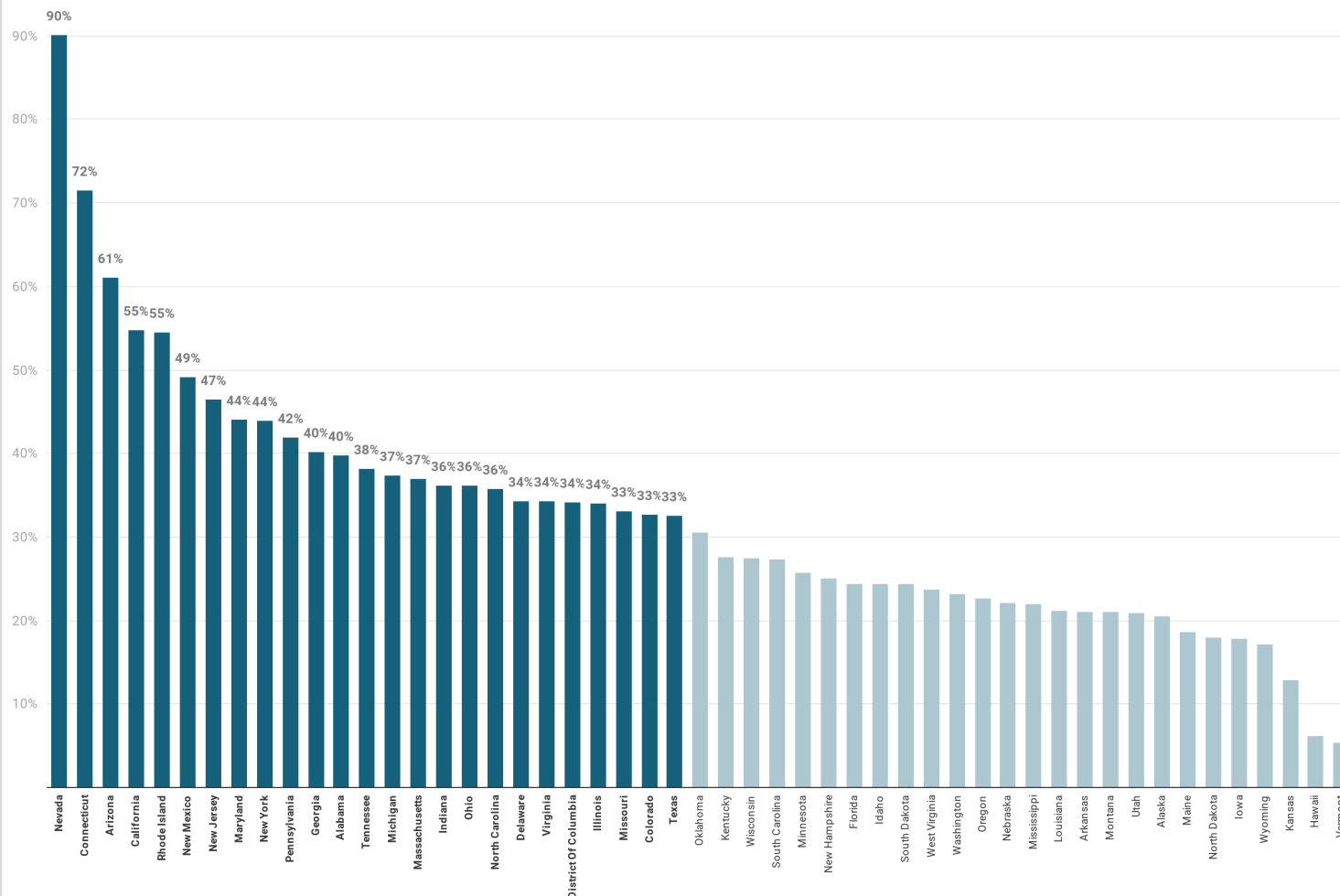


Chart: Health Industry Advisor LLC • Source: The Atlantic's Covid Tracking project & worldometers.info • Created with Datawrapper

The average Covid-19 census per 100 new-cases continues to be relatively low, compared to earlier in the pandemic

Covid-19 Hospital Census / 100 Daily New Detected Cases

7-Day Moving Average, As of December 14

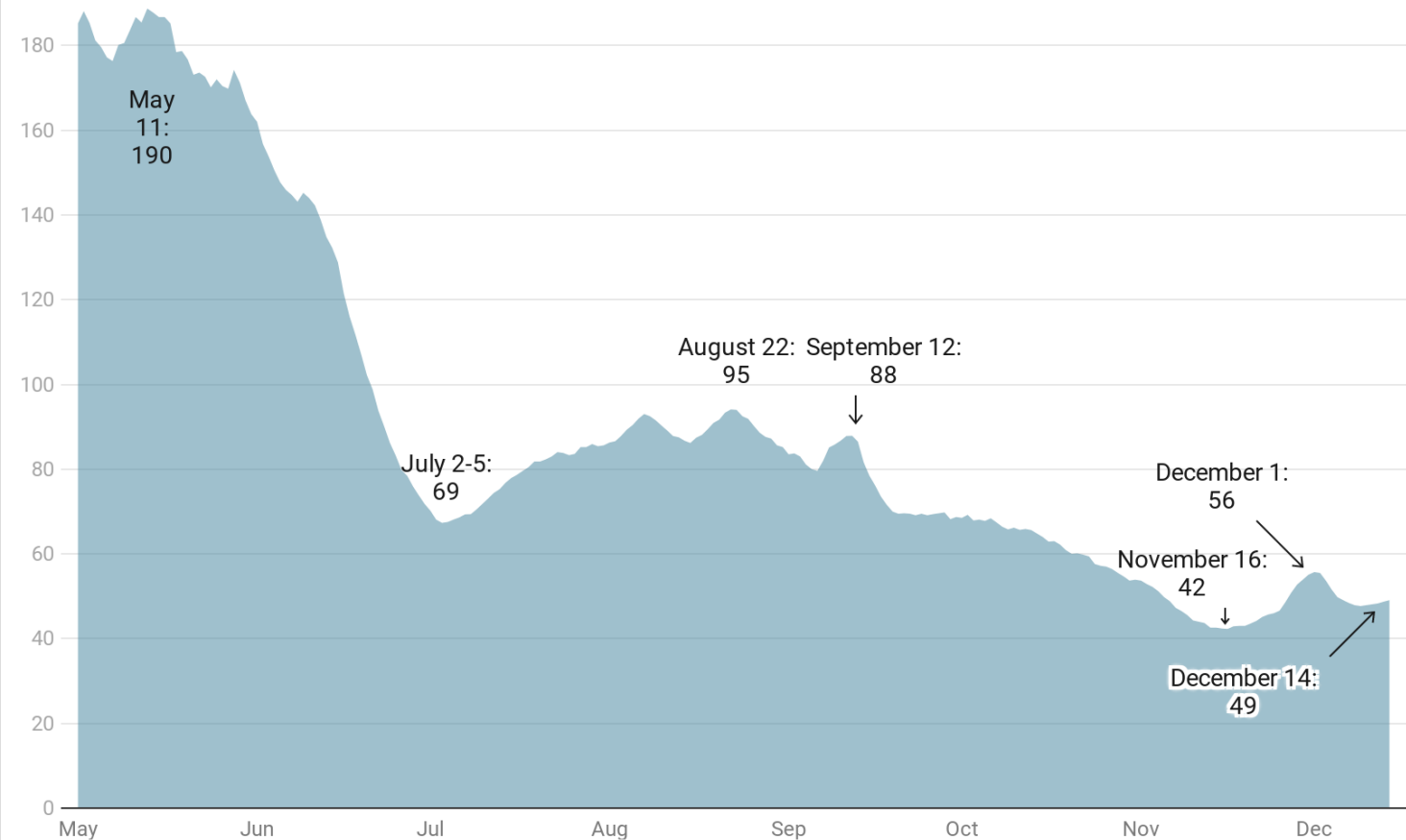


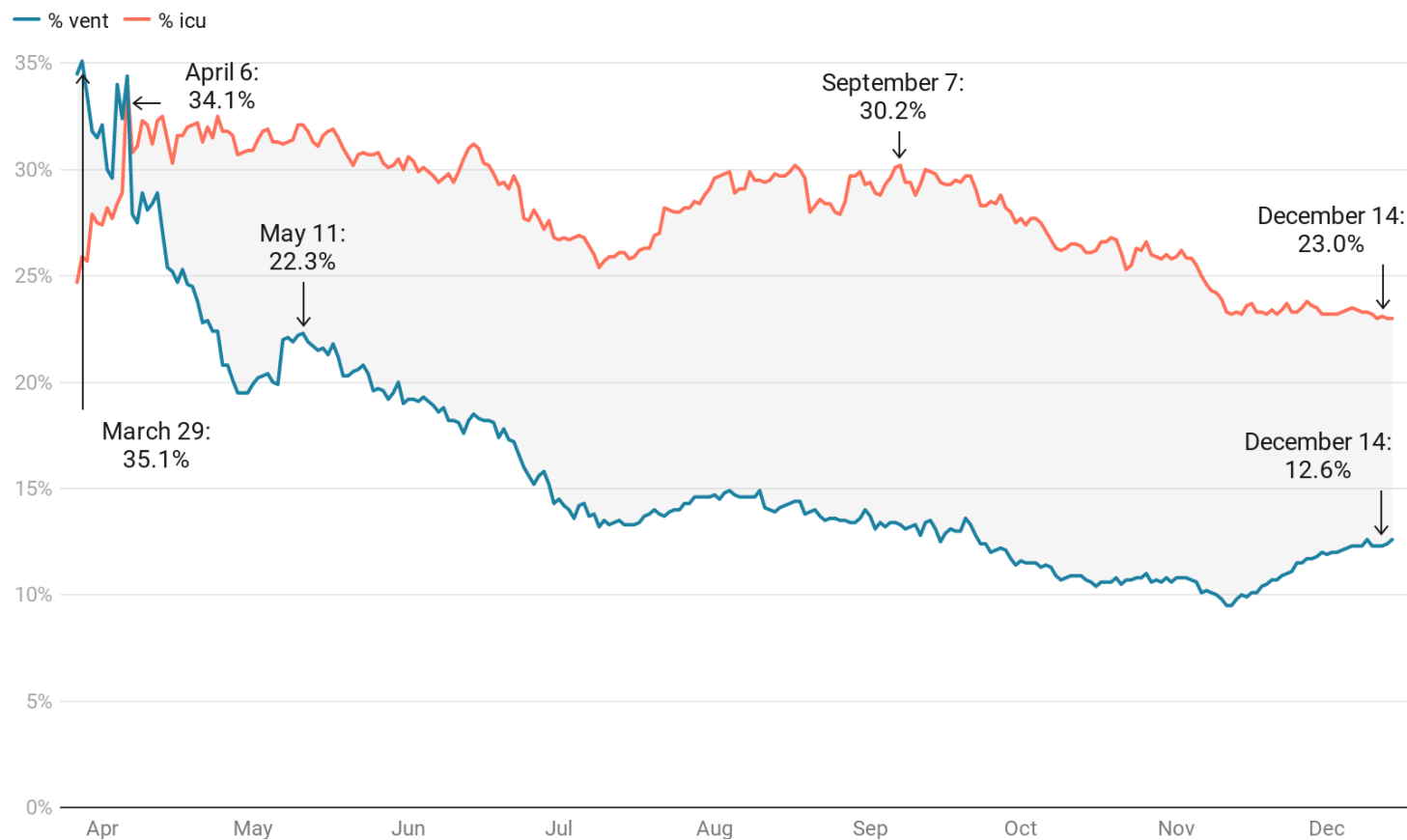
Chart: Health Industry Advisor LLC • Source: The Atlantic's Covid Tracking project & worldometers.info • Created with Datawrapper

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

The likelihood of a hospitalized Covid-19 patients would be on a ventilator trended up for several weeks before stabilizing the past week

Severity of Hospitalized Patients

% of patients on ventilators and in the ICU, As of December 14



Health Industry Advisor LLC analysis

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

The % of ER visits for COVID-19-like illnesses (CLI) seems to have declined sharply since Thanksgiving (as have visits for Pneumonia; visits for shortness-of-beath have increased)

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 December 11

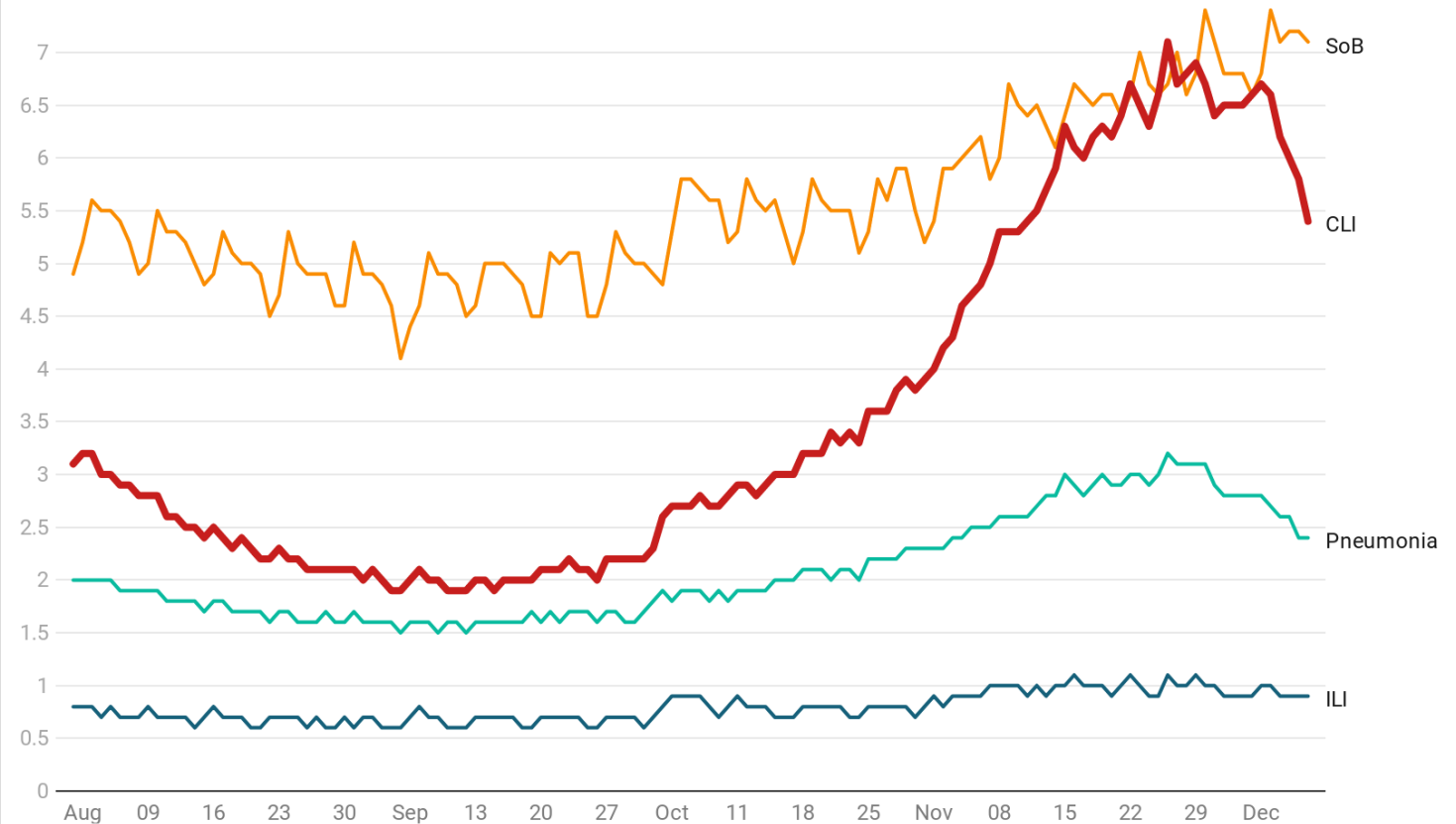


Chart: Health Industry Advisor LLC • Source: CDC • Created with Datawrapper

The 7-day average deaths have been increasing since Thanksgiving . . . And are higher than at any point during the pandemic

Deaths Reported With Coronavirus in the U.S.

Trailing 7-Day Moving Average, As of December 14



Health Industry Advisor LLC analysis

Chart: Health Industry Advisor LLC • Source: worldometers.info • 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®ion=United%20States&panel=mortality>