COVID-…22?

Where We Are, How We Got Here, and How This Ends

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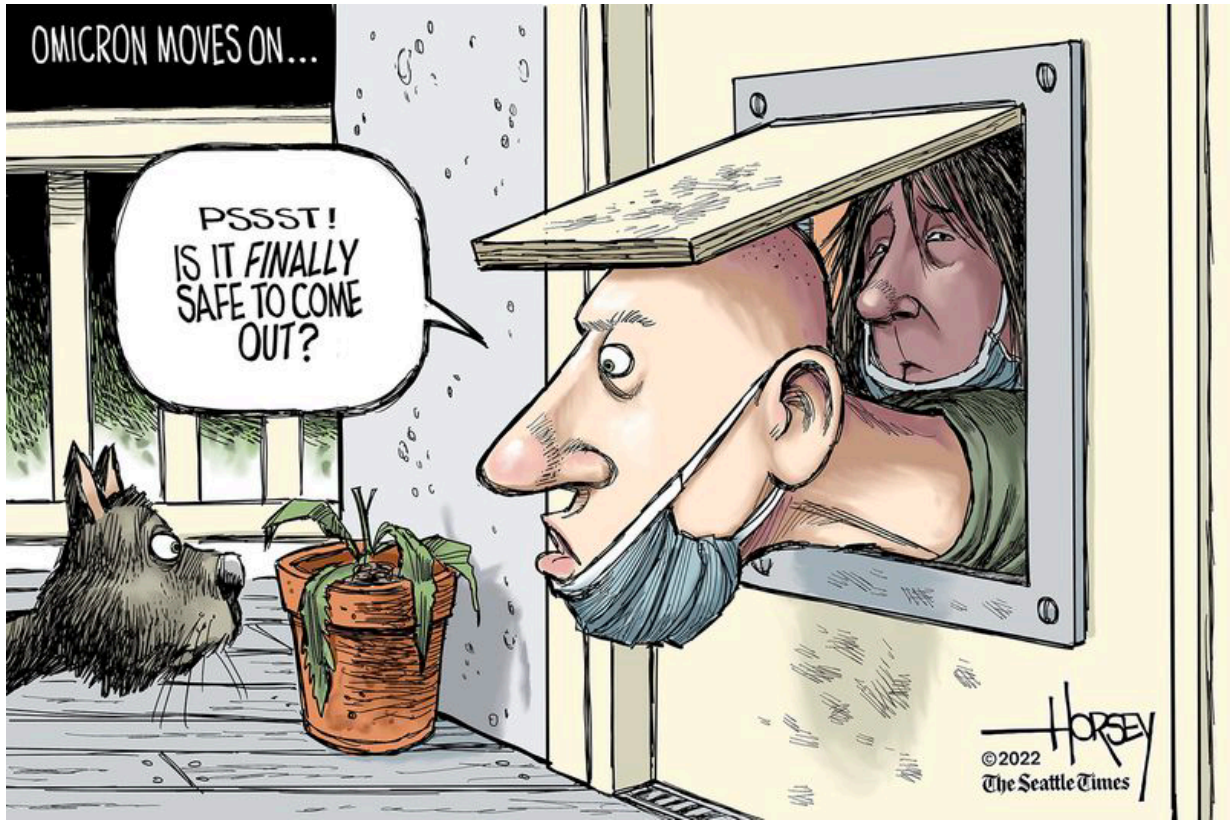
Disclosures

- No relevant financial disclosures

Agenda

- Where we are
  - Current epidemiology and trends
- How we got here
  - Vaccines
  - Therapeutics
  - Variants
- How this ends
  - CDC Mask Guidance
  - Struggles, FAQ, what I'll do, vulnerabilities and silver linings

Where are we?


OMICRON MOVES ON...
PSSST! IS IT FINALLY SAFE TO COME OUT?
Horsey
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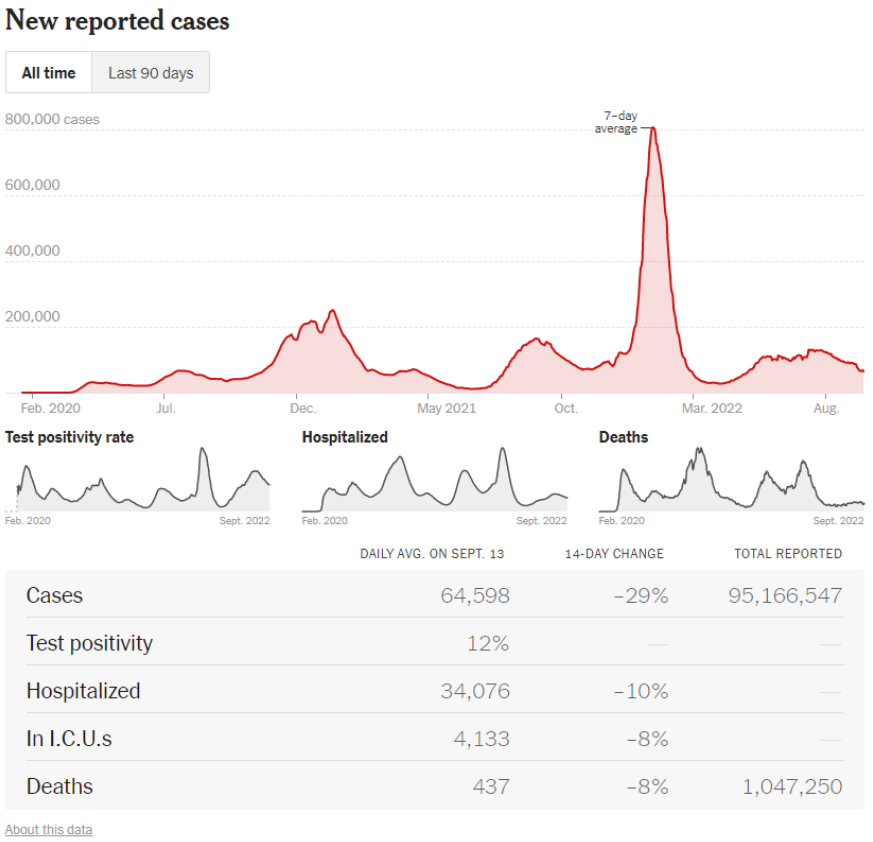
National Epidemiology

- Over 25% of Americans documented to have had COVID and over 70% estimated to have had COVID since 1/2020
- Proportional mortality drastically reduced with Omicron
- Deaths have been fairly stable since March 2022



New reported cases

All time | Last 90 days

800,000 cases
600,000
400,000
200,000
7-day average
Feb. 2020 Jul. Dec. May 2021 Oct. Mar. 2022 Aug.

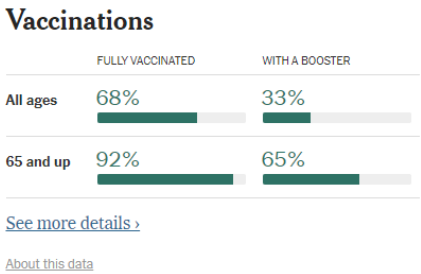
Test positivity rate
Feb. 2020 Sept. 2022

Hospitalized
Feb. 2020 Sept. 2022

Deaths
Feb. 2020 Sept. 2022

	DAILY AVG. ON SEPT. 13	14-DAY CHANGE	TOTAL REPORTED
Cases	64,598	-29%	95,166,547
Test positivity	12%	—	—
Hospitalized	34,076	-10%	—
In I.C.U.s	4,133	-8%	—
Deaths	437	-8%	1,047,250

About this data



Vaccinations

	FULLY VACCINATED	WITH A BOOSTER
All ages	68%	33%
65 and up	92%	65%

See more details ›

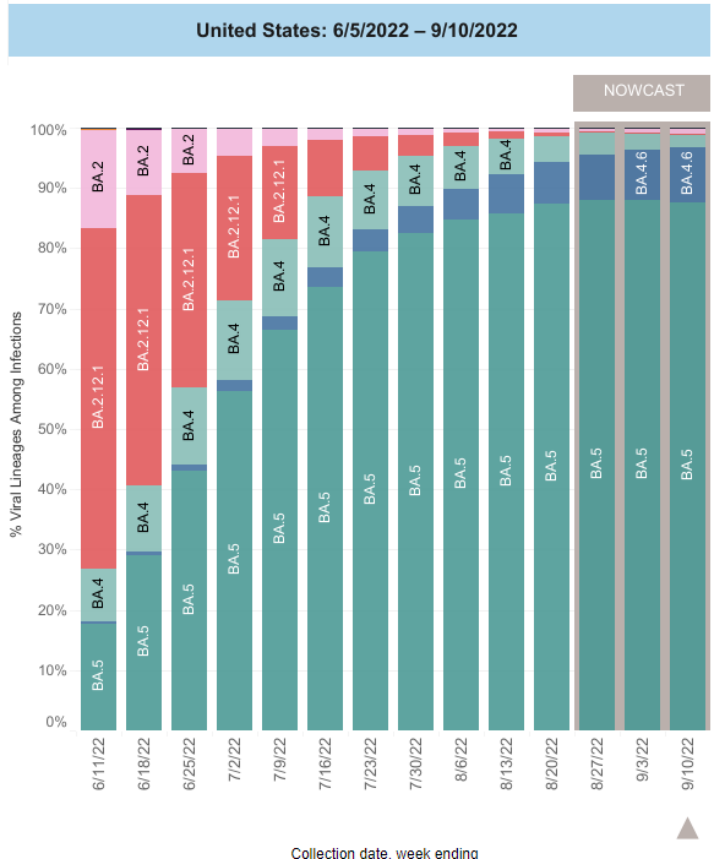
About this data

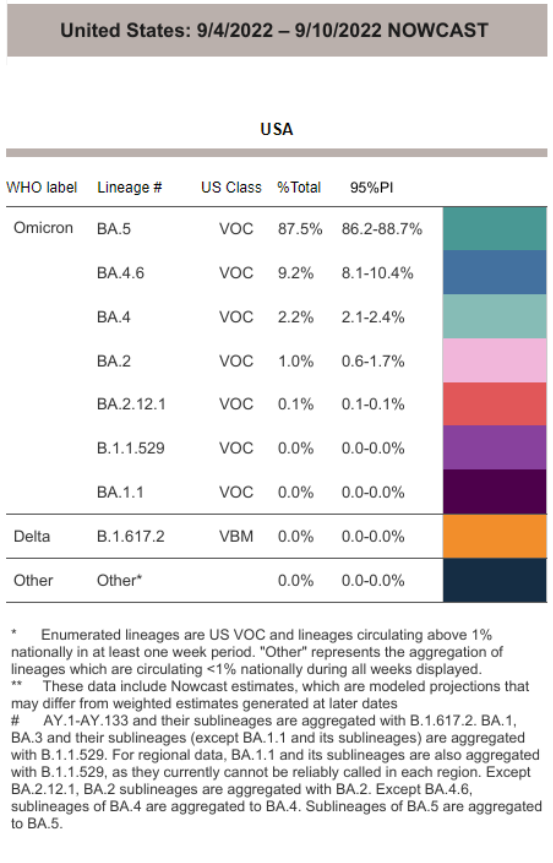
State of the virus

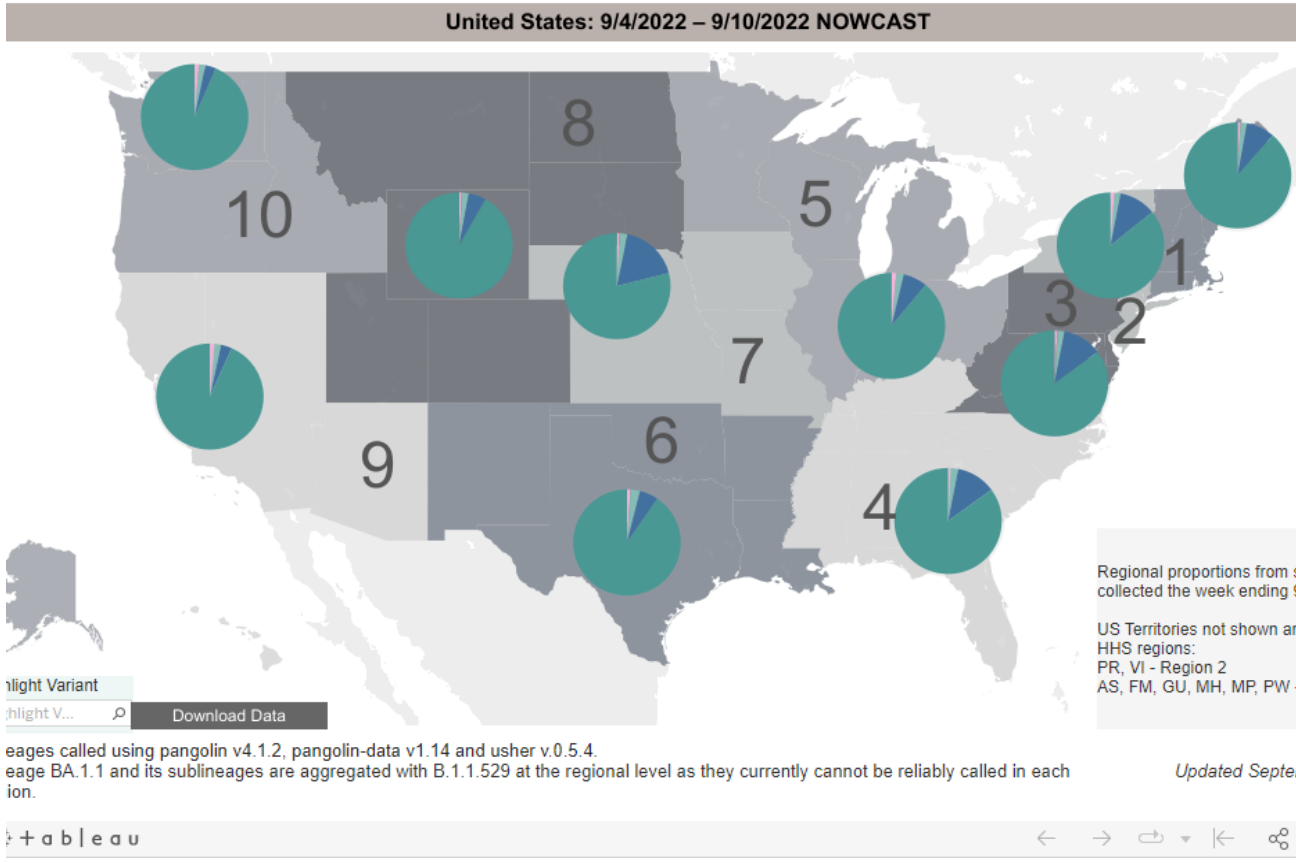
Update for September 8

- Known coronavirus cases have fallen significantly in recent weeks, with the national average falling below 90,000 cases per day just before Labor Day.
- The holiday has skewed current figures somewhat, since many states reported delayed or incomplete data in the aftermath of the long weekend. Still, case counts are in far better shape today than a month ago, when nearly 120,000 cases were announced each day.
- Cases have decreased over the past two weeks in all but a handful of states. In the Northwest, Washington and Oregon have both seen cases fall by more than 20 percent.
- Hospitalizations have also seen sustained improvement. Fewer than 35,000 people are

Covid in the U.S.: Latest Maps, Case and Death Counts - The New York Times (nytimes.com)



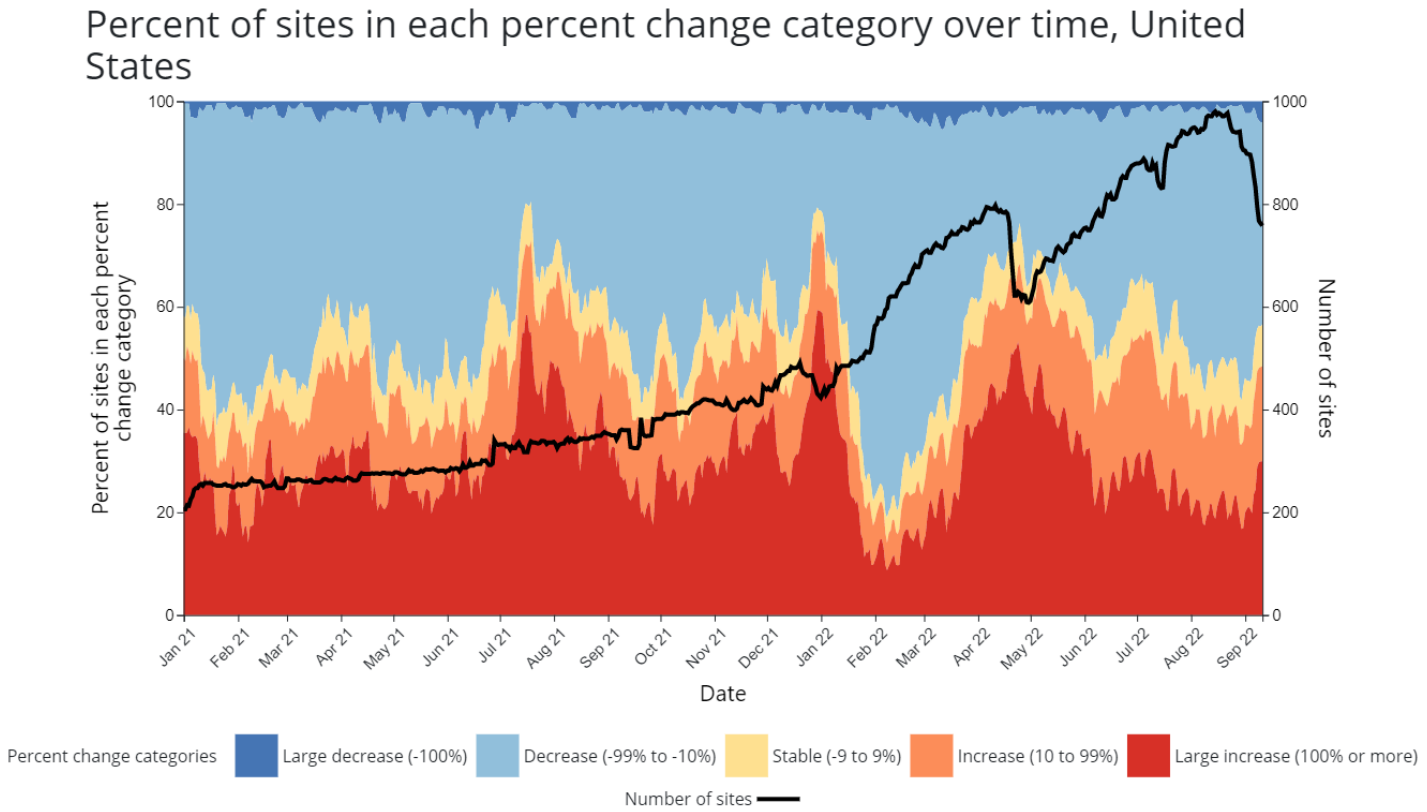




National Epidemiology

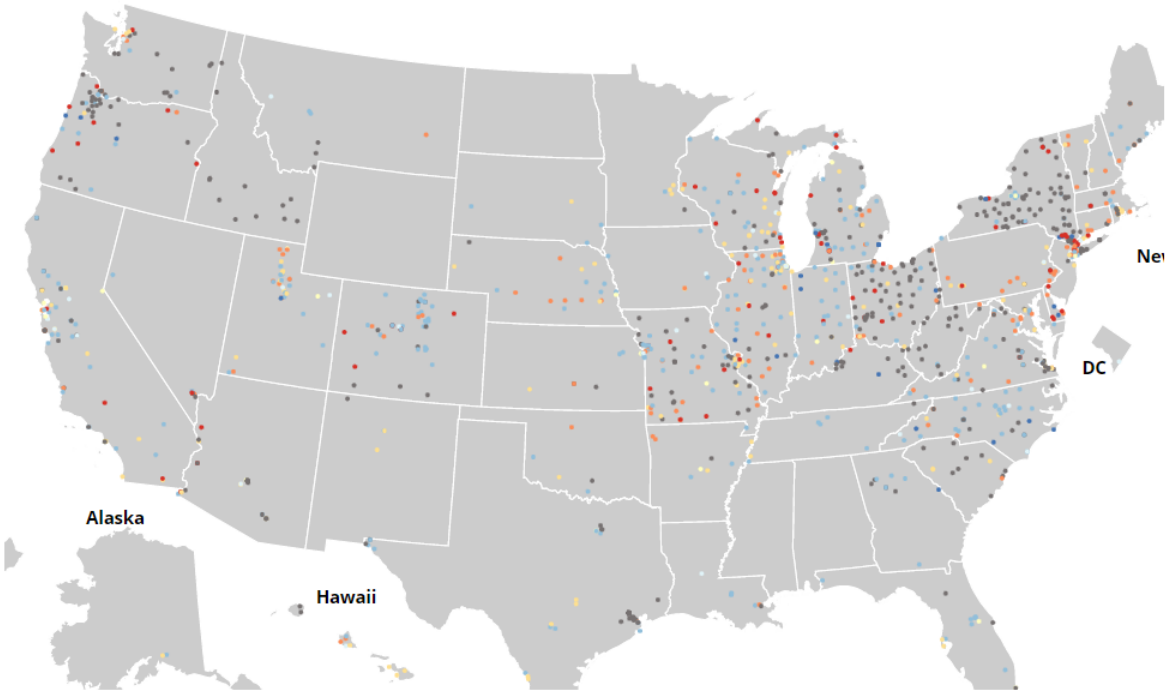
https://covid.cdc.gov/covid-data-tracker/#variant-proportions

Wastewater Monitoring



https://covid.cdc.gov/covid-data-tracker/#wastewater-surveillance

Wastewater Change Map



Percent change of SARS-CoV-2 in the last 15 days by site, United States

15-day % change category	Num. sites	% sites	Category change in last 7 days
– 100%	31	4	48%
– 99% to – 10%	298	39	– 36%
– 9% to 0%	34	4	– 31%
1% to 9%	28	4	– 15%
10% to 99%	140	18	0%
100% to 999%	145	19	12%
1000% or more	82	11	49%

Total sites with current data: 758

Total number of wastewater sampling sites: 1183

How is the 15-day percent change calculated?

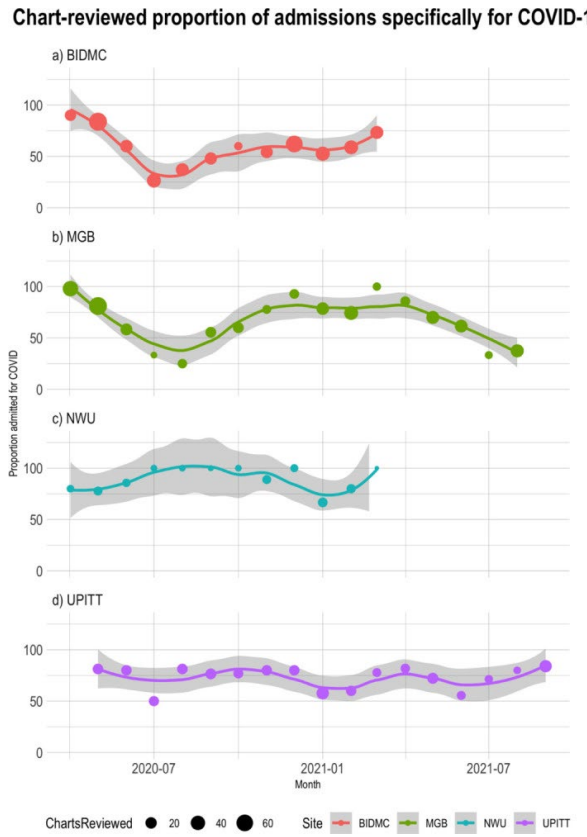
Select legend categories to filter points on the map.

– 100% – 99% to – 10% – 9% to 0% 1% to 9% 10% to 99% 100% to 999% 1000% or more No recent data

https://covid.cdc.gov/covid-data-tracker/#wastewater-surveillance

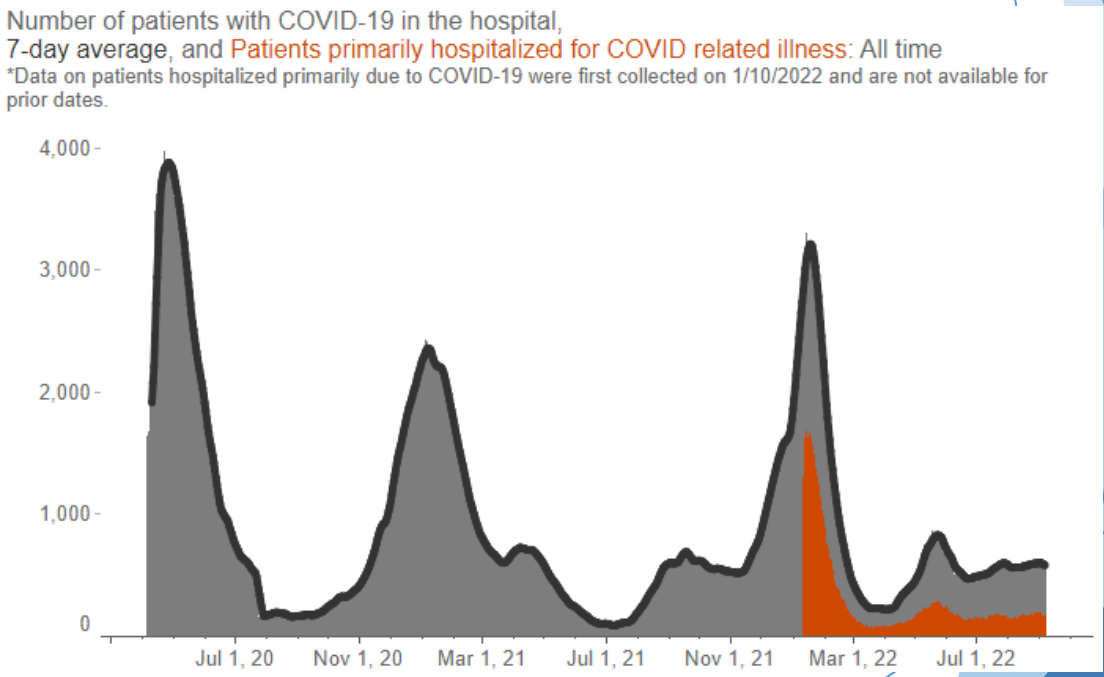
Hospitalizations – Primary vs. Incidental

Ancestral strain through Alpha



Klann et. al. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8963684/

Omicron Era



https://www.mass.gov/info-details/covid-19-response-reporting#covid-19-interactive-data-dashboard-

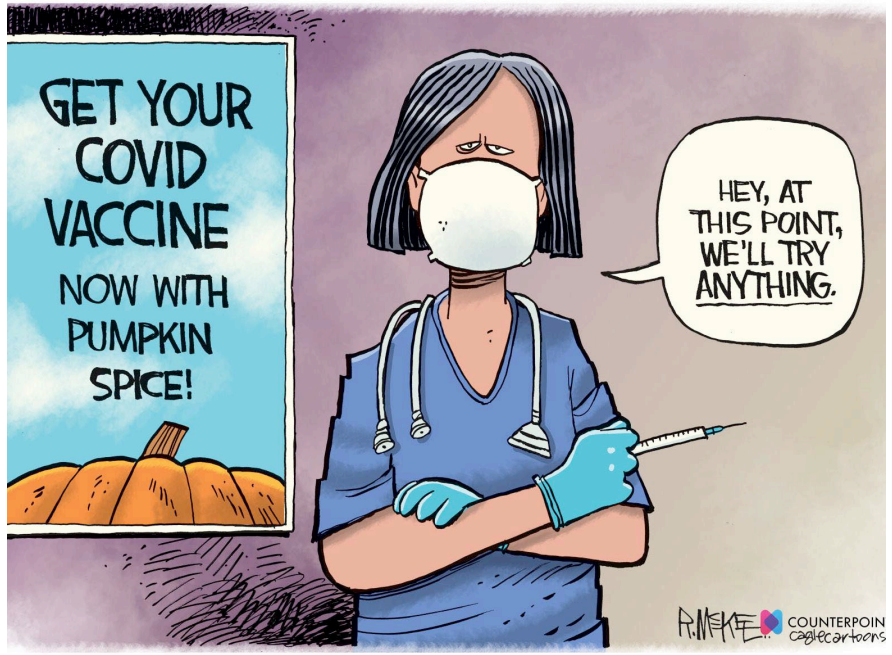
So where are we?

Hostler's Conditions of Endemicity

- Decreased severity of illness
  - Vaccination
  - Omicron
- Ability to protect yourself and others
  - Vaccination
  - PPE
- Behavioral changes
  - Stay home/wear a mask when sick
- Ability to remain flexible
  - We'll be able to do this in health care but anticipate big societal issues here, which we'll probably pay for

How did we get here?

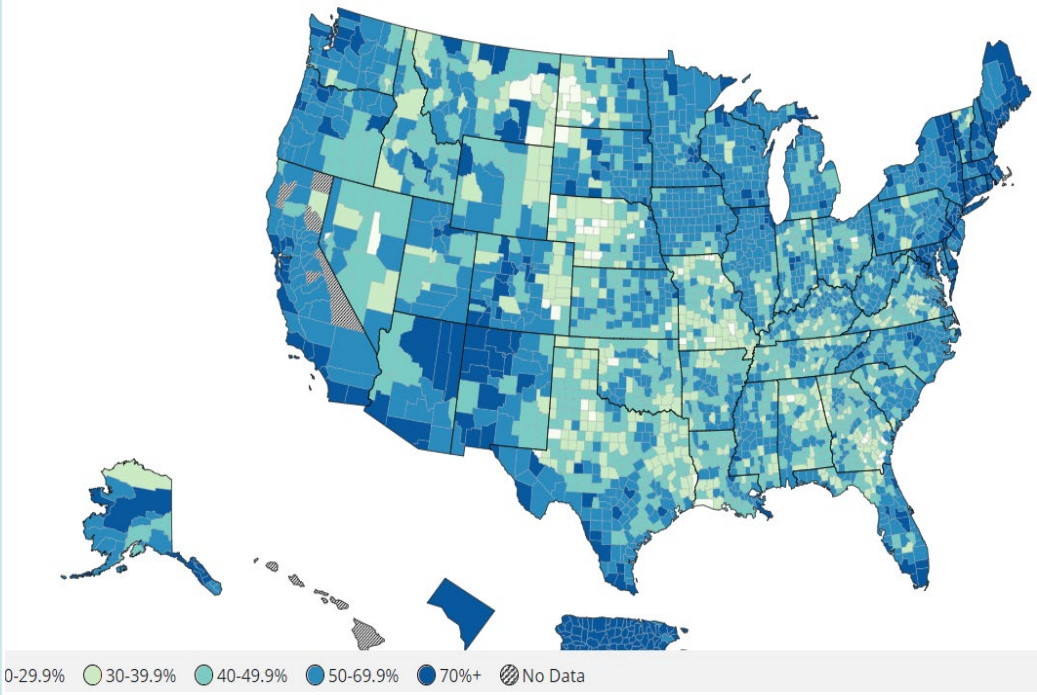
Vaccines



- 4 effective and safe vaccines widely available in the United States
- Everyone 6mo+ eligible and encouraged
- Bivalent boosters now available

At Least One Dose	Fully Vaccinated	First Booster Dose	Second Booster Dose

Vaccinated People	Count	Percent of US Population
Total	263,103,582	79.2%
Population ≥ 5 Years of Age	261,793,204	83.8%
Population ≥ 12 Years of Age	250,806,049	88.5%
Population ≥ 18 Years of Age	232,901,518	90.2%
Population ≥ 65 Years of Age	57,488,420	95%



CDC | Data as of: September 7, 2022 6:00am ET. Posted: September 8, 2022

Vaccines

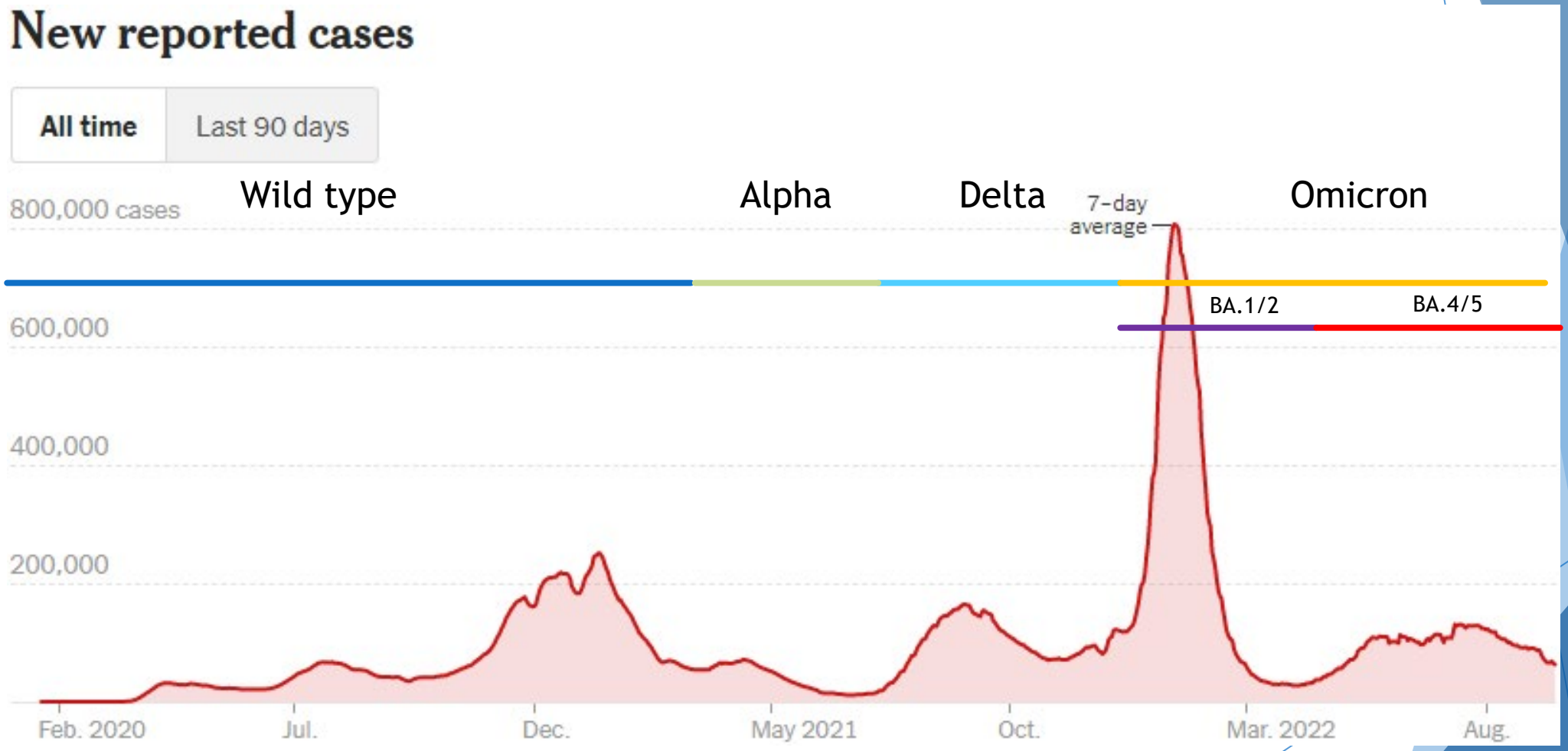
COVID Therapeutics

- Pre-exposure:
  - Evusheld (IM)
- Early outpatient therapy:
  - 1) Nirmatrelvir/ritonavir (PO)
  - 2) Remdesivir (IV)
  - 3) Bebtelovimab (IV)
  - 3) Molnupiravir (PO)
- Inpatient Therapeutics
  - Remdesivir
  - Dexamethasone
  - Baricitinib
  - Tocilizumab

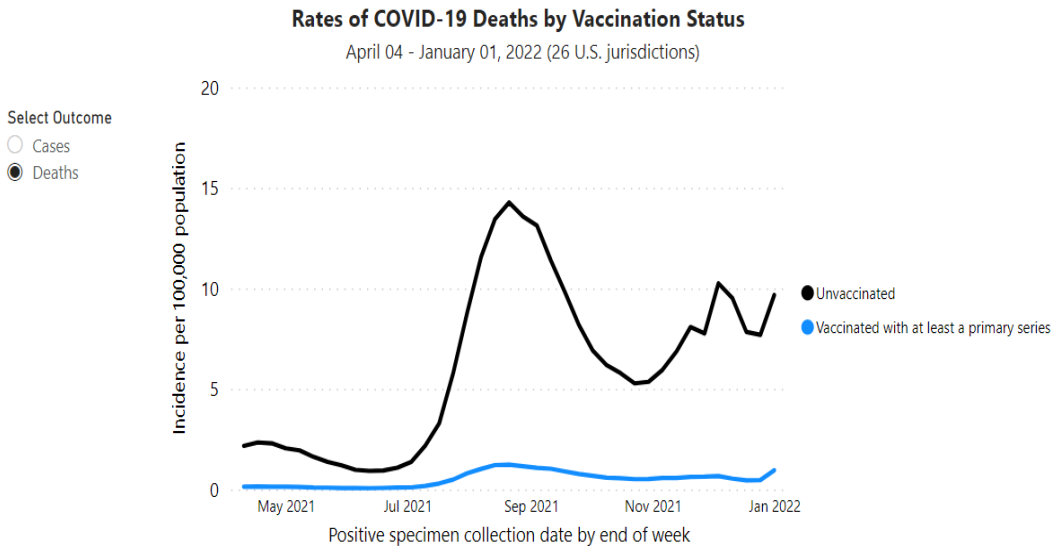
Therapeutic struggles

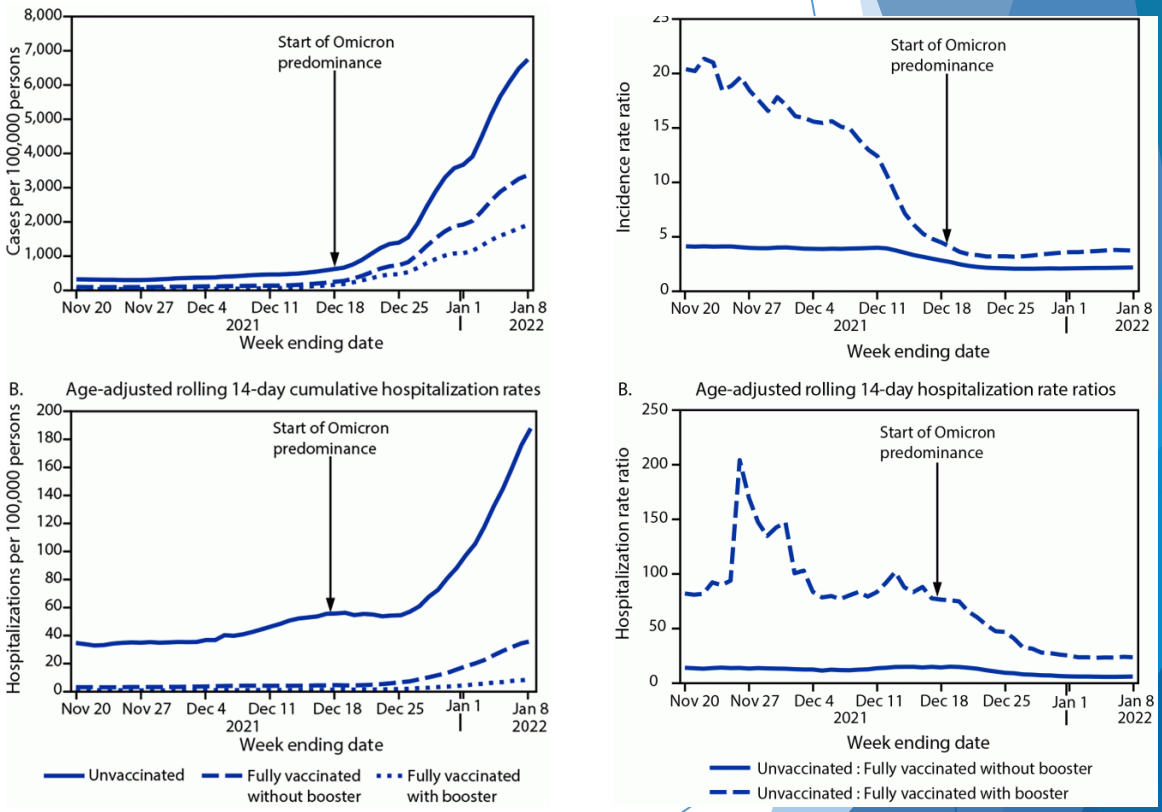
- No significant movement in appropriate therapies for inpatients
- No change in therapeutics in about 9 months (except removal of sotrovimab)
- Restrictions on EUA therapies make them difficult to distribute and tailor therapies for individuals
  - Individual benefit
  - Public health benefit
- A LOT of drug interactions for the most effective oral therapy
- Supply remains an issue

Variants


New reported cases
All time
Last 90 days
800,000 cases
600,000
400,000
200,000
Wild type
Alpha
Delta
7-day average
Omicron
BA.1/2
BA.4/5
Feb. 2020
Jul.
Dec.
May 2021
Oct.
Mar. 2022
Aug.

The Omicron Effect





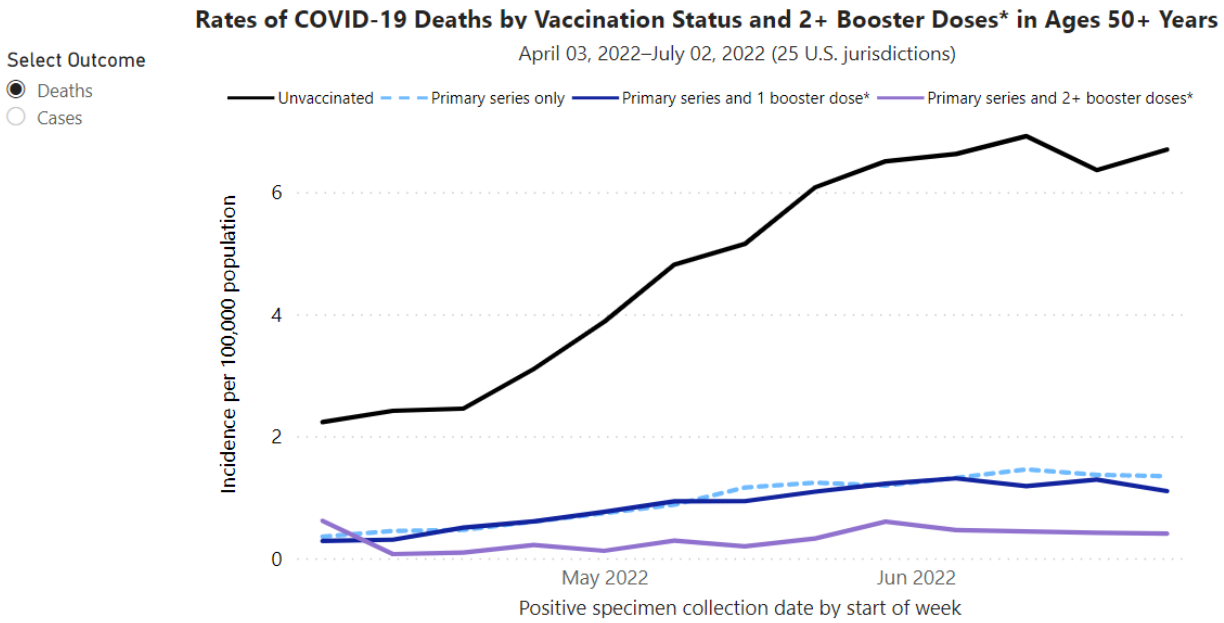
Vaccine Effectiveness

Table 4a. Consensus estimates of vaccine effectiveness against BA.1 or BA.2 Omicron for 2 doses and 3 doses of COVID-19 vaccine compared to unvaccinated individuals

Vaccine product for primary course	Outcome	Second dose: 0 to 3 months	Second dose: 4 to 6 months	Second dose: 6+ months	Booster dose: all periods	Booster dose: 0 to 3 months	Booster dose: 4 to 6 months	Booster dose: 6+ months
AstraZeneca	All Infection	30% (20 to 40%)	0 to 30% (range only)	0% (0 to 10%)	See individual periods	40% (30 to 50%)	20% (10 to 30%)	0% (0 to 10%)
	Symptomatic	40% (30 to 50%)	20% (5 to 30%)	5% (0 to 5%)	See individual periods	60% (50 to 70%)	40% (30 to 50%)	10% (0 to 20%)
	Hospitalisation	85% (60 to 90%)	70% (50 to 75%)	65% (45 to 85%)	See individual periods	90% (85 to 95%)	85% (85 to 95%)	70% (50 to 85%)
	Mortality	Insufficient data	Insufficient data	Insufficient data	See individual periods	90% (85 to 98%)	Insufficient data	Insufficient data
	Transmission	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Moderna	All Infection	30% (20 to 40%)	0 to 30% (range only)	30% (10 to 50%)	See individual periods	40% (30 to 50%)	20% (10 to 30%)	0% (0 to 10%)
	Symptomatic	55% (35 to 75%)	30% (15 to 35%)	15% (10 to 20%)	See individual periods	65% (55 to 75%)	40% (30 to 50%)	10% (0 to 20%)
	Hospitalisation	85 to 95% (range only)	75 to 85% (range only)	55 to 90% (range only)	See individual periods	85 to 95% (range only)	Insufficient data	Insufficient data
	Mortality	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
	Transmission	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data	Insufficient data
Pfizer	All infection	30% (20 to 40%)	0 to 30% (range only)	20% (10 to 30%)	See individual periods	40% (30 to 50%)	20% (10 to 30%)	0% (0 to 10%)
	Symptomatic	50% (30 to 65%)	20% (15 to 30%)	15% (10 to 15%)	See individual periods	65% (55 to 75%)	45% (35 to 55%)	10% (0 to 20%)
	Hospitalisation	90% (85 to 95%)	80% (75 to 85%)	70% (55 to 90%)	See individual periods	90% (85 to 95%)	85% (85 to 95%)	70% (50 to 85%)
	Mortality	Insufficient data	Insufficient data	Insufficient data	See individual periods	90% (85 to 98%)	Insufficient data	Insufficient data
	Transmission	Insufficient data	Insufficient data	Insufficient data	0 to 25% (range only)	Insufficient data	Insufficient data	Insufficient data

UK Health Security Agency COVID-19 Vaccine Surveillance Report – Week 35 (1 September 2022)

Vaccine Effectiveness



In June 2022, among people ages 50 years and older, unvaccinated people had:

14X
Risk of Dying from COVID-19

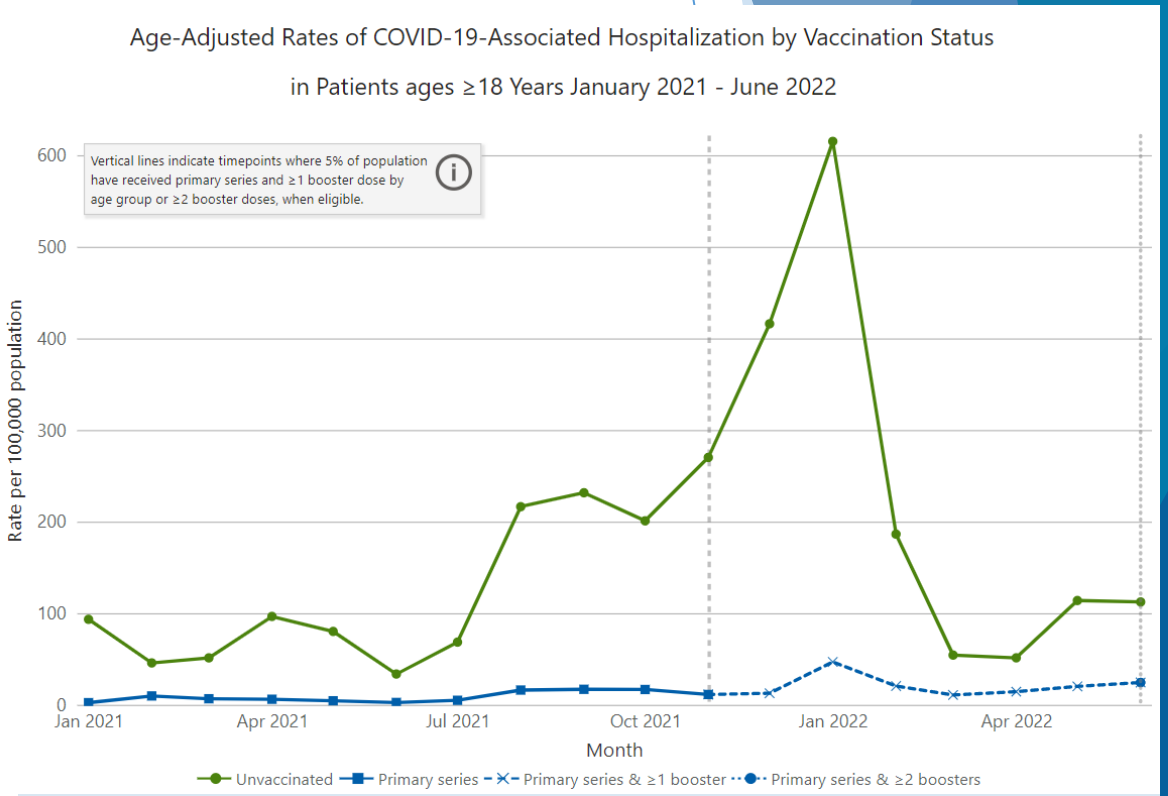
compared to people vaccinated with a primary series and two or more booster doses.*

Among people ages 50 years and older, vaccinated people with a primary series and one booster dose had:

3X
Risk of Dying from COVID-19

compared to people vaccinated with a primary series and two or more booster doses.*

Source: CDC COVID-19 Response, Epidemiology Task Force, Surveillance & Analytics Team, Vaccine Breakthrough Unit

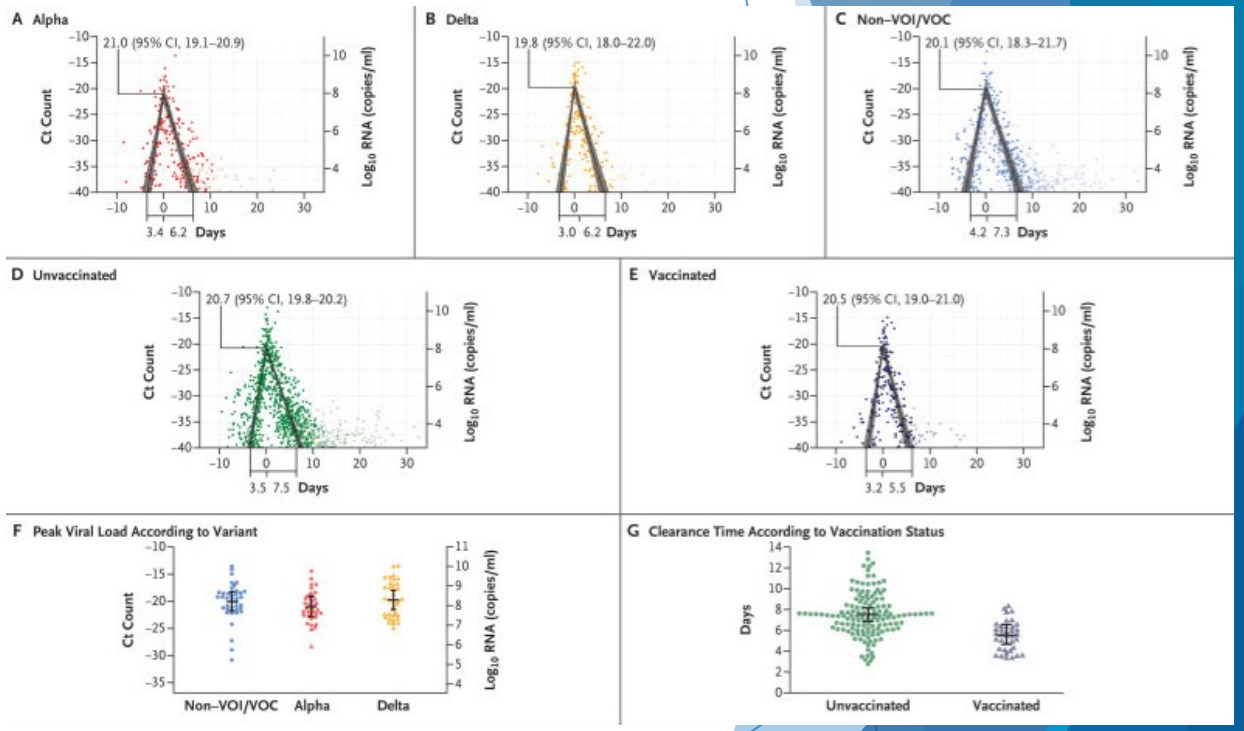


In June 2022, compared to people who are up to date with COVID-19 vaccination, monthly rates of COVID-19-associated hospitalizations were **4.6x Higher in Unvaccinated Adults Ages 18 Years and Older.**

1.7x Higher in Unvaccinated Children Ages 5-11 Years	**2.0x** Higher in Unvaccinated Adolescents Ages 12-17 Years	**2.8x** Higher in Unvaccinated Adults Ages 18-49 Years	**3.6x** Higher in Unvaccinated Adults Ages 50-64 Years	**6.3x** Higher in Unvaccinated Adults Ages 65 Years and Older

Change in Viral Dynamics

- Alpha and Delta shed for shorter duration than wild type
- Clearance time significantly shorter in vaccinated populations



https://www.nejm.org/doi/10.1056/NEJMc2102507?url_ver=Z39.88-2003&rfr_id=ori:rid:crossref.org&rfr_dat=cr_pub%20%200pubmed

Morbidity and Mortality Weekly Report (*MMWR*)

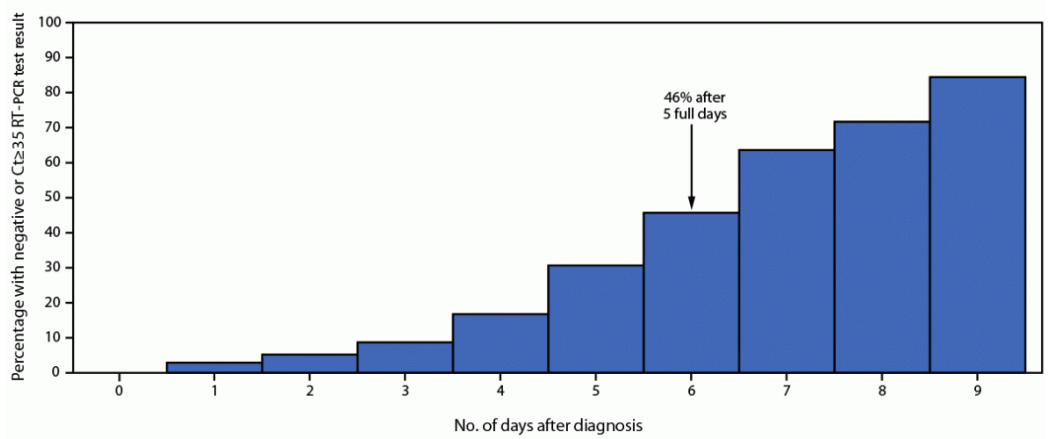
CDC

Results from a Test–to–Release from Isolation Strategy Among Fully Vaccinated National Football League Players and Staff Members with COVID–19 — United States, December 14–19, 2021

Weekly / February 25, 2022 / 71(8);299–305

Christina D. Mack, PhD[1]; Erin B. Wasserman, PhD[1]; Marie E. Killerby, VetMB[2]; Rieza H. Soelaeman, PhD[2]; Aron J. Hall, DVM[2]; Adam MacNeil, PhD[2]; Deverick J. Anderson, MD[3]; Patti Walton, MHSA[4]; Saamir Pasha, MPH[1]; Emily Myers[5]; Catherine S. O'Neal, MD[6]; Christopher J. Hostler, MD[3]; Navdeep Singh, MD[7]; Thom Mayer, MD[8]; Allen Sills, MD[5]
(View author affiliations)

FIGURE 1. Percentage of 173 fully vaccinated* COVID–19 patients (SARS–CoV–2 B.1.1.529 [Omicron] and unsequenced†) with a negative or cycle–threshold ≥35§ reverse transcription–polymerase chain reaction test result, by number of days after diagnosis — National Football League, United States, December 14–19, 2021



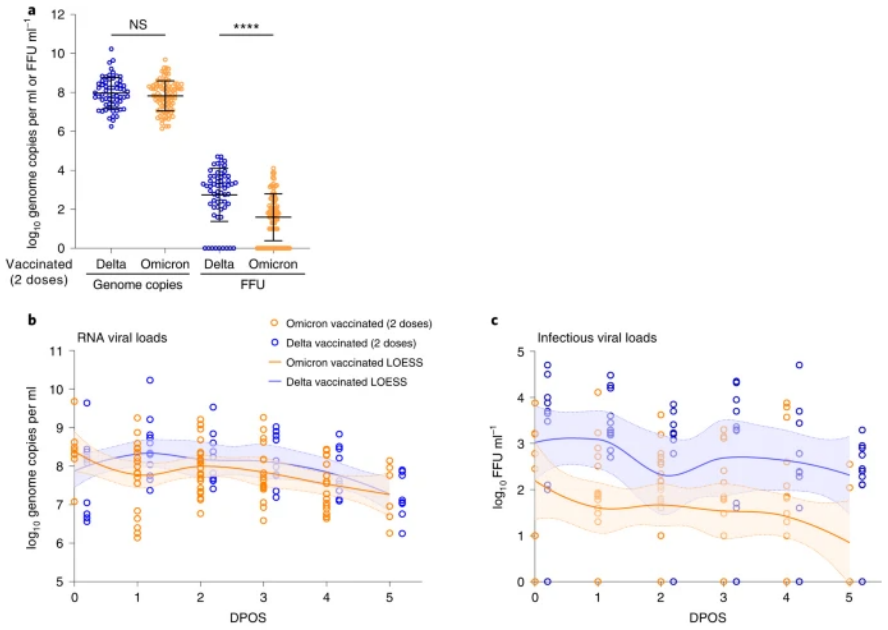
Change in Viral Dynamics

- Omicron sheds for even shorter duration than Alpha or Delta
- Time to negativity among vaccinated individuals about 2 days shorter than Delta
- Supportive of decreased isolation time

Change in Viral Dynamics

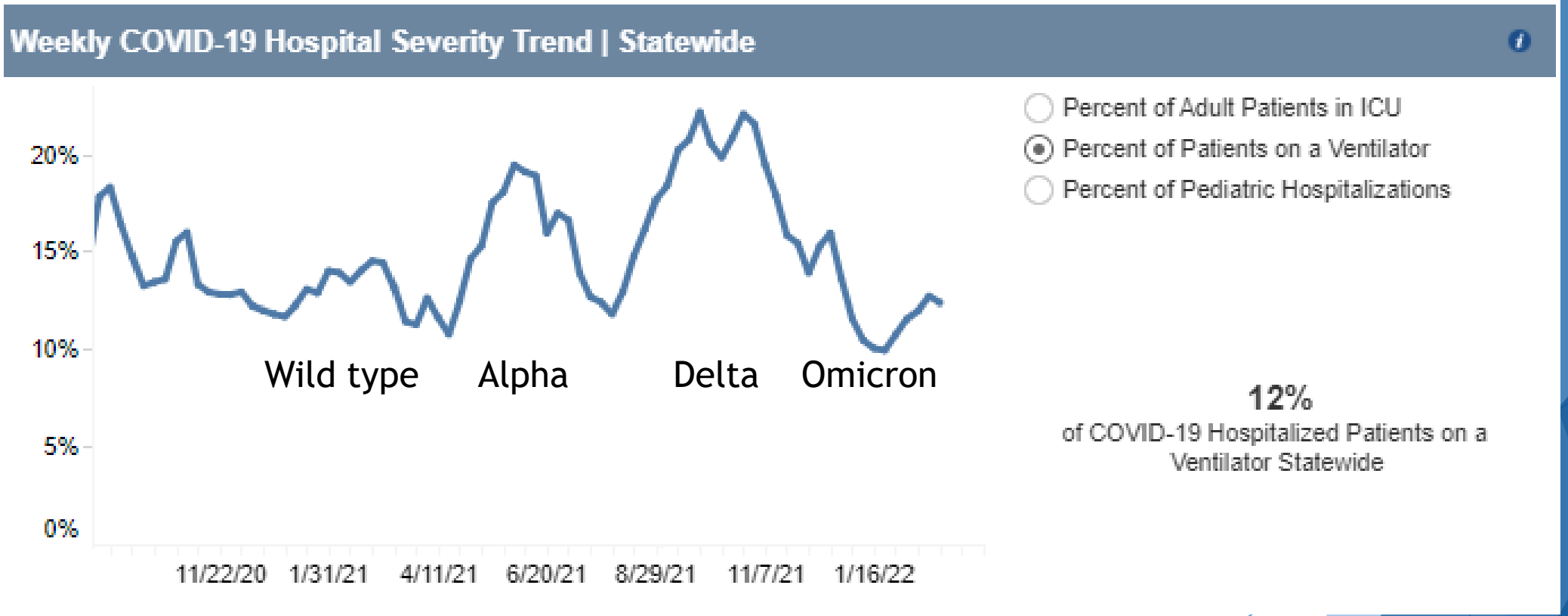
- Infectious titers for vaccinated individuals with Omicron lower than Delta
- Viral loads declined similarly but infectious viral loads declined faster with Omicron than Delta

Fig. 4: SARS-CoV-2 infectious VLs in vaccine breakthrough infections with Omicron or Delta.

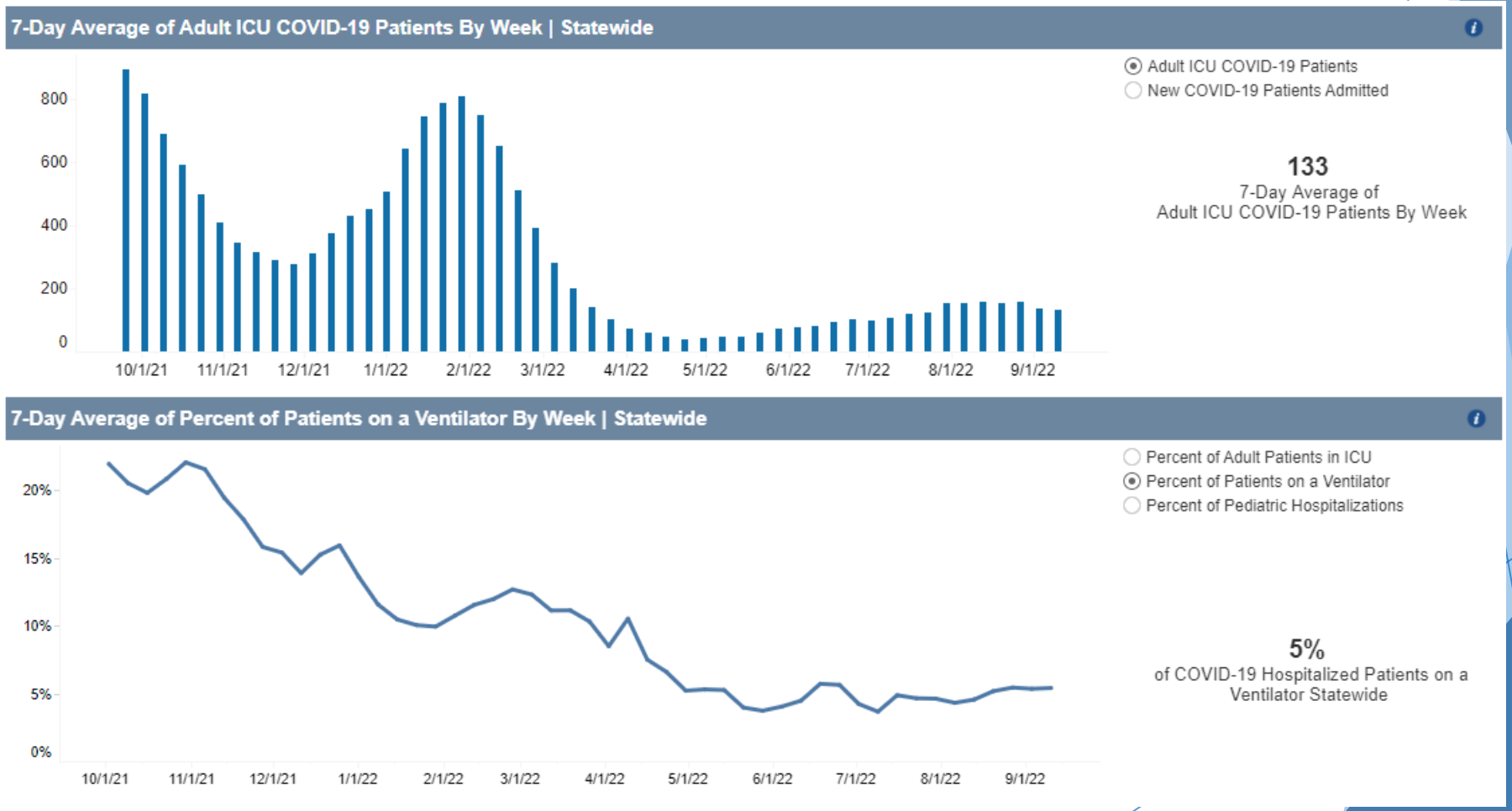


Puhach et. al. https://www.nature.com/articles/s41591-022-01816-0

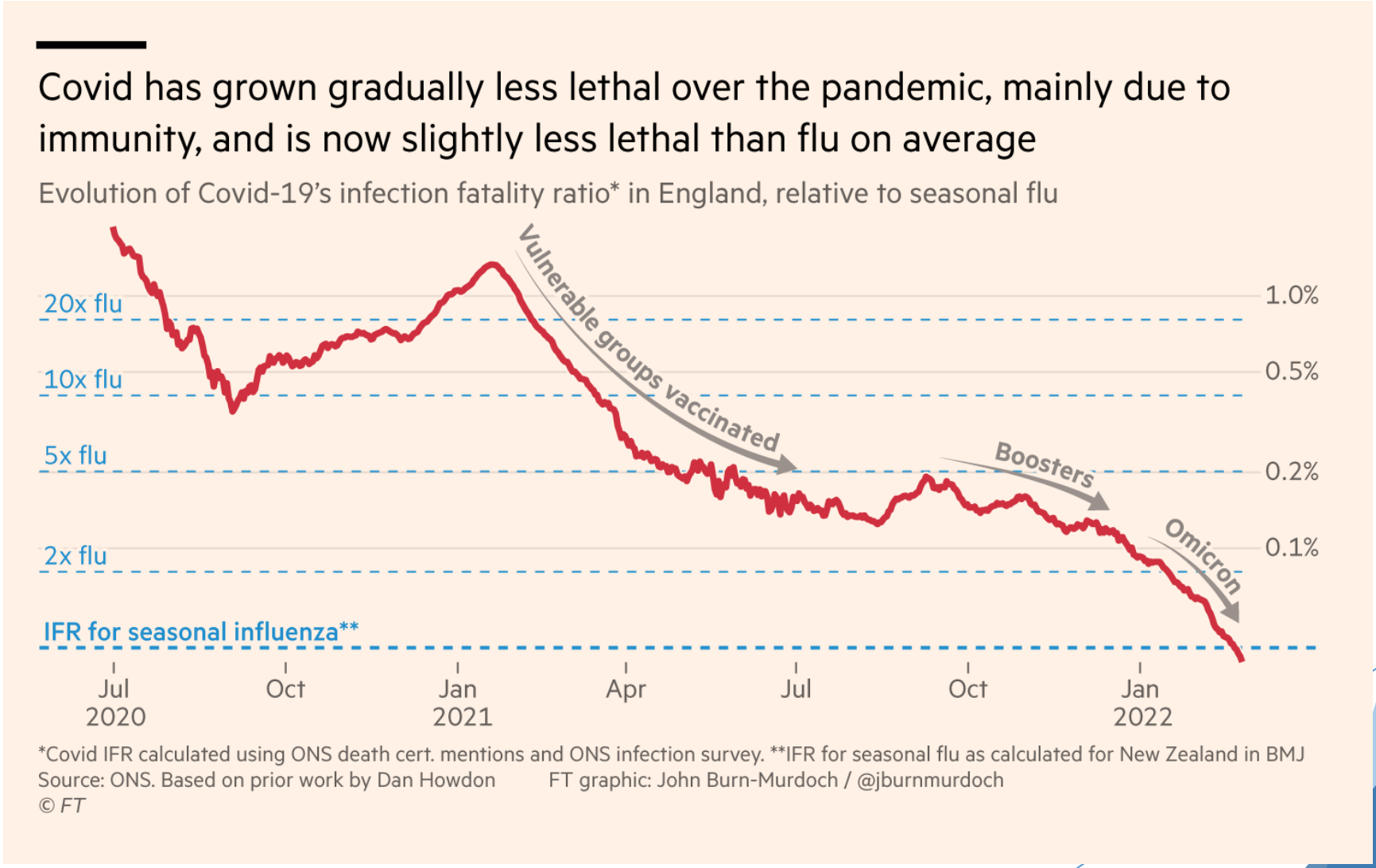
Change in Severity of Illness



Change in Severity of Illness



Change in Severity of Illness



How does this end?

- Not with a bang, but a whimper
  - COVID will not be eradicated
  - Areas of the world will not all arrive at endemicity at the same time
  - Continue to see relative decline in severity of illness as it continues to circulate
- Transition from public health measures to individual health measures
- How we prepare for the future remains to be seen…but I'm not optimistic

CDC Public Mask Guidance

- Takes into account new COVID-19 admissions per 100K population, % staffed inpatient beds occupied by COVID-19 patients, and new COVID-19 cases per 100K population over 7- day span
- Does NOT apply to healthcare settings or public transportation

COVID-19 Community Levels – Use the Highest Level that Applies to Your Community				
New COVID-19 Cases Per 100,000 people in the past 7 days	Indicators	Low	Medium	High
Fewer than 200	New COVID-19 admissions per 100,000 population (7-day total)	<10.0	10.0-19.9	≥20.0
	Percent of staffed inpatient beds occupied by COVID-19 patients (7-day average)	<10.0%	10.0-14.9%	≥15.0%
200 or more	New COVID-19 admissions per 100,000 population (7-day total)	NA	<10.0	≥10.0
	Percent of staffed inpatient beds occupied by COVID-19 patients (7-day average)	NA	<10.0%	≥10.0%

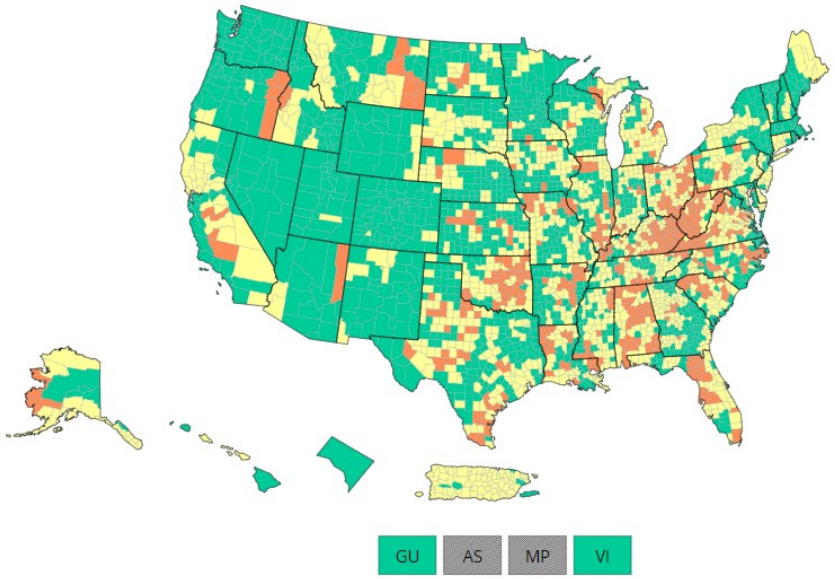
The COVID-19 community level is determined by the higher of the new admissions and inpatient beds metrics, based on the current level of new cases per 100,000 population in the past 7 days

To find out the COVID-19 community level:

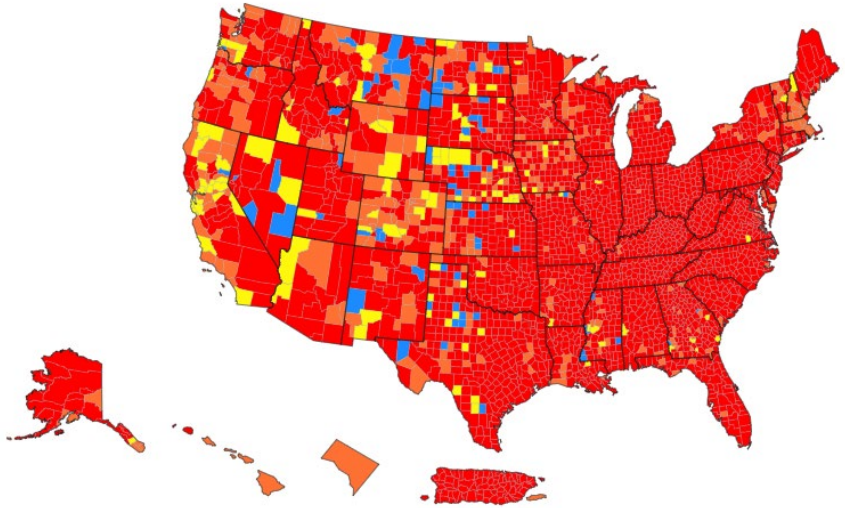
- First determine whether a county, state, or territory has fewer than 200 new cases per 100,000 people in the past 7 days or 200 new cases or more per 100,000 people in the past 7 days.
- Then, determine the level (low, medium, or high) for the new admissions and inpatient beds and indicators using the scale for the area's number for new cases.
- The COVID-19 Community Level is based on the higher of the new admissions and inpatient beds metrics.
- Check your county's COVID-19 Community Level.

CDC Public Mask Guidance

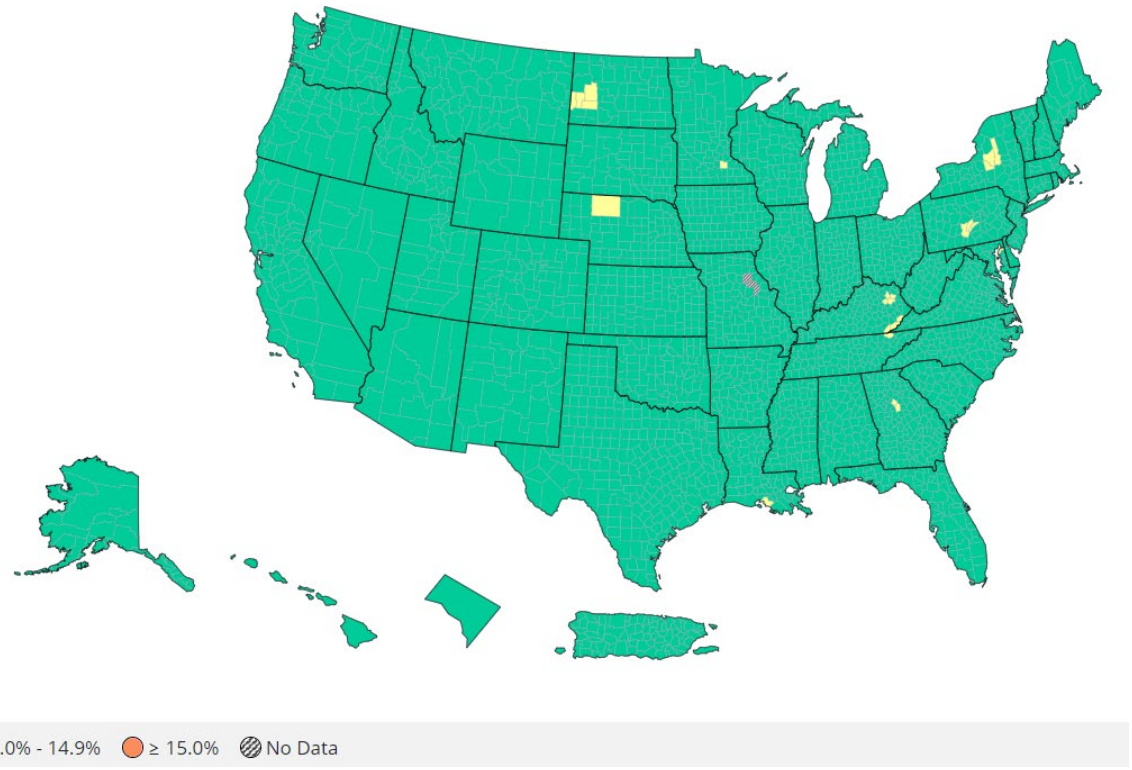
CDC Community Level – 9/8/2022



CDC Transmission Level – 9/13/2022



% Staffed Inpatient Beds with COVID Patients – 9/12/2022



Where people will struggle most

- Individualized, situation specific risk:benefit calculation
- PTSD from the last couple years
- Recognition of the changing dynamics - COVID-22 now is not the same as COVID-19

Risk of COVID-19 Hospitalization

Analysis from logistic regression on confirmed cases and hospitalizations Dec 14 – Jan 4.

# of at-risk conditions	Age group	Female				Male			
		0 Doses	1 Dose	2 Doses	3 Doses	0 Doses	1 Dose	2 Doses	3 Doses
0 at-risk conditions	<20	0.3%	0.1%	0.1%	0.0%	0.4%	0.2%	0.1%	0.0%
	20-39	1.5%	0.5%	0.4%	0.2%	1.8%	0.7%	0.4%	0.2%
	40-49	1.9%	0.7%	0.4%	0.2%	2.3%	0.8%	0.5%	0.3%
	50-59	2.7%	1.0%	0.6%	0.3%	3.2%	1.2%	0.8%	0.4%
	60-69	2.9%	1.1%	0.7%	0.3%	3.6%	1.3%	0.8%	0.4%
	70-79	5.2%	1.8%	1.2%	0.6%	6.3%	2.2%	1.5%	0.7%
	80+	9.5%	3.3%	2.2%	1.1%	11.8%	4.0%	2.7%	1.3%
1-2 at-risk conditions	<20	0.9%	0.3%	0.2%	0.1%	1.2%	0.4%	0.3%	0.1%
	20-39	4.5%	1.7%	1.1%	0.5%	4.7%	1.8%	1.1%	0.6%
	40-49	5.2%	1.9%	1.2%	0.6%	5.9%	2.2%	1.3%	0.7%
	50-59	6.8%	2.6%	1.6%	0.8%	8.3%	3.2%	1.9%	1.0%
	60-69	7.5%	3.0%	1.8%	0.9%	9.5%	3.6%	2.2%	1.1%
	70-79	13.9%	5.4%	3.3%	1.6%	17.2%	6.9%	4.2%	2.0%
	80+	26.2%	9.7%	6.2%	2.9%	33.9%	13.1%	8.1%	3.9%
3+ at-risk conditions	<20	5.5%	1.8%	1.3%	0.5%	7.3%	1.8%	1.4%	1.4%
	20-39	23.0%	10.6%	5.1%	2.9%	25.2%	11.0%	6.6%	3.6%
	40-49	26.2%	10.6%	5.8%	3.6%	35.6%	8.3%	6.5%	4.0%
	50-59	36.0%	13.2%	7.7%	4.3%	37.0%	12.3%	8.9%	5.1%
	60-69	33.2%	14.8%	7.6%	3.9%	40.3%	16.2%	9.4%	5.0%
	70-79	50.1%	23.2%	12.8%	5.9%	59.6%	26.6%	15.9%	7.5%
	80+	71.9%	31.8%	20.7%	9.4%	83.7%	43.8%	26.3%	12.7%

Model estimates* of the proportion of cases that would result in hospitalization by demographic group and vaccine status

Hospitalization risk for younger people with two or more doses approaches zero

Even with 3 doses, substantial risk observed for those over 80+ (over 10%) when multiple risk conditions present

*Point estimates expected to change as more data becomes available. Differences between same-colored cells may not be statistically significant.

How to think about risk

2014 Mortality Risk from Non-COVID Activities

Activity	Unit	MM
Flight	One flight	0.02
Driving	250 miles	1
Motorcycle	25 miles	4
General anesthesia	1 procedure	5
Scuba diving	1 trip	5
Skydiving	1 trip	7
Driving	Annual	100 (U.S.); 31 (U.K.)
Giving birth	1 birth	210 (U.S.), 120 (U.K.), 40 (Sweden), 11,000 (Chad)
Active service in Afghanistan	Full year in 2011	5,000
Baby's first year of life	1 year	6,600
Heroin use	1 year	19,700

Blastland, M and Spieghalter, D. The Norm Chronicles.

January 2022 Mortality Risk from COVID Infection

Age	Unvaccinated	Not boosted	Boosted
0-4	227	-	-
5-17	Data unavailable		
18-49	404	90	48
50-64	4994	1033	516
65+	28978	15489	6023

Credit: Katelyn Jetelina, PhD, MPH

Child Hospitalization Rate

Risk of hospitalization in unvaccinated children

Age	RSV (per 100,000)*	Flu (per 100,000)*	COVID-19 (per 100,000)**
<1 year	2381	181	89
1	710	86	
2	395	62	
3	211	48	
4	111	41	
5-6	72	40	32
7-11	36	23	
12-17	39	17	66

*Averaged across years 2003-2010

**December 2020-January 2022

Table created by Katelyn Jetelina/YLE, based on data from two sources: RSV/Flu from Goldstein et al and COVID19 from CDC's COVIDNet.

Have the goalposts shifted?

- No! Triggers for widespread public health measures always dependent on a number of factors:
  - Severity of illness associated with disease
  - Ability for individuals to protect themselves
  - Likelihood that absence of public health measures results in overwhelming health care infrastructure
- With declining severity of illness, vaccination and widespread availability of respiratory protection, and declining impact on health care infrastructure, focus shifts to the individual.

So what will the epidemiologist do?

- 6 and 8 year children in public school
- Wife, 35
- Frequent contact with in-laws in their 60s and grandparents-in-law in 80s
- No major comorbidities
- All members of family up to date with vaccinations
- Wife had COVID in June, no in-house transmission

So what will the epidemiologist do?

- When schools stopped requiring masking, I let my kids unmask
  - When schools recommend masking due to COVID outbreaks, I have my kids mask
- When county mandates ceased, I unmasked in public settings (NOT HEALTHCARE SETTINGS)
- We stopped avoiding experience-based activities or trips in January 2022
  - Skiing January 2022
  - NHL All Star Game in Las Vegas and Super Bowl in LA in February 2022
  - Iceland in June 2022
  - England in July/August 2022
  - Boston last week
- When >3 months from booster or infection, we mask at certain points during travel. Otherwise, mostly unmasked

When will we need boosters?

- Depends on many factors:
  - Community transmission rates
  - Circulating variants
    - Severity of illness associated with variant
    - VE against variant
  - Individual risk factors for severe disease

- Bivalent boosters available now and FDA has indicated their plan to do similar variant modifications annually as we do for flu
- Intranasal vaccines, dual flu/COVID vaccines, and universal coronavirus vaccines all in development

Remaining Vulnerabilities and Missed Opportunities

- Need for a centralized data collection mechanism for prospective surveillance
  - Agencies are trying to maintain and expand reporting mechanisms, but legal aspects are challenging
- Politicization of pandemic has significantly reduced trust in public health infrastructure
- Lack of political will to adapt to changing circumstances in many localities
- We tend to be fairly prone to amnesia

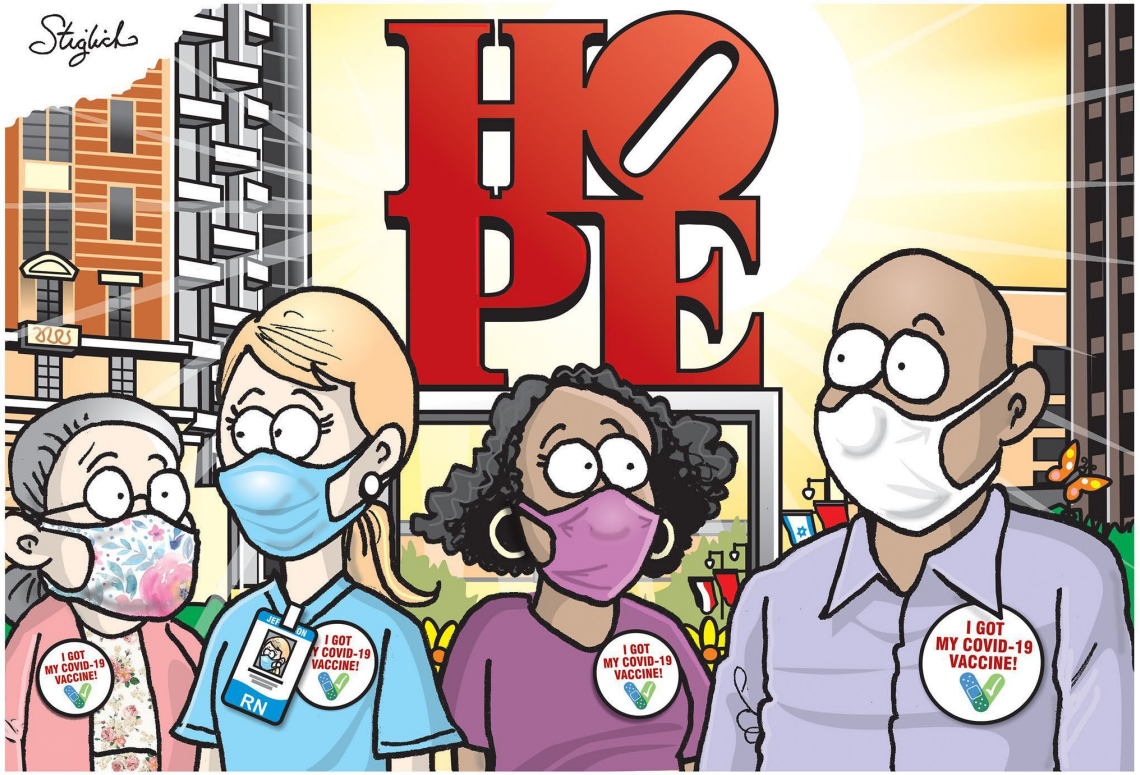
Silver Lining

- Infrastructure developed for rapid production of variant-specific vaccines and therapeutics
- New fields of pan-organism vaccine development making significant headway
- Broader recognition of the need to protect others when experiencing a respiratory viral illness
- Horizontal impact of mRNA vaccines

Summary

- COVID is here to stay, but COVID-22 is not COVID-19
- Vaccination is and will remain the best tool to provide individual and public health benefit
- Dropping mask mandates doesn't mean *everyone* should stop wearing masks in every situation or stop caring about COVID
- Changing rules doesn't mean "flip-flopping", it's how we're supposed to react to a dynamic environment
- We need to advocate for enhancing our public health infrastructure and break down the barriers that prevent coordinated federal efforts
- This will not be the last pandemic

Questions?


Stiglich
HOPE
I GOT MY COVID-19 VACCINE!
RN
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