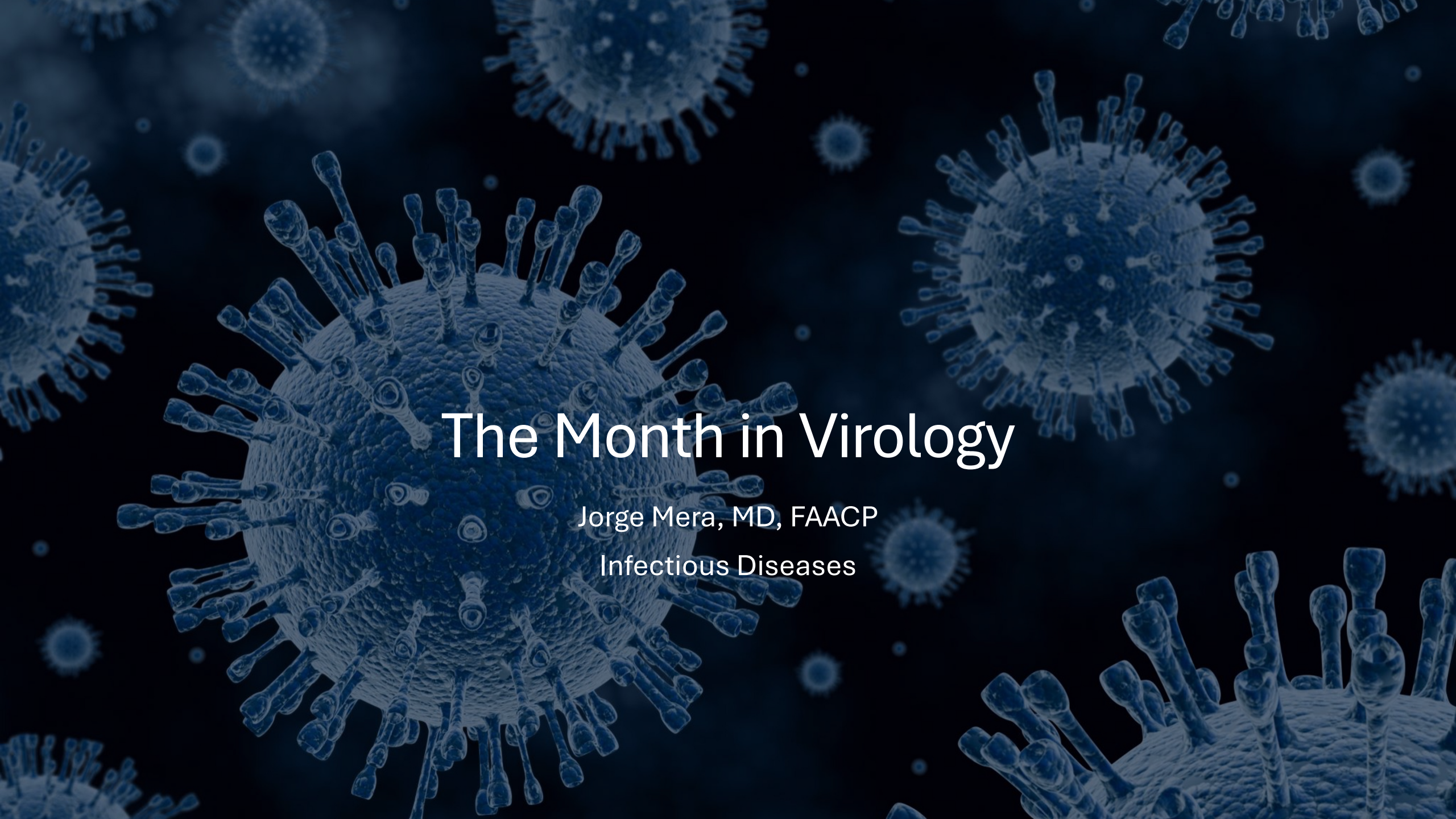


The Month in Virology

Jorge Mera, MD, FAACP

Infectious Diseases

Outline

Epidemiology Updates

- COVID-19, RSV, Influenza

Treatment

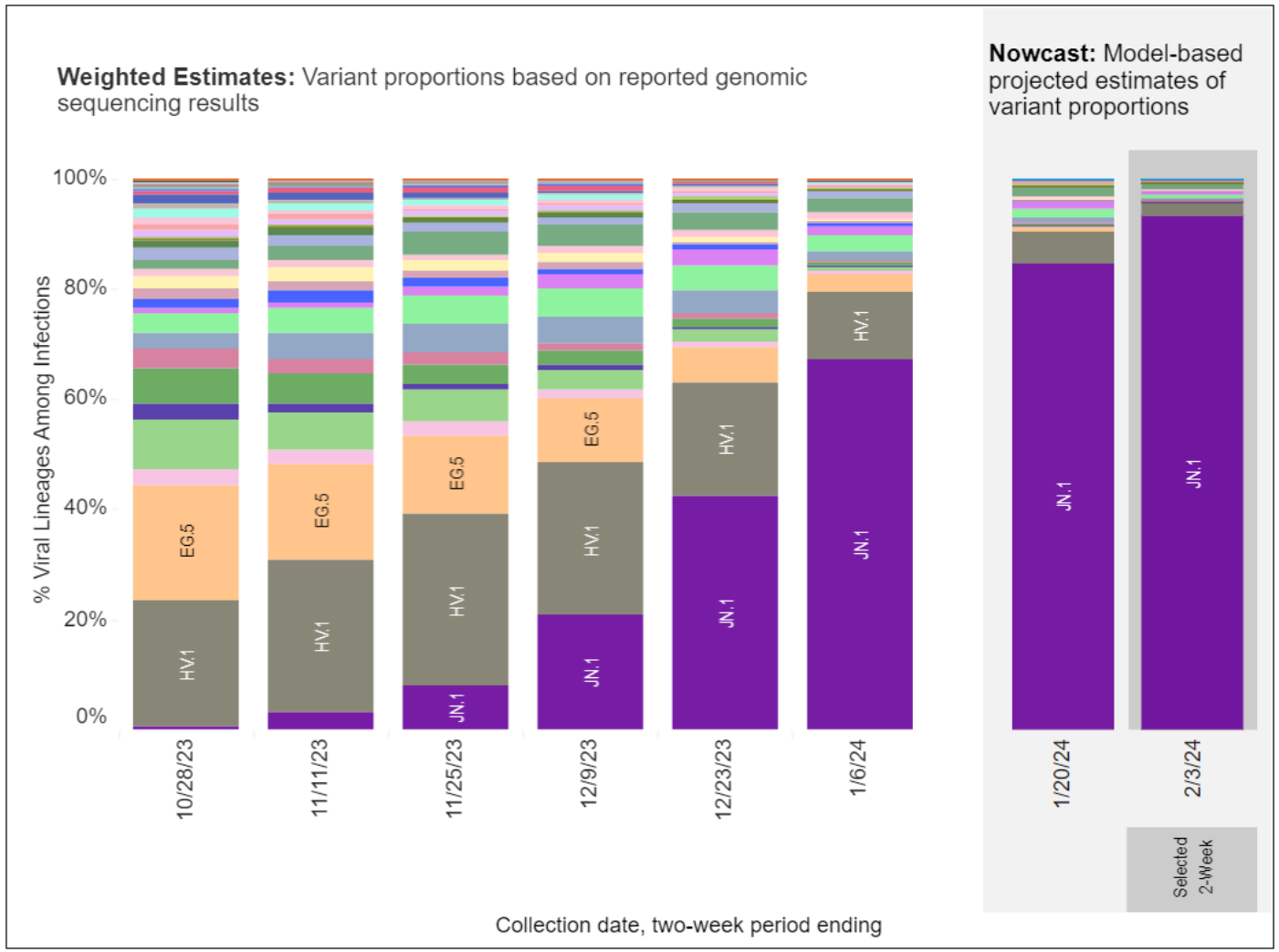
- COVID-19: New anti-viral for COVID-19 and more on Ivermectin

Literature review

- Long COVID
- VZV
- Dengue
- HCV

Weighted and Nowcast Estimates in United States for 2-Week Periods in 10/15/2023 – 2/3/2024

Hover over (or tap in mobile) any lineage of interest to see the amount of uncertainty in that lineage's estimate.



Nowcast Estimates in United States for 1/21/2024 – 2/3/2024

USA

WHO label	Lineage #	%Total	95%PI
Omicron	JN.1	93.1%	91.5-94.4%
	HV.1	2.3%	2.0-2.8%
	JG.3	1.1%	0.8-1.4%
	JD.1.1	0.8%	0.6-1.0%
	BA.2.86	0.7%	0.5-0.9%
	HK.3	0.4%	0.4-0.5%
	GE.1	0.4%	0.1-1.0%
	EG.5	0.3%	0.2-0.4%
	BA.2	0.3%	0.0-1.9%
	EG.5.1.8	0.1%	0.1-0.1%
	JF.1	0.1%	0.1-0.1%
	FL.1.5.1	0.1%	0.0-0.1%
	XBB.1.9.1	0.0%	0.0-0.1%
	XBB	0.0%	0.0-0.1%
	XBB.1.16.6	0.0%	0.0-0.1%
	XBB.1.16.11	0.0%	0.0-0.1%
	XBB.1.5.70	0.0%	0.0-0.1%
	GK.1.1	0.0%	0.0-0.0%
	XBB.1.16.15	0.0%	0.0-0.0%
	HF.1	0.0%	0.0-0.0%
	XBB.2.3	0.0%	0.0-0.0%
	XBB.1.16	0.0%	0.0-0.0%
	GK.2	0.0%	0.0-0.0%
	XBB.1.5	0.0%	0.0-0.0%
	CH.1.1	0.0%	0.0-0.0%
	EG.6.1	0.0%	0.0-0.0%
	XBB.1.16.1	0.0%	0.0-0.0%
	XBB.1.42.2	0.0%	0.0-0.0%
	XBB.1.9.2	0.0%	0.0-0.0%
	XBB.1.5.68	0.0%	0.0-0.0%
	XBB.1.16.17	0.0%	0.0-0.0%
	XBB.1.5.72	0.0%	0.0-0.0%
Other	Other*	0.1%	0.1-0.2%

* Enumerated lineages are US VOC and lineages circulating above 1% nationally in at least one 2-week period. "Other" represents the aggregation of lineages which are circulating <1% nationally during all 2-week periods displayed.
\# While all lineages are tracked by CDC, those named lineages not enumerated in this graphic are aggregated with their parent lineages, based on Pango lineage definitions, described in more detail here: https://www.pango.network/the-pango-nomenclature-system/statement-of-nomenclature-rules/.

COVID-19 Snapshot

Early Indicators

Test Positivity

% Test Positivity

10.0%

(January 28 to February 3, 2024)

Trend in % Test Positivity

-0.6% in most recent week

Dec 16, 2023 Feb 3, 2024

Emergency Department Visits

% Diagnosed as COVID-19

1.8%

(January 28 to February 3, 2024)

Trend in % Emergency Department Visits

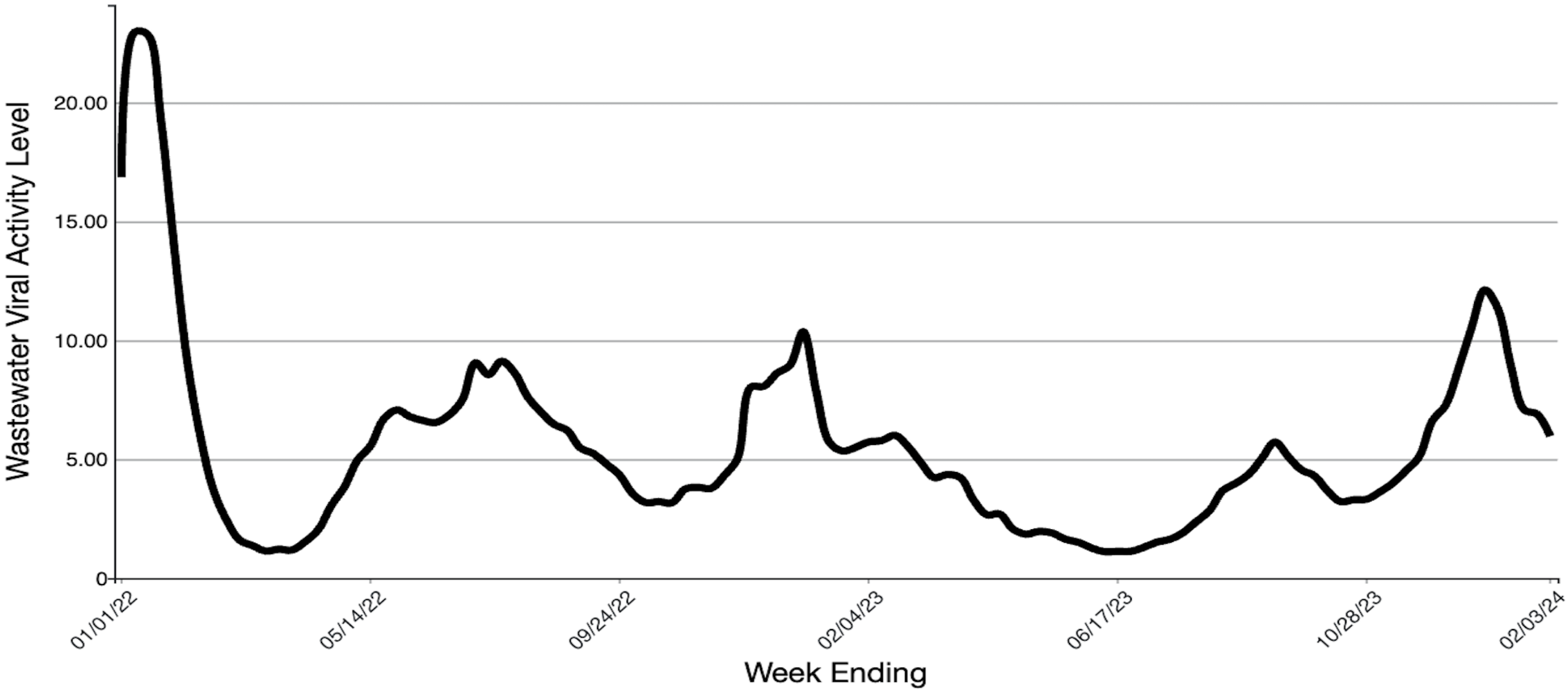
-10.8% in most recent week

Dec 16, 2023 Feb 3, 2024

These early indicators represent a portion of national COVID-19 tests and emergency department visits. Wastewater information also provides early indicators of spread.

CDC | Test Positivity data through: February 3, 2024; Emergency Department Visit data through: February 3, 2024; Hospitalization data through: February 3, 2024; Death data through: February 3, 2024. Posted: February 9, 2024, 12:01 PM ET

COVID-19 Wastewater Viral Activity Level Over Time, United States



Centers for Disease Control and Prevention. COVID Data Tracker. Atlanta, GA: U.S. Department of Health and Human Services, CDC; 2024, February 14. https://covid.cdc.gov/covid-data-tracker

COVID-19 Hospitalizations and Deaths

Severity Indicators

Hospitalizations

Hospital Admissions

20,772

(January 28 to February 3, 2024)

Trend in Hospital Admissions

-10% in most recent week

Dec 16, 2023 Feb 3, 2024

Deaths

% of All Deaths in U.S. Due to COVID-19

3.1%

(January 28 to February 3, 2024)

Trend in % COVID-19 Deaths

-6.1% in most recent week

Dec 16, 2023 Feb 3, 2024

Total Hospitalizations

6,793,622

Total Deaths

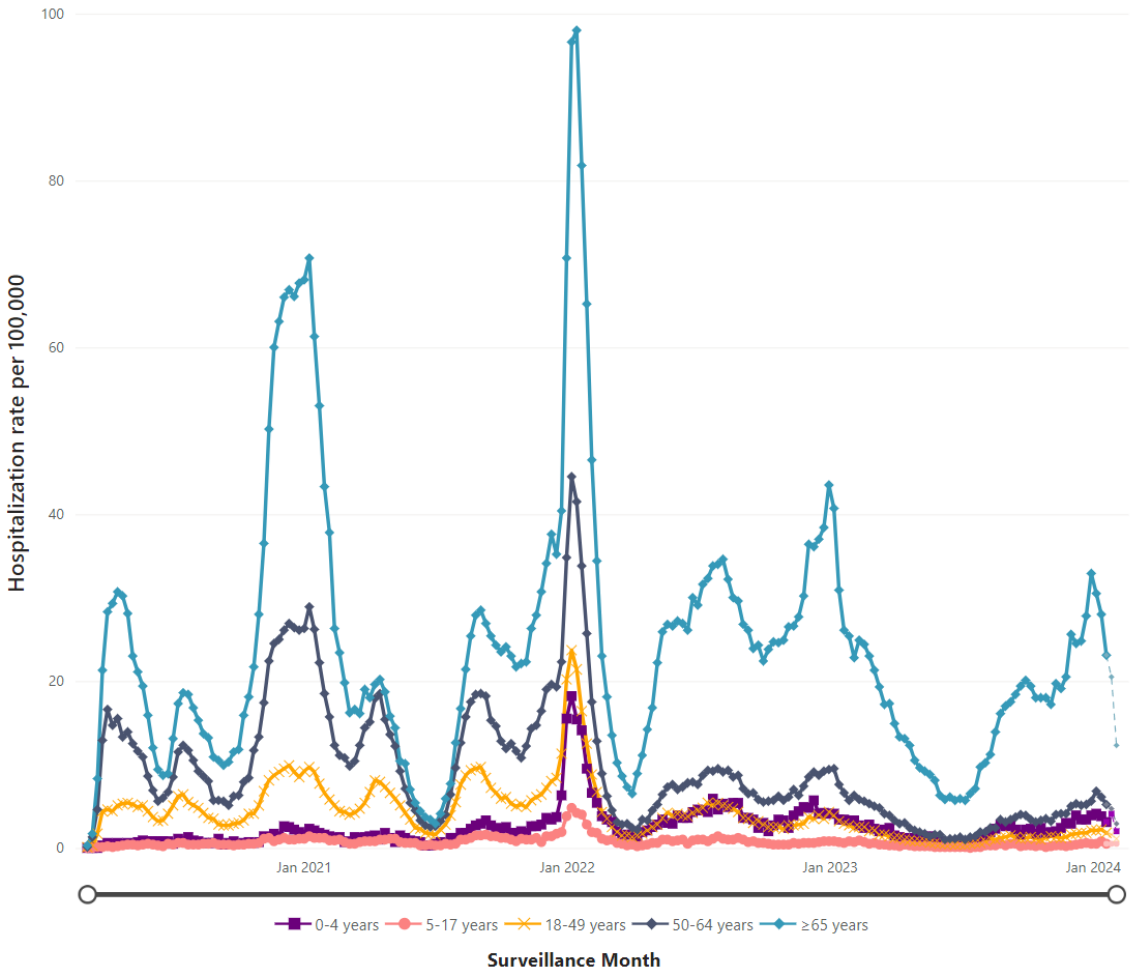
1,176,639

- **Vaccines available for COVID-19**
- **Antivirals Available for COVID-19**
  - Nirmetralvir/ritonavir
  - Remdesivir
  - Molnupiravir

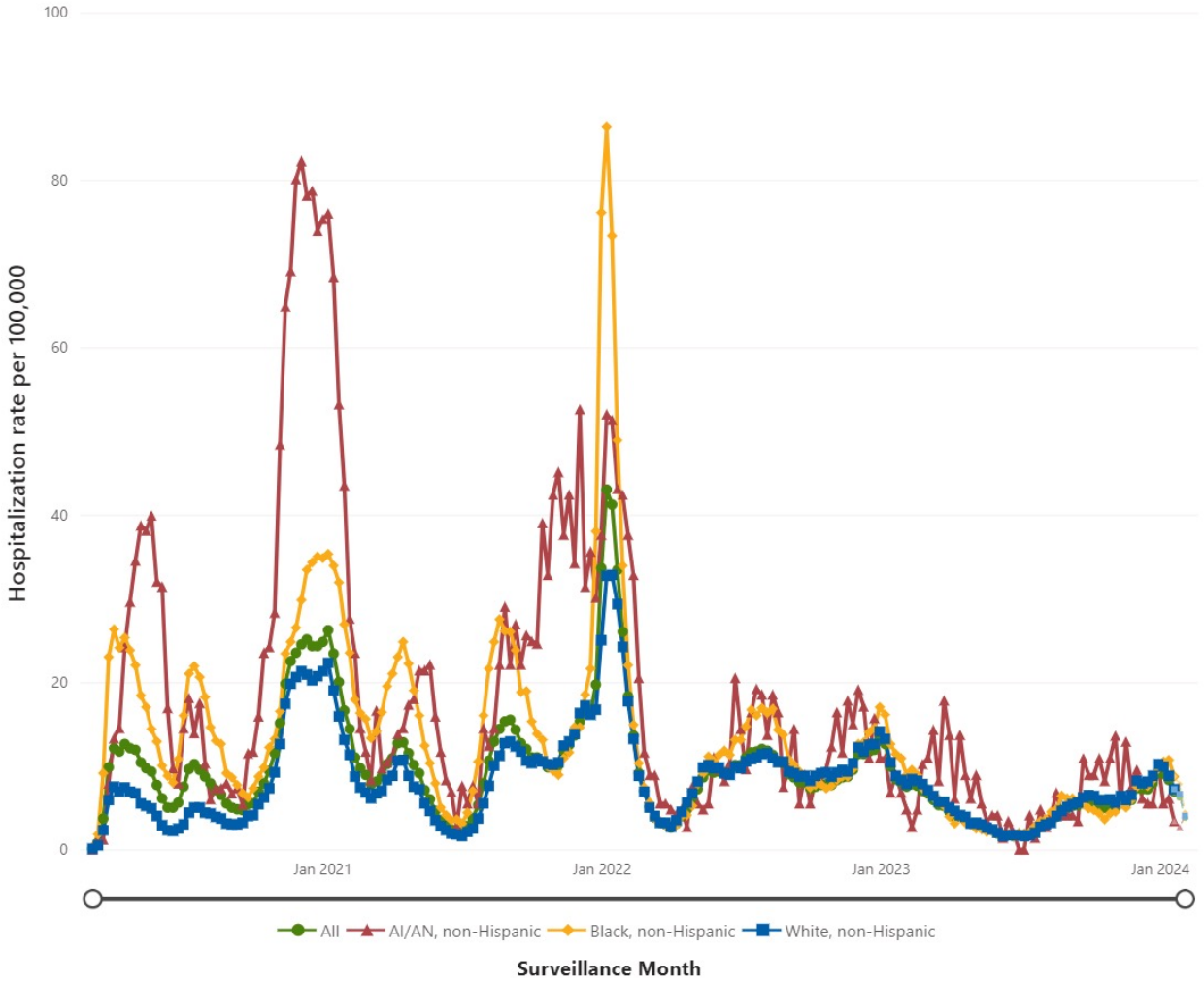
CDC | Test Positivity data through: February 3, 2024; Emergency Department Visit data through: February 3, 2024; Hospitalization data through: February 3, 2024; Death data through: February 3, 2024.
Posted: February 9, 2024 12:01 PM ET

Hospitalizations due to COVID-19

Stratified by Age

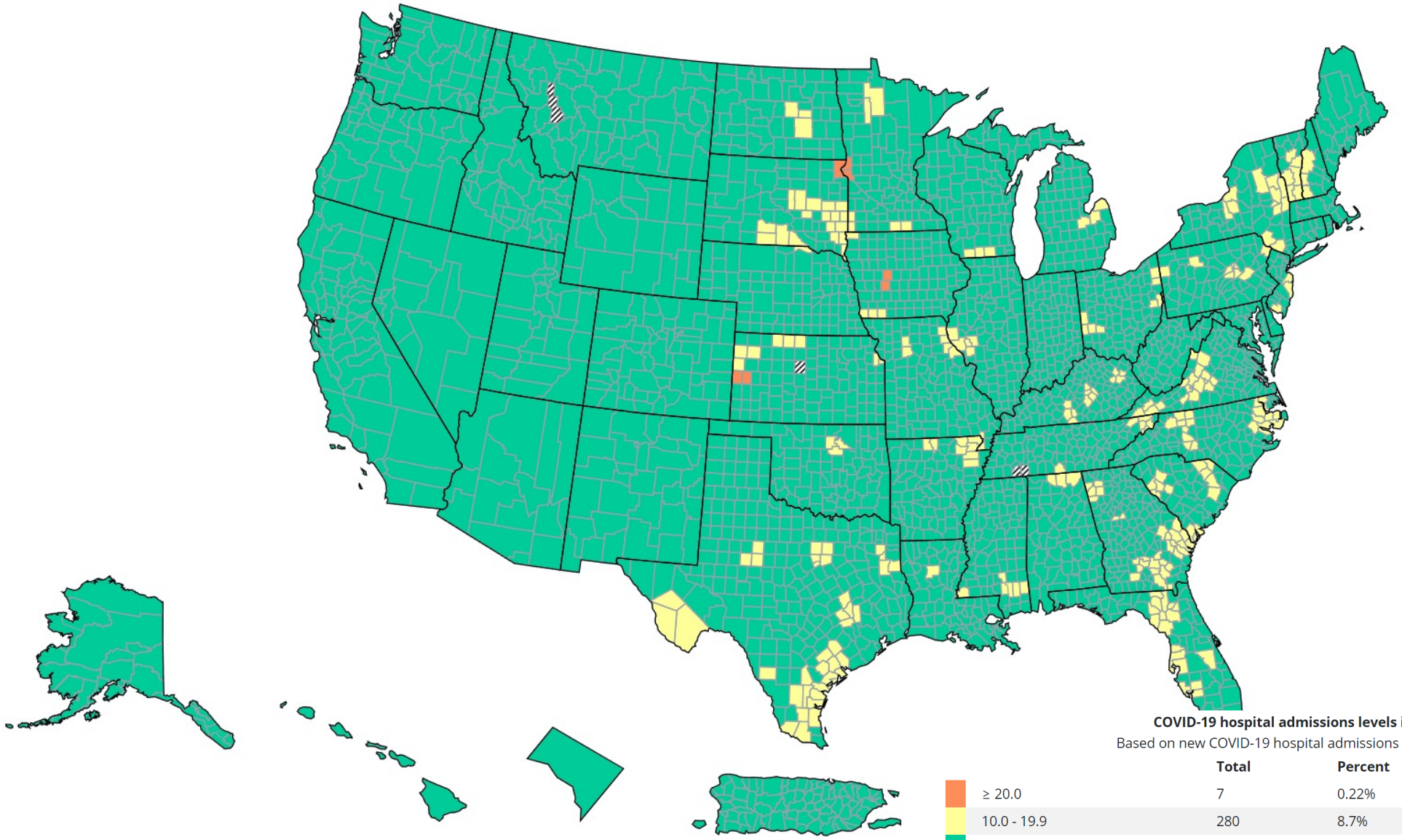


Stratified by Race



https://www.cdc.gov/coronavirus/2019-ncov/covidnetdashboard/de/powerbi/dashboard.html

Reported COVID-19 New Hospital Admissions Rate per 100,000 Population in the Past Week, by County – United States



COVID-19 hospital admissions levels in U.S. by county

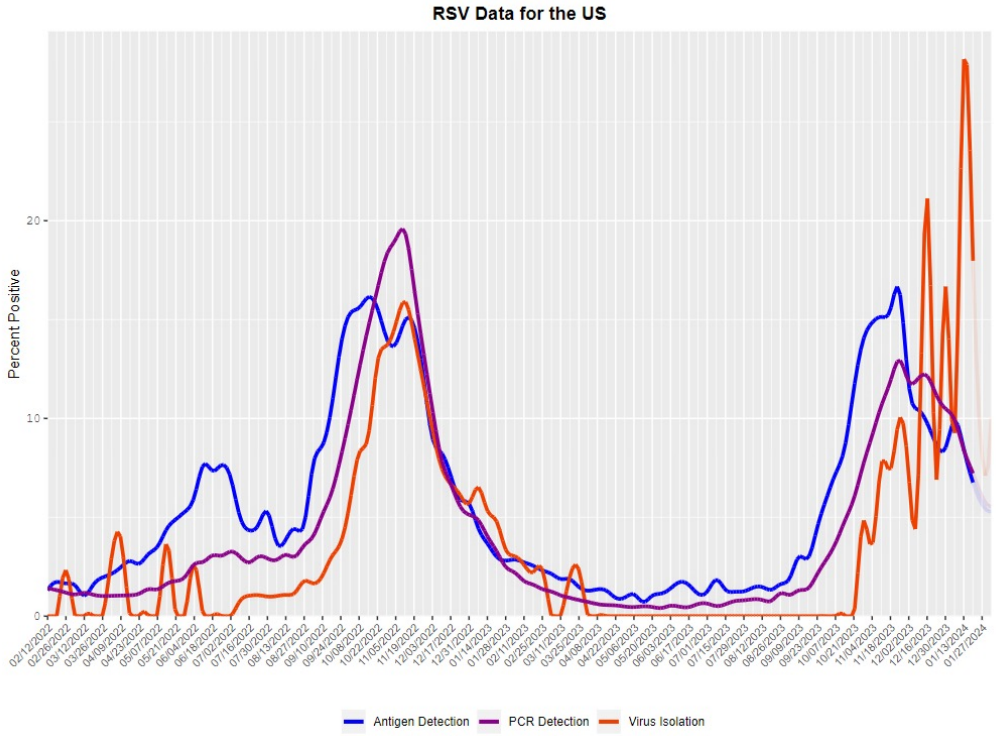
Based on new COVID-19 hospital admissions per 100,000 population

	Total	Percent	% Change
≥ 20.0	7	0.22%	-0.4%
10.0 - 19.9	280	8.7%	-2.98%
<10.0	2932	91.08%	3.39%

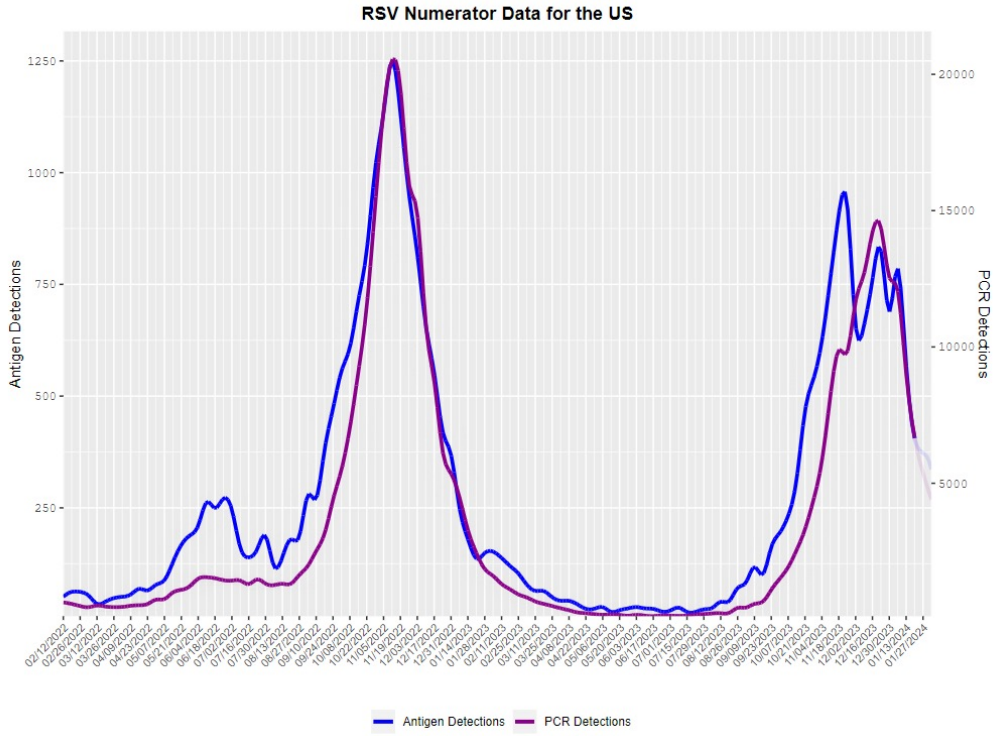
Time Period: New COVID-19 hospital admissions per 100,000 population (7-day total) are calculated using data from the MMWR week (Sun-Sat) ending February 3, 2024.

RSV Trends

Percent Positive



Detections

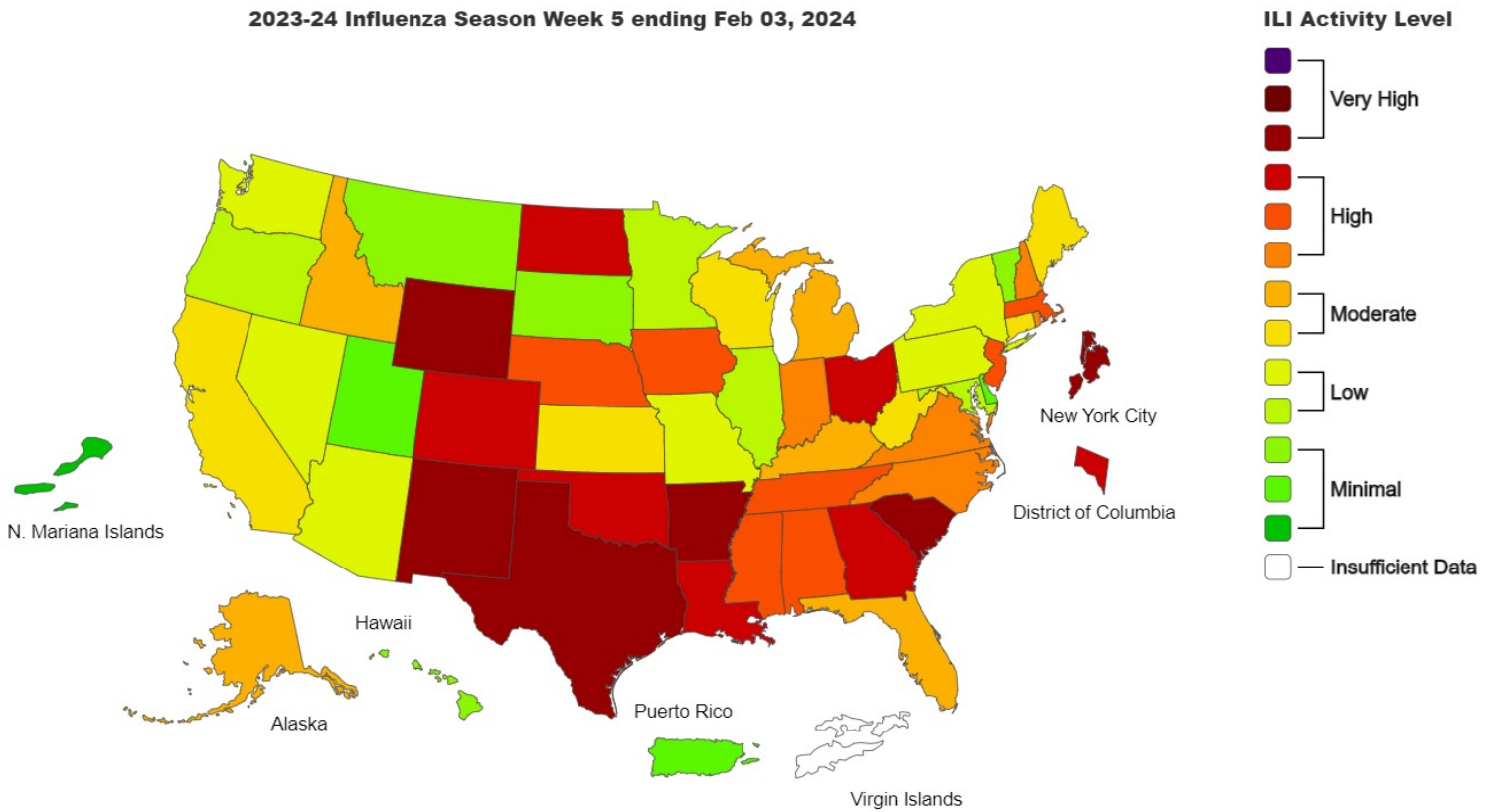


- RSV vaccines available for adults > 60 years old and Pregnant females
- Monoclonal antibodies available for infants

Last Reviewed: February 8, 2024

Source: National Center for Immunization and Respiratory Diseases (NCIRD), Coronavirus and Other Respiratory Viruses Division

Influenza Activity Week 5 ending Feb 3, 2024



- **Vaccines available for Influenza**
- **Antivirals available for Influenza**
  - Oseltamivir (oral)
  - Baloxavir (oral)
  - Zanamivir (inhaled)
  - Peramivir (Parenteral)

https://www.cdc.gov/flu/weekly/index.htm#ClinicalLaboratories

Poll Question #1

Patients with mild to moderate COVID-19 who take nirmaltrelvir/ritonavir are less likely to experience rebound COVID-19 symptoms compared to patients who do not receive antiviral treatment

A. True
B. False

Clinical Infectious Diseases
MAJOR ARTICLE

Symptoms, Viral Loads, and Rebound Among Coronavirus Disease 2019 (COVID-19) Outpatients Treated With Nirmatrelvir/Ritonavir Compared With Propensity Score–Matched Untreated Individuals

Study compared symptom and viral dynamics in individuals with COVID-19 who completed N/R treatment with similar untreated individuals.

- Participants identified from a COVID-19 household transmission study.
- Daily symptoms, medication use, and respiratory specimens for quantitative PCR for 10 days

Participants who completed N/R treatment were propensity score matched to untreated participants. The following variables were compared:

- Symptom rebound and viral load (VL) rebound
- Average daily symptoms
- Average daily VL

Clinical Infectious Diseases
MAJOR ARTICLE

Symptoms, Viral Loads, and Rebound Among Coronavirus Disease 2019 (COVID-19) Outpatients Treated With Nirmatrelvir/Ritonavir Compared With Propensity Score–Matched Untreated Individuals

Results.

- Treated participants had greater occurrence of symptom and VL rebound
  - Symptom rebound 32% vs 20%; P = .009
  - VL rebound 27% vs 7%; P < .001.

Conclusions

- Individuals who completed N/R treatment experienced fewer symptoms and lower daily average VL but rebound occurred more often compared with untreated individuals.
- Providers should prescribe N/R, when indicated, and communicate rebound risk to patients.

Poll Question #2

Ivermectin at a maximum targeted dose of 600ug/Kg/day x 6 days for adult patients with mild to moderate COVID-19 shortened duration of symptoms compared to placebo

A. True
B. False

Ivermectin: Really??

JAMA

QUESTION Does ivermectin, at a maximum targeted dose of 600 µg/kg daily for 6 days, compared with placebo shorten symptom duration for adults with mild to moderate COVID-19?

CONCLUSION Among adult outpatients with mild to moderate COVID-19, treatment with ivermectin at a maximum targeted dose of 600 µg/kg daily for 6 days, compared with placebo, did not improve time to sustained recovery.

POPULATION

713 Women
493 Men

Adult (≥30 years) outpatients with mild to moderate symptomatic COVID-19

Median age: 48 years

LOCATIONS

93
Health care facilities in the US

INTERVENTION

1334 Patients randomized
1206 Patients analyzed

602
Ivermectin
Ivermectin for 6 consecutive days with a maximum targeted daily dose of approximately 600 µg/kg

604
Placebo
Matched placebo

PRIMARY OUTCOME

Time to sustained recovery (defined as ≥3 consecutive days without symptoms)

FINDINGS

Median (IQR) time to recovery

Ivermectin
11 (11-12) days

Placebo
11 (11-12) days

The posterior probability that ivermectin reduced symptom duration by more than 1 day was <0.1%.

Hazard ratio, 1.02
(95% credible interval, 0.92-1.13); *P* = .68

Naggie S, Boulware DR, Lindsell CJ, et al. Effect of higher-dose ivermectin for 6 days vs placebo on time to sustained recovery in outpatients with COVID-19. *JAMA*. Published online February 20, 2023. doi:10.1001/jama.2023.1650

Oral Simnotrelvir/ritonavir for Adult Patients with Mild-to-Moderate Covid-19

Phase 2–3, double-blind, randomized, placebo-controlled trial

- 35 sites in China; 1208 participants;
- Simnotrelvir/ritonavir (750mg/100mg) or placebo twice daily for 5 days
- Given within 3 days of symptom onset

Efficacy end point was the time to sustained resolution of symptoms

- Absence of 11 Covid-19–related symptoms for 2 consecutive days
- Safety and changes in viral load were also assessed

N Engl J Med 2024;390:230-41. DOI: 10.1056/NEJMoa2301425

Oral Simnotrelvir Study: Results

Symptom outcomes:

- Time to sustained resolution of symptoms was significantly shorter in the Simnotrelvir/r
  - 180.1 hours vs 216.0 hours. Median difference, −35.8 hours (P = 0.006)

Viral load outcomes:

- On day 5, the decrease in viral load from baseline was greater in the Simnotrelvir/r group

Adverse effects:

- Incidence of adverse events was higher in the Simnotrelvir/r group (29.0% vs. 21.6%).
- Most adverse events were mild or moderate.

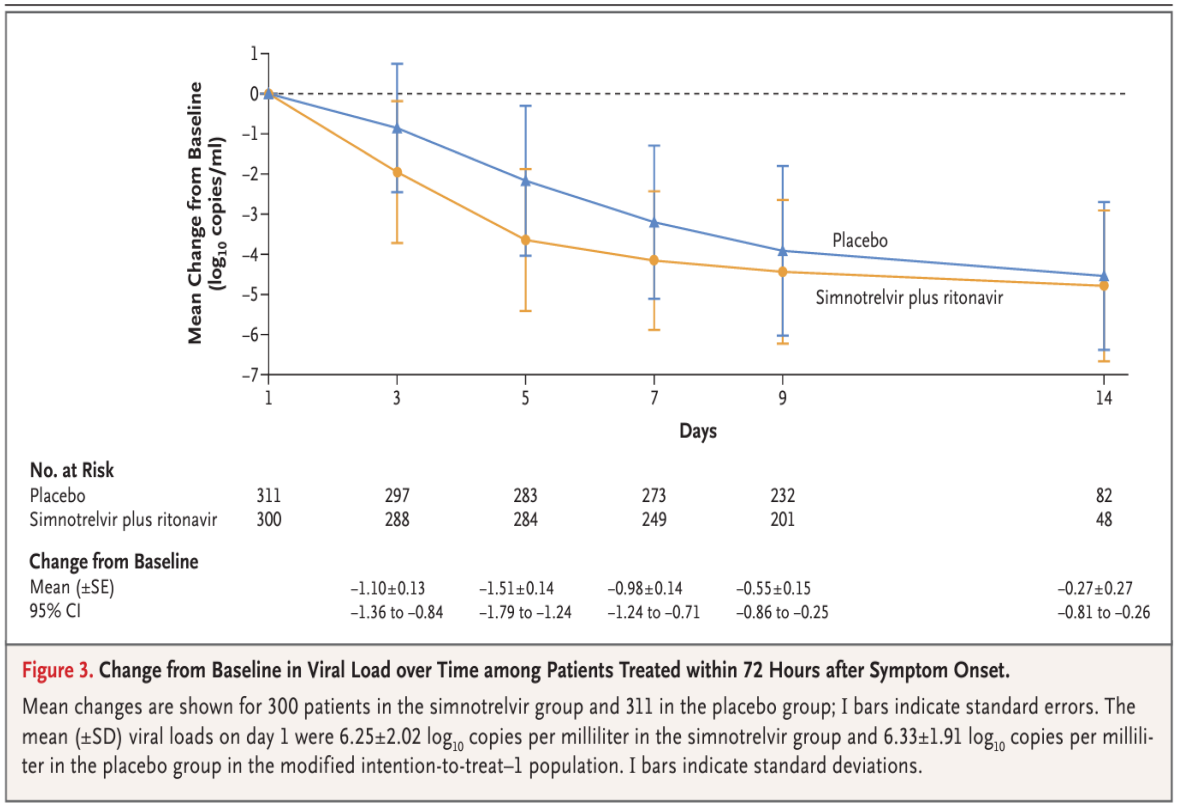


Figure 3. Change from Baseline in Viral Load over Time among Patients Treated within 72 Hours after Symptom Onset.

Mean changes are shown for 300 patients in the simnotrelvir group and 311 in the placebo group; I bars indicate standard errors. The mean (±SD) viral loads on day 1 were 6.25±2.02 log_{10} copies per milliliter in the simnotrelvir group and 6.33±1.91 log_{10} copies per milliliter in the placebo group in the modified intention-to-treat–1 population. I bars indicate standard deviations.

N Engl J Med 2024;390:230-41. DOI: 10.1056/NEJMoa2301425

Poll Question #3

How many symptoms were found to be associated with Long COVID-19 in the RECOVER STUDY (Long COVID NIH US Study)?

A. 4

B. 8

C. 12

D. 16

Identifying Long COVID Based on Symptoms Reported by Adults in the RECOVER Study

Research Question:

- What symptoms are associated with Long COVID
- Were certain participants more likely to get Long COVID

Methodology

- Researchers looked at 37 symptoms that participants who had COVID reported more often 6 months or more after having COVID compared to participants who never had COVID.

Patients were asked

- Symptoms reported in surveys
- If and when they had COVID
- How many times they had COVID
- If they had gotten a COVID vaccine

Thaweethai T, Jolley SE, Karlson EW, et al. Development of a Definition of Postacute Sequelae of SARS-CoV-2 Infection. *JAMA.* 2023;329(22):1934–1946.

RECOVER Study: Results

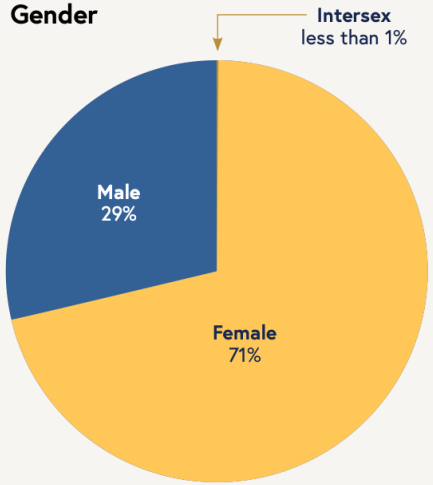
Whose data was included in this research?
This research included about 10,000 participants who joined the RECOVER adult study before April 10, 2023. Participants had at least one study visit and had taken a survey about their symptoms. This included:

About 1,000
participants who never had COVID (uninfected)

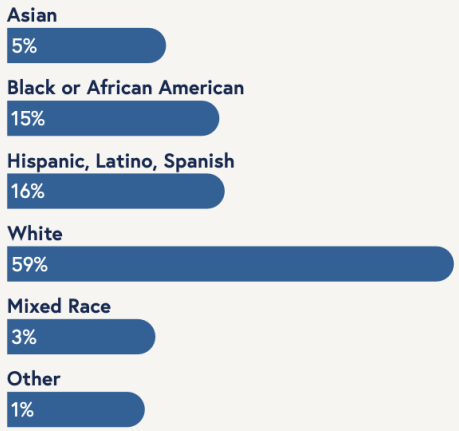
About 9,000
participants who had COVID before they joined the study

The participants' average age was 47.

Gender



Race and Ethnicity



Out of the symptoms, 12 could best identify participants with Long COVID

- Feeling tired and unwell that gets worse after physical or mental activity (post-exertional malaise)
- Feeling weak and tired (fatigue)
- Brain fog
- Dizziness
- Symptoms that affect the stomach and digestion (gastrointestinal symptoms)
- Fluttering or pounding heartbeats (palpitations)
- Loss of sexual desire or ability
- Loss of, or change in, taste or smell
- Feeling thirsty
- Long-term (chronic) cough
- Chest pain
- Unusual movements (abnormal movements)

Thaweethai T, Jolley SE, Karlson EW, et al. Development of a Definition of Postacute Sequelae of SARS-CoV-2 Infection. *JAMA.* 2023;329(22):1934–1946.

The Recover Study: Participants More Likely to Have Long COVID

- Had COVID for the first time before 12/2021 (before the Omicron variant)
- Had COVID more than once
- Not gotten a COVID vaccine.

Thaweethai T, Jolley SE, Karlson EW, et al. Development of a Definition of Postacute Sequelae of SARS-CoV-2 Infection. *JAMA.* 2023;329(22):1934–1946.

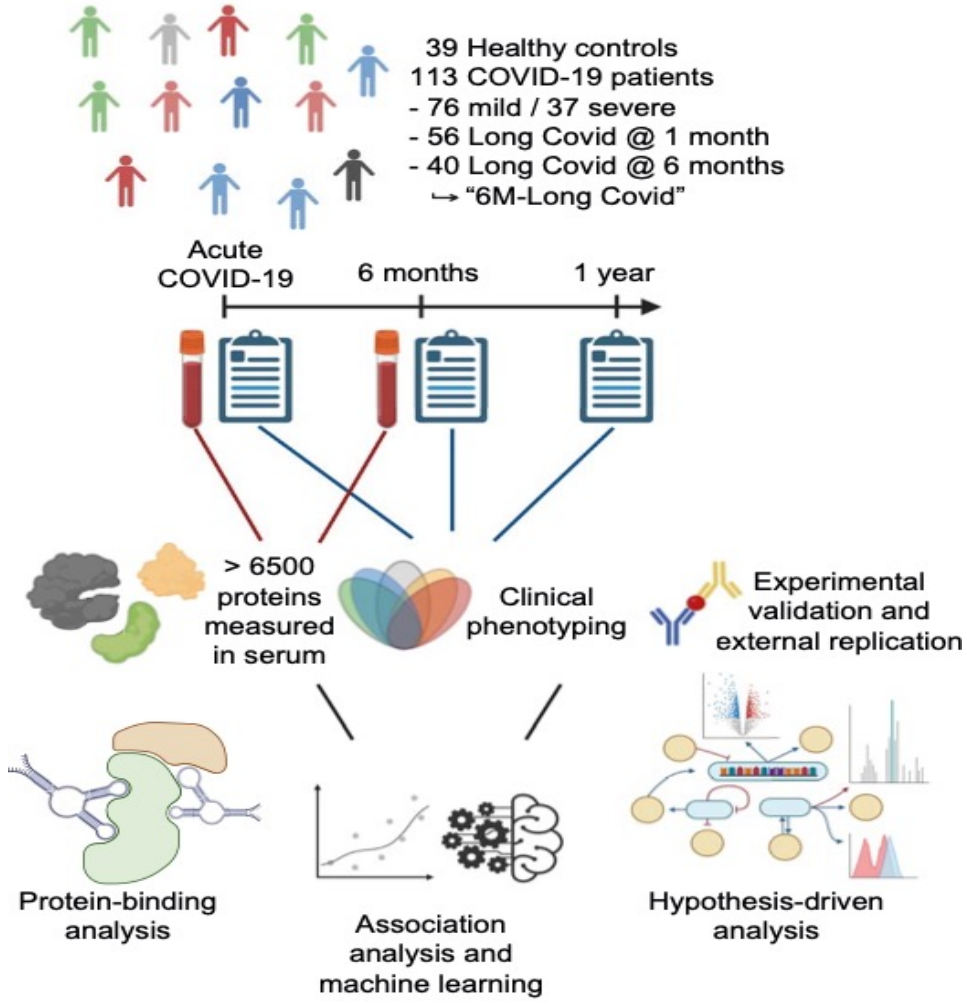
Persistent complement dysregulation with signs of thromboinflammation in active Long Covid:

Multimodal Proteomic Analysis

- Patients with acute mild/severe COVID-19 compared to a control group

> 6500 proteins analyzed

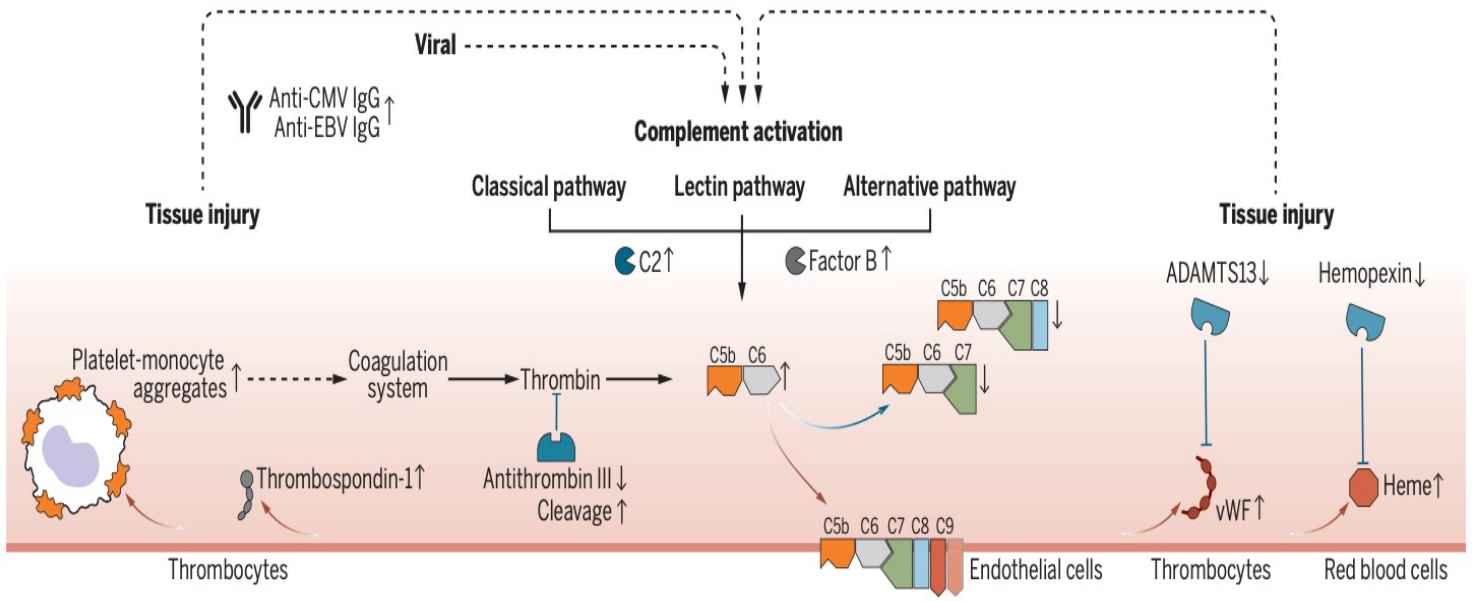
- Longitudinal sampling
- Followed for 12 months



Gervia-Hasler et al., Science 383, eadg7942 (2024) 19 January 2024

Persistent complement dysregulation with signs of thromboinflammation in active Long Covid

Gervia-Hasler et al., Science 383, eadg7942 (2024) 19 January 2024



Pathomechanistic model of Long Covid. Model of complement-mediated thromboinflammation, showing increased and decreased biomarkers (up arrows and down arrows, respectively) measured at 6-month follow-up in patients with persistent Long Covid symptoms compared with recovered COVID-19 patients and healthy controls. Measurements were done using proteomics, spectral flow cytometry, single-cell transcriptomics, high-throughput antibody measurements, and targeted assays. Red arrows mark activating protein interactions, and blue arrows mark inhibiting protein interactions. Dashed arrows connect changes in different biological pathways.

- Terminal complement system dysregulation and ongoing activation of the alternative and classical complement pathways
- The latter associated with increased antibody titers against several herpesviruses possibly stimulating this pathway
- Markers of hemolysis, tissue injury, platelet activation, and monocyte–platelet aggregates were increased in Long Covid

Machine learning confirmed complement and thromboinflammatory proteins as top biomarkers, warranting diagnostic and therapeutic interrogation of these systems.

Annals of Internal Medicine

ORIGINAL RESEARCH

Effectiveness of Recombinant Zoster Vaccine Against Herpes Zoster in a Real-World Setting

Ousseny Zerbo, PhD; Joan Bartlett, MPH; Bruce Fireman; Ned Lewis, MPH; Kristin Goddard, MPH; Kathleen Dooling, MD; Jonathan Duffy, MD; Jason Glanz, PhD; Allison Naleway, PhD; James G. Donahue, DVM, PhD, MPH; and Nicola P. Klein, MD, PhD

Background:	• Recombinant zoster vaccine (RZV) was 97% effective against herpes zoster (HZ) in a clinical trial.
Objective:	• To evaluate real-world effectiveness of RZV against HZ.
Design and Setting:	• Prospective cohort study. Four health care systems in the Vaccine Safety Datalink.
Participants:	• Persons aged 50 years or older • ~2.0 million persons (7.6 million person-years of follow-up)
Outcome measurements:	• Incident HZ defined by a diagnosis with an antiviral prescription

Annals of Internal Medicine

ORIGINAL RESEARCH

Effectiveness of Recombinant Zoster Vaccine Against Herpes Zoster in a Real-World Setting

Ousseny Zerbo, PhD; Joan Bartlett, MPH; Bruce Fireman; Ned Lewis, MPH; Kristin Goddard, MPH; Kathleen Dooling, MD; Jonathan Duffy, MD; Jason Glanz, PhD; Allison Naleway, PhD; James G. Donahue, DVM, PhD, MPH; and Nicola P. Klein, MD, PhD

Vaccine Efficacy

- 1 dose: 70% in the 1st year, 45% in the 2nd year, 48% in the 3rd year, 52% after the 3rd year.
- 2 doses, 79% in the 1st year, 75% in the 2nd year, and 73% in the 3rd and 4th years.
- In persons who received corticosteroids before vaccination: 65% and 77% in those who didn't.

Limitation:

- HZ could not be identified as accurately in these observational data as in the previous clinical trials.

Ousseny Zerbo, Joan Bartlett, Bruce Fireman, et al. Ann Intern Med. [Epub 9 January 2024]. doi:10.7326/M23-2023

Annals of Internal Medicine

ORIGINAL RESEARCH

Effectiveness of Recombinant Zoster Vaccine Against Herpes Zoster in a Real-World Setting

Ousseny Zerbo, PhD; Joan Bartlett, MPH; Bruce Fireman; Ned Lewis, MPH; Kristin Goddard, MPH; Kathleen Dooling, MD; Jonathan Duffy, MD; Jason Glanz, PhD; Allison Naleway, PhD; James G. Donahue, DVM, PhD, MPH; and Nicola P. Klein, MD, PhD

Conclusion:

- Two doses of RZV were highly effective, although less effective than in the previous clinical trials.
- Two-dose effectiveness waned very little during the 4 years of follow-up.
- One-dose dose effectiveness waned substantially after 1 year

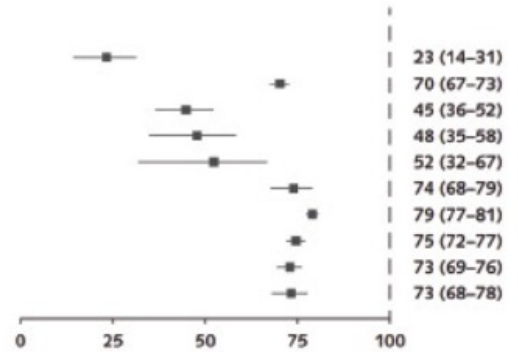
Ousseny Zerbo, Joan Bartlett, Bruce Fireman, et al. Ann Intern Med. [Epub 9 January 2024]. doi:10.7326/M23-2023

What is the real-world effectiveness of a 2-dose series of recombinant zoster vaccine (RZV) against herpes zoster (HZ)?

- 4 health care systems
- Vaccine Safety Datalink Study participants aged ≥50 years
- 7.6 million person-years follow-up

Effectiveness of RZV against HZ, January 2018 to December 2022, by vaccine dose and time since vaccination.

RZV Vaccination Status	HZ Cases	Person-Years	Unadjusted Rate per 1000 Person-Years	Adjusted VE (95% CI), %
Unvaccinated (reference group)	42 798	6 419 704	6.7	
1–29 d after first dose	314	59 736	5.3	23 (14–31)
30 d to <1 y after first dose	509	242 597	2.1	70 (67–73)
1 to <2 y after first dose	189	48 006	3.9	45 (36–52)
2 to <3 y after first dose	77	21 267	3.6	48 (35–58)
≥3 y after first dose	30	9182	3.3	52 (32–67)
1–29 d after second dose	83	44 943	1.8	74 (68–79)
30 d to <1 y after second dose	573	372 668	1.5	79 (77–81)
1 to <2 y after second dose	395	211 095	1.9	75 (72–77)
2 to <3 y after second dose	244	122 806	2.0	73 (69–76)
≥3 y after second dose	121	62 192	1.9	73 (68–78)



RZV was highly effective against HZ

Annals of Internal Medicine

Zerbo O, Bartlett J, Fireman B, et al. Effectiveness of recombinant zoster vaccine against herpes zoster in a real-world setting. Ann Intern Med. 9 January 2024. [Epub ahead of print]. doi:10.7326/M23-2023
http://acpjournals.org/doi/10.7326/M23-2024

Poll Question #4

Which of the following statements are true?

A. Dengue virus is spread by Aedes mosquitoes
B. All cases of Dengue virus infection in the US are imported
C. Infection with one of the four dengue viruses will induce long-lived immunity for that specific virus
D. All of the above are true
E. Only A and C are true

Introduction and Spread of Dengue Virus 3, Florida, USA, May 2022–April 2023

In early 2022:

- The FDOH identified an increase in travel-associated DENV infections, primarily among travelers returning from Cuba.
- In July 2022, a DENV-3 outbreak was reported in Cuba; DENV-3 case increases were also documented in other countries in the Americas.

On July 18, 2022

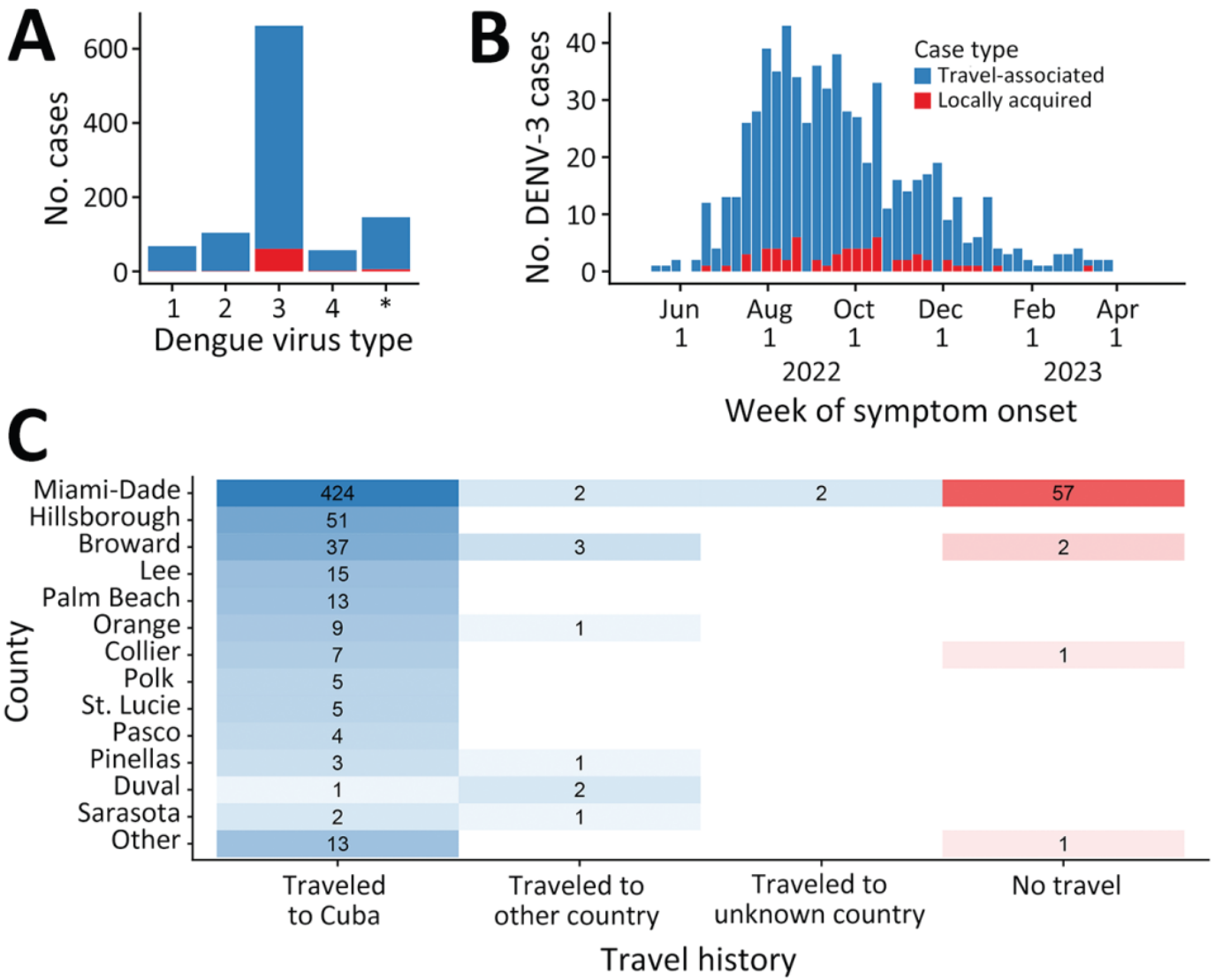
- Miami-Dade County health officials issued a mosquito-borne illness advisory after the 1st locally acquired DENV infection in 2022 was confirmed in a Florida resident.

This report documents the DENV-3 outbreak in Florida by:

- Describing the epidemiologic features of reported cases
- Analyzing DENV-3 genomic sequences
- Reconstructing possible transmission trees.

FDOH: Florida Department of Health

DENV serotype distribution and DENV-3 case distribution by week of symptom onset, county of reporting, and origin of travel



A) Number of dengue cases by each virus serotype. Cases with an unknown dengue virus type (asterisk) only had a positive serologic test or multiple serotypes identified.

B) Epidemic curve of reported cases of DENV-3, showing 601 travel associated cases and 61 locally acquired cases.

C) Heat map indicating number of DENV-3 cases by county and by travel history. Other countries were Bangladesh, Colombia, Guyana, India, Jamaica, Mexico, Pakistan, and Sri Lanka. The names of counties reporting >3 DENV-3 cases are shown and sorted by the total number of cases reported.

DENV, dengue virus; DENV-3, DENV serotype 3.

Dengue Virus (DENV)

DENV spread through the bite of an infected *Aedes* species mosquito

- These mosquitoes also spread Zika and chikungunya

Almost half of the world's population live in areas with a risk of Dengue, each year:

- Up to 400 million people are infected by a dengue virus.
- Approximately 100 million people get sick from infection
- Approximately 40,000 die from severe dengue.

https://www.cdc.gov/dengue/healthcare-providers/clinical-presentation.html

Dengue: Facts

Dengue can range from asymptomatic infection or mild illness to severe disease.

- An estimated 1 in 4 dengue virus infections are symptomatic.
- Symptomatic dengue most commonly presents as a mild to moderate, nonspecific, acute febrile illness.

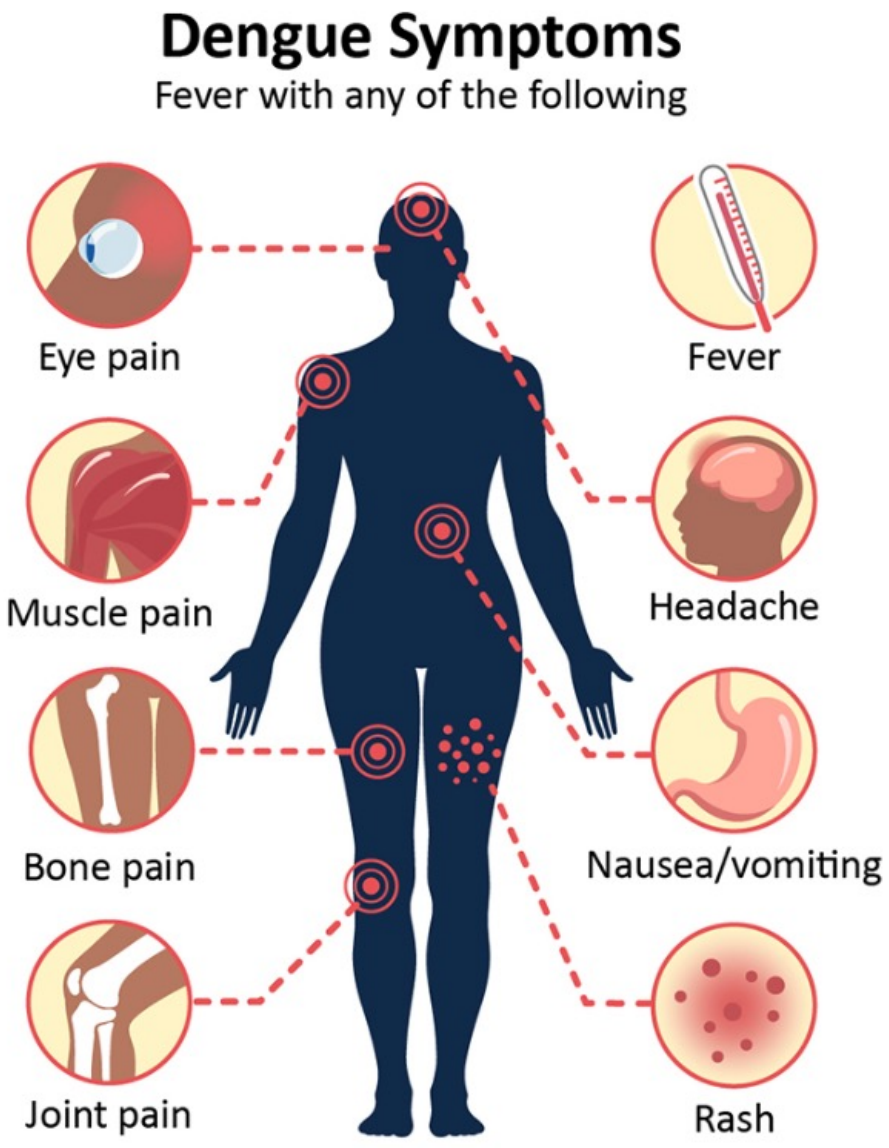
Infection with one of the four dengue viruses will induce long-lived immunity for that specific virus.

- **There ere are four dengue viruses, people can be infected with DENV multiple times in their life.**
- Approximately 1 in 20 patients with dengue virus disease progress to develop severe, life-threatening disease
- **The second infection with DENV is a risk factor for severe dengue.**

Early clinical findings are nonspecific

- Prompt intensive supportive therapy can reduce risk of death among patients with severe dengue to <0.5%.

https://www.cdc.gov/dengue/healthcare-providers/clinical-presentation.html



Symptoms of dengue typically last 2–7 days.
Most people will recover after about a week.

- **Dengue**
  - Combination of ≥2 clinical findings in a febrile person who traveled to or lives in a dengue-endemic area.
  - A positive tourniquet test, leukopenia are included
- **Warning signs that can predict severe Dengue**
  - Abdominal pain or tenderness, persistent vomiting, clinical fluid accumulation, mucosal bleeding, lethargy, restlessness, and liver enlargement.
- **Severe dengue:** Any of the following symptoms:
  - Severe plasma leakage leading to shock or fluid accumulation with respiratory distress
  - Severe bleeding or severe organ impairment such as elevated transaminases ≥1,000 IU/L, impaired consciousness, or CHF

https://www.cdc.gov/dengue/healthcare-providers/clinical-presentation.html

Differentiating Dengue from Severe Dengue

Dengue	Combination of ≥2 clinical findings in a febrile person who traveled to or lives in a dengue-endemic area. Clinical findings include nausea, vomiting, rash, aches and pains, a positive tourniquet test, leukopenia
Warning signs that can predict severe Dengue	Abdominal tenderness, persistent vomiting, fluid overload, mucosal bleeding, lethargy, restlessness, and liver enlargement. The presence of a warning sign may predict severe dengue in a patient.
Severe dengue: is defined by any of the following symptoms:	Severe plasma leakage leading to shock or fluid accumulation with respiratory distress Severe bleeding or severe organ impairment such as elevated transaminases ≥1,000 IU/L, impaired consciousness, or CHF

https://www.cdc.gov/dengue/healthcare-providers/clinical-presentation.html

Dengue: Clinical Manifestations

Febrile phase (Usually lasts three to seven days)

Symptoms

- Fever is nearly universal and is typically ≥38.5°C.
- Rash may develop two to five days after onset of fever

Physical examination

- Rash, conjunctival injection, pharyngeal erythema, and hemorrhagic features
- A tourniquet test

Laboratory findings – Typical findings include leukopenia, thrombocytopenia, and elevated aminotransferases.

Critical phase (small proportion of patients)

At defervescence, plasma leakage, bleeding, shock, and organ impairment or failure, which usually lasts 24 to 48 hours.)

Recovery phase

Last 2-4 days and a rash may appear

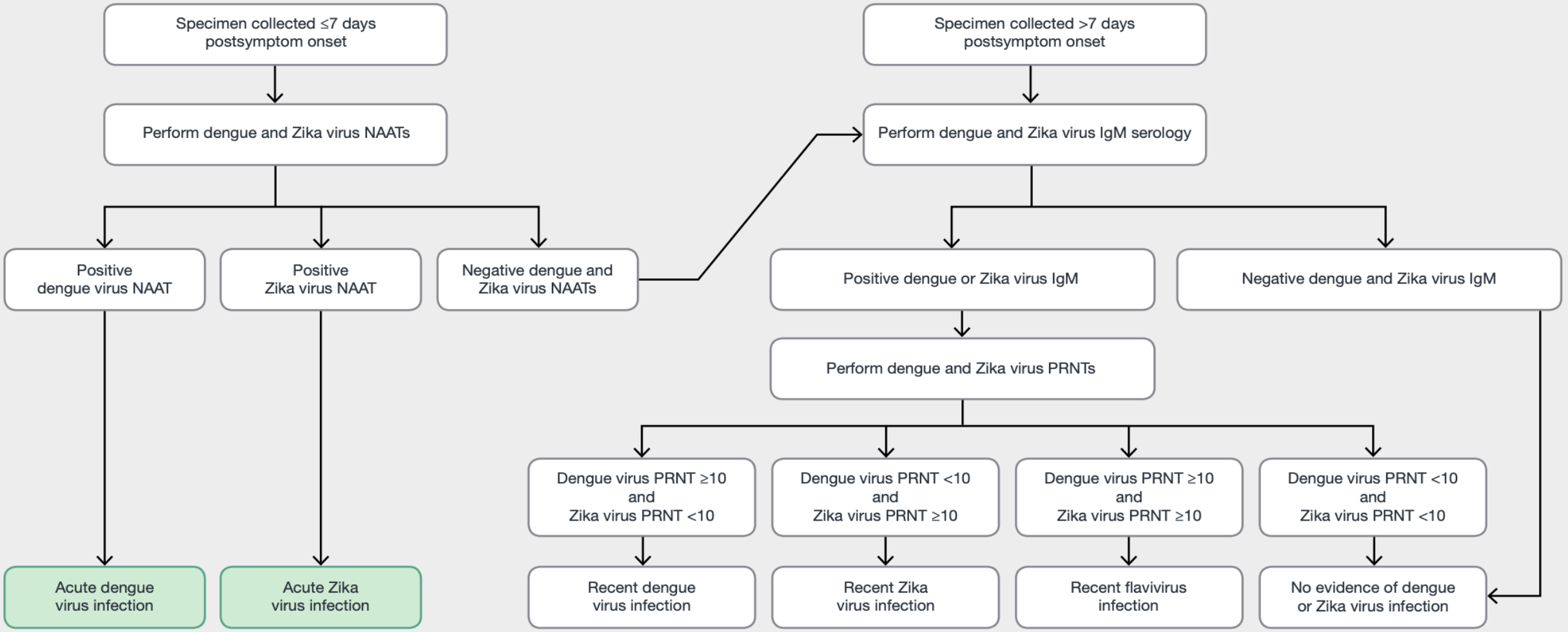
Fatigue may be longer

https://www.cdc.gov/dengue/healthcare-providers/clinical-presentation.html

Dengue and Zika Virus Testing Guidance: Symptomatic Non-Pregnant People with a Clinically Compatible Illness and Risk for Infection with Both Viruses*

Accessible version: https://www.cdc.gov/mmwr/volumes/68/rr/rr6801a1.htm?s_cid=rr6801a1_w

Testing Guidance and Interpretation of Results for Healthcare Providers



HCV Update

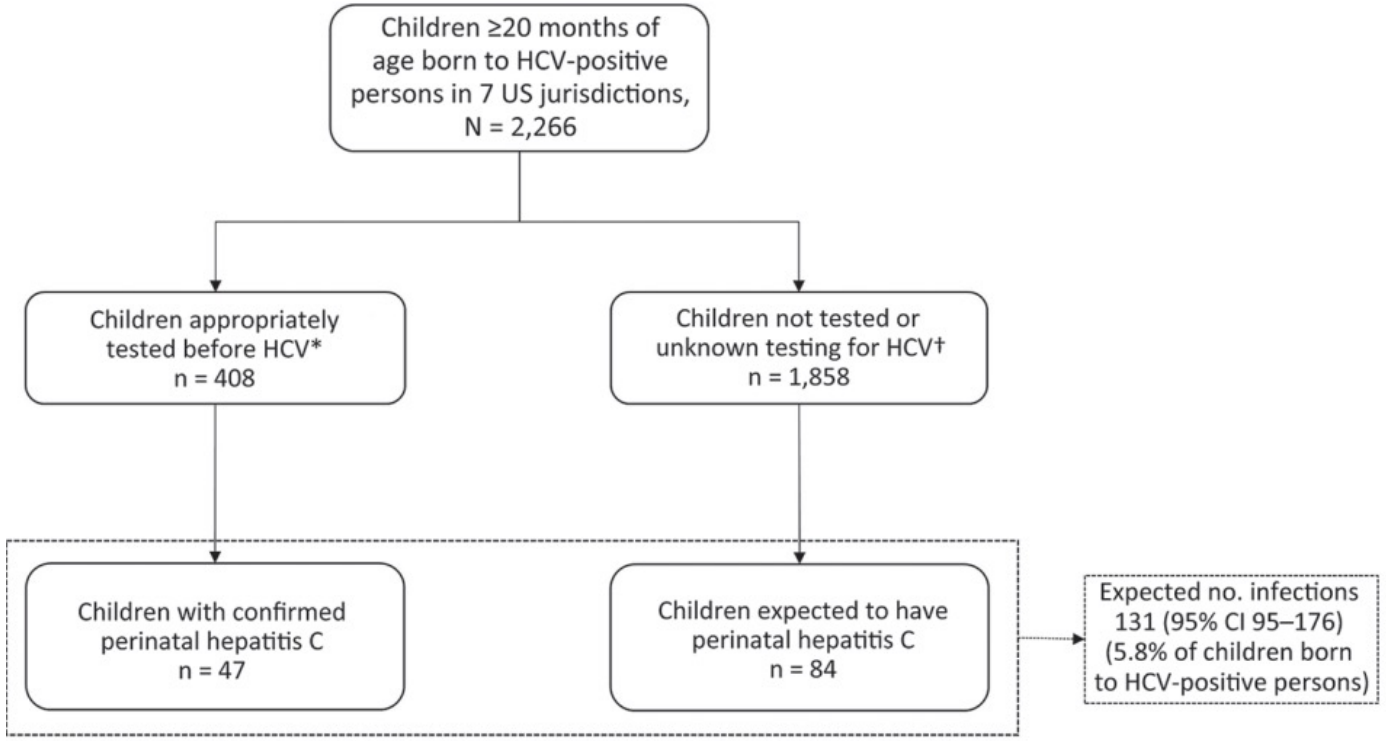
Acute hepatitis C cases in 2021

- 5,023 acute hepatitis C cases were reported (Estimated: 69,800)
- 60% increase from the reported rate during 2017
- 7% increase from the reported rate during 2020

Hepatitis C-associated deaths during 2020

- **Increased 4%** compared to 2019
- The death rates were higher among AI/AN and non-Hispanic Black persons (3.2 times and 1.8 times, respectively) than among non-Hispanic White persons.

Frequency of Children Diagnosed with Perinatal Hepatitis C, United States, 2018–2020



Observed and expected HCV infections among children with perinatal hepatitis C exposure in 7 US jurisdictions, 2018–2020. *Appropriate testing is considered test conducted at ≥2 months for HCV RNA or ≥18 months for HCV antibody. †May include children who tested negative for HCV, children whose tests were not reported to the health department, or children tested at an inappropriate age (< 2 months for HCV RNA or < 18 months for HCV antibody)

- This report identified more positive infants than a previous study (36% vs. 16%)
- But both indicate that most children perinatally exposed to hepatitis C are not tested for infection.

Potential reasons for low testing:

- Loss to follow-up
- Lack of awareness of the need for testing
- Delayed testing or testing too early
  Not completing ordered tests
- Lack of reporting positive tests to health departments.

Questions?