New York State Department of Health

Public Health Corps Summit

Building Resilience in Public Health: Reimagining, Reinventing, and Rebuilding

November 15-16, 2022

Leveraging DOH Data to Respond to Public Health Crises

Presenter: Eli Rosenberg, PhD
Moderator: Stephanie Mack

New York State Department of Health

Public Health Corps Summit

LEARNING OBJECTIVES

- Describe how public health data is used to identify at-risk populations
- Describe how data analysis shapes policy recommendations
- Describe how data are communicated to the public
- Describe how emergency situations impact data decisions and epidemiology investigations

Leveraging DOH Data to Respond to Public Health Crises

Eli Rosenberg, PhD - Deputy Director for Science

Office of Public Health, Office of Science

New York State Department of Health

NYSPHC SUMMIT – NOVEMBER 16, 2022

About the New York State Department of Health

The New York State Department of Health (the Department) has been overseeing the health, safety, and well-being of New Yorkers since 1901 – from sanitation and vaccinations to utilizing new developments in science as critical tools in the prevention and treatment of infectious diseases. In the face of today's new public health challenges and evolving health care system, the Department's commitment to protecting the health and well-being of all New Yorkers is unwavering.

Mission, Vision and Values

- **Mission:** We protect, improve and promote the health, productivity and wellbeing of all New Yorkers.
- **Vision:** New Yorkers will be the healthiest people in the world - living in communities that promote health, protected from health threats, and having access to quality, evidence-based, cost-effective health services.
- **Values:** Dedication to the Public Good, Innovation, Excellence, Integrity, Teamwork, Efficiency.

CRISIS EMERGENCY RISK COMMUNICATION

2014 EDITION

BE FIRST. BE RIGHT. BE CREDIBLE.

Centers for Disease Control and Prevention

Inherent tension in these 3 principles.
Strive to maximize all in NYS

CDC Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

About CDC

CDC › About CDC › CDC Organization › Mission, Role and Pledge

Pledge to the American People

Print

1. Be a diligent steward of the funds entrusted to our agency:
   CDC accomplishes agency-wide fiscal accountability and oversight of appropriations, acquisitions, assistance, and financial management of government funds. This aids in CDC's public health mission by ensuring appropriate fiscal stewardship of tax payer dollars.
   - CDC Funding

2. Provide an environment for intellectual and personal growth and integrity:
   CDC expects that employees know and follow the fourteen principles of ethical conduct for executive branch personnel. These principles help foster growth for both individual employee and agency wide progress to further public health science, and maintain the public's trust.
   - Ethics and Compliance Activity

3. Base all public health decisions on the highest quality scientific data that is derived openly and objectively:
   CDC ensures its science and research activities, as well as employees, comply with various federal laws, regulations, and policies in order to exercise the highest level of scientific integrity. To "enhance the quality, integrity of and access to CDC science," is one of 4 pillars the Office of the Associate Director of Science at CDC considers a priority and responsibility.

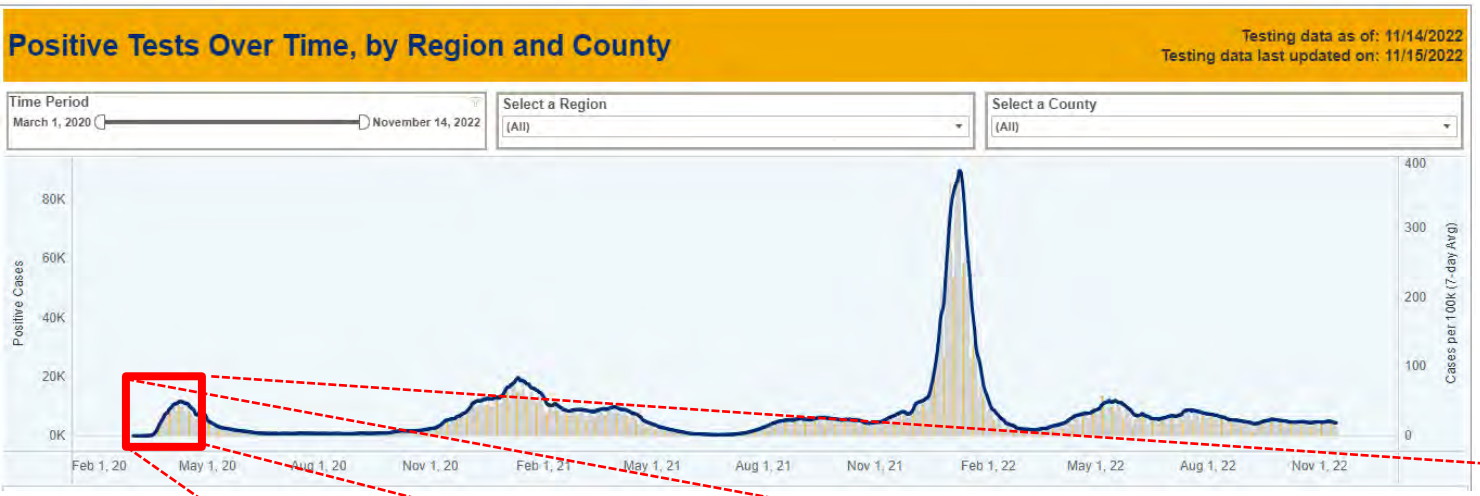
We have applied these principles to answer questions during public health emergencies

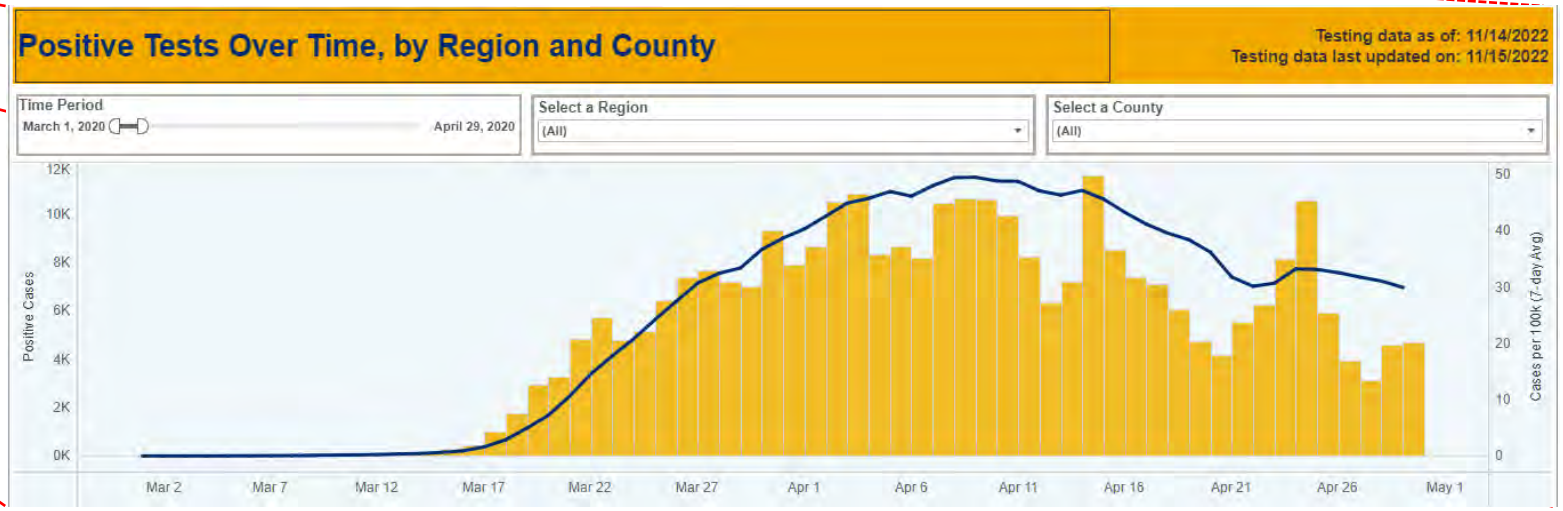
- Who is at greatest risk for COVID-19?
- How do we know which potential therapies work against COVID-19?
- Are COVID-19 vaccines working?
- Where is polio spreading and how should we respond?

For each issue, consider…

- What did we know at the time?
- What data did we have available or could we get quickly?
- What did we find?
- How did that inform change or action?
- How did we share with the public?

Who is at greatest risk for COVID-19?





March 1 - 9, 2020

Andrew Cuomo @NYGovCuomo

We have learned of the 1st positive case of COVID-19 i NY. The patient contracted the virus while in Iran & is isolated

There is no reason for undue anxiety—the general risk remains low in NY. We are diligently managing this situation &will provide info as it becomes available.

GOVERNOR CUOMO ISSUES STATEMENT REGARDING NOVEL CORONAVIRUS IN NE\ YORK

"This evening we learned of the first positive case of novel coronavirus — or COVID-19 — in New York State. The patient, a woman in her late thirties, contracted the virus while traveling abroad in Iran, and is currently isolated in her home. The patient has respiratory symptoms, b is not in serious condition and has been in a controlled situation since arriving to New York.

"The positive test was confirmed by New York's Wadsworth Lab in Albany, underscoring the importance of the ability for our state to ensure efficient and rapid turnaround, and is exactly why I advocated for the approval from Vice President Pence that New York was granted just yesterday.

Andrew Cuomo @NYGovCuomo · Mar 6

UPDATE: We have learned of 11 new confirmed cases of #Coronavirus in NYS — bringing the total number of cases to 44.

-8 of the new new cases are in Westchester County
-3 of the new cases are in Nassau County

We have expected the number of positive cases to go up as we test.

Andrew Cuomo @NYGovCuomo · Mar 7

UPDATE: We have learned of new confirmed cases of #Coronavirus in NYS bringing the total number of cases to 76.

- 57 cases in Westchester County
- 11 cases in NYC
- 4 cases in Nassau County
- 2 cases in Rockland County
- 2 cases in Saratoga County

Andrew Cuomo @NYGovCuomo · Mar 7

I am declaring a State of Emergency for New York amid an outbreak of #Coronavirus.

We will continue to provide updates to New Yorkers.

For more information on #COVID19, visit:
health.ny.gov/diseases/commu...

522 3K 5.3K

Andrew Cuomo @NYGovCuomo · Mar 8

After days of advocating the federal gov't to expand #Coronavirus testing capacity, we just received word that Northwell Laboratories has been authorized to test.

Manual testing of 75-80 samples/day will begin at Northwell immediately.

AFTER TOUR OF NORTHWELL LABS, GOVERNOR CUOMO ANNOUNCES FDA APPROVAL FOR NORTHWELL TO TEST NOVEL CORONAVIRUS

Andrew Cuomo @NYGovCuomo · Mar 9

UPDATE: There are additional confirmed cases of #Coronavirus in NYS, bringing total to 142.

Westchester: 98
NYC: 19
Nassau: 17
Rockland: 4
Saratoga: 2
Suffolk: 1
Ulster: 1

March 2020: Need for epidemiologic information

- Testing essential for understanding outbreak & gateway to other interventions
  - Capacity being rapidly scaled up at public health, commercial laboratories
  - NYS DOH data systems being adapted to novel infection
- Need for internal understanding of cases: person, place, time
  - Factors associated with diagnosis?
  - What are the range of symptoms & outcomes of diagnosed cases?
- Low public availability of information
  - CDC published limited information in March via *MMWR* – mostly small outbreaks
  - Health departments focused on primary, critical aspects of response
  - No ubiquitous dashboard websites
- DOH developed first detailed scientific reports of US epidemiological picture, linking:
  - Laboratory reporting (ECLRS)
  - Case investigation data (CDESS)
  - Electronic medical records (SHIN-NY)
  - Household testing efforts in Westchester & Nassau Counties

March 2020 overview of cases

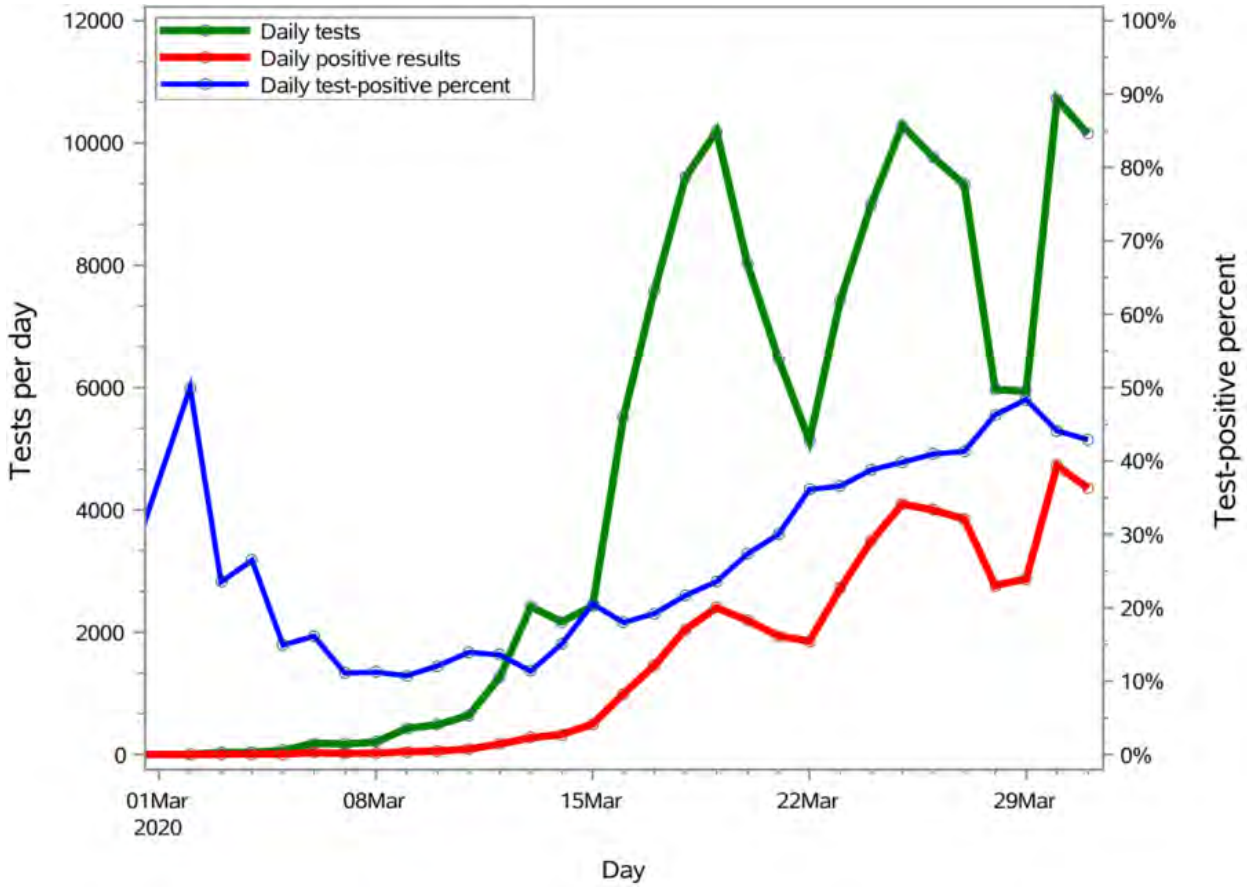
- Reporting on emergence of COVID-19 in NYS, including test results, % positivity, and demographics, initial outcomes of cases

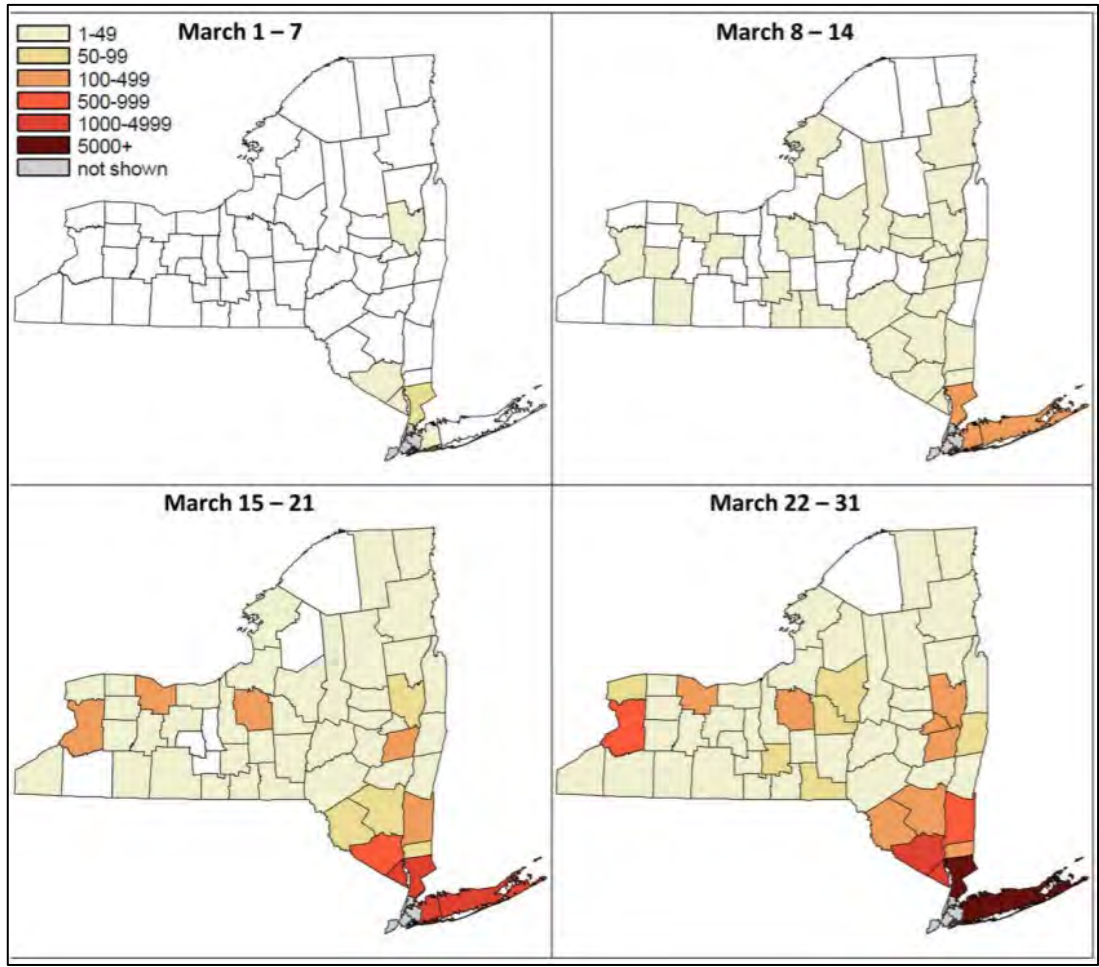
Clinical Infectious Diseases

COVID-19 Testing, Epidemic Features, Hospital Outcomes, and Household Prevalence, New York State—March 2020 FREE

Eli S Rosenberg ✉, Elizabeth M Dufort, Debra S Blog, Eric W Hall, Dina Hoefer, Bryon P Backenson, Alison T Muse, James N Kirkwood, Kirsten St George, David R Holtgrave ... Show more

Clinical Infectious Diseases, ciaa549, https://doi.org/10.1093/cid/ciaa549
Published: 08 May 2020 **Article history** ▾





March 2020 overview of cases: Household data

- Active case-finding in homes of earliest cases in mainly Westchester, Nassau counties
- Address-matched testing data, could estimate prevalence in case households
  - 57% of persons infected
  - 25% of homes: all members infected
  - Age gradient in prevalence
- Some of earliest US prevalence data for children
  - Aligned with global household and age-specific infection estimates

Table 2. Prevalence of Coronavirus Disease 19 (COVID-19) in households of persons diagnosed in New York State (excluding New York City), March 2 – March 13, 2020

	All household members				All household members, excluding first-reported case			
	N	n	%	p-value	N	n	%	p-value
Overall (155 households)	498	286	57.4		343	131	38.2	
# of persons tested in household				0.10 [1]				0.065
One (52 households)	52	52	100.0		--	--	--	
Two (31 households)	62	44	71.0		31	13	41.9	
Three (15 households)	45	33	73.3		30	18	60.0	
Four (14 households)	56	28	50.0		42	14	33.3	
Five or more (43 households)	283	129	45.6		240	86	35.8	
Households >1 person	446	234	52.5	<0.001	343	131	38.2	0.002
0 to < 5 years	26	6	23.1		25	5	20.0	
5 to < 18 years	138	44	31.9		131	37	28.2	
18 to < 30 years	29	15	51.7		24	10	41.7	
30 to < 50 years	115	75	65.2		71	31	43.7	
50 to < 65 years	92	65	70.7		58	31	53.4	
65+ years	41	28	68.3		29	16	55.2	
Missing date of birth	5	1	20.0		5	1	20.0	

- Informed Summer 2020 debate around relative transmission probability from children and % of community transmission driven by children → school reopening considerations

Tracker dashboard

NEW YORK STATE | Department of Health

New York State Department of Health COVID-19 Tracker

Testing data as of: 11/11/2022 2 PM
Testing data last updated on: 11/12/2022

Statewide

Tested Positive (11/11)
3,676

Total Results Received (11/11)
65,621

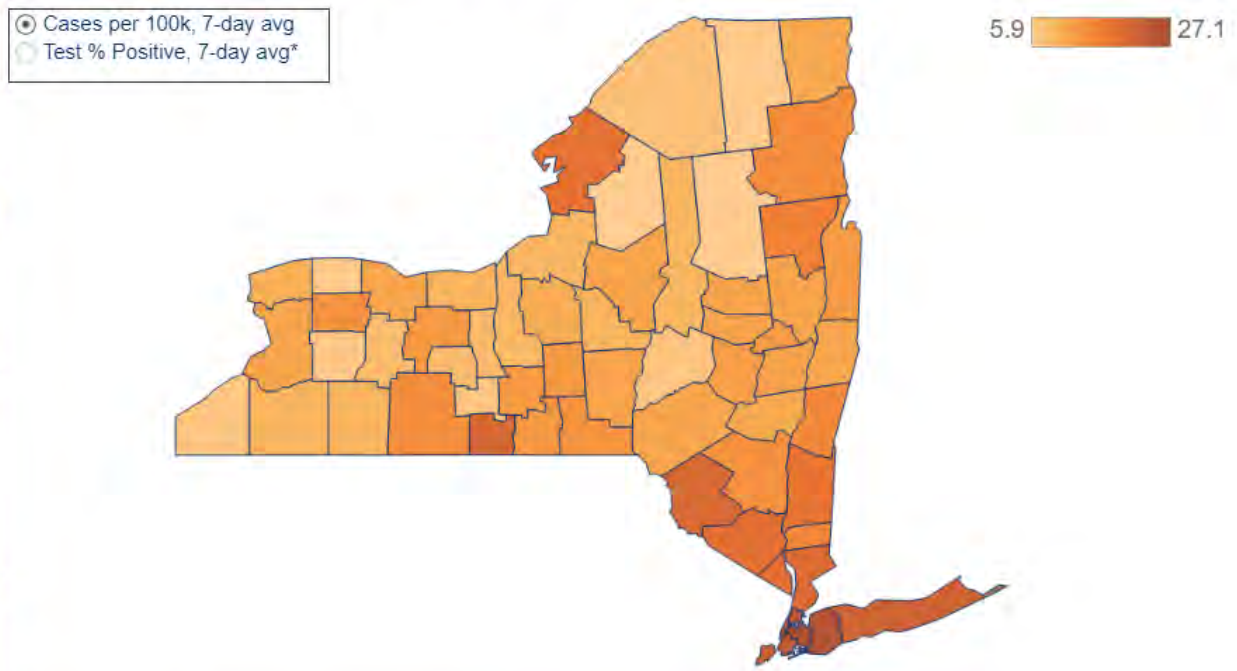
Tested Positive (Cumulative)
6,212,342

Total Results Received (Cumulative)
122,318,500

Tested Positive by Sex (Cumulative)

Female	Male	Unknown
52.6%	45.8%	1.6%

Positive Tests by County



County Testing Details: None

Click County to See Detail
Click Again for Statewide

Albany
Allegany
Bronx
Broome
Cattaraugus
Cayuga
Chautauqua
Chemung
Chenango
Clinton
Columbia
Cortland
Delaware
Dutchess
Erie
Essex
Franklin
Fulton
Genesee
Greene
Hamilton
Herkimer
Jefferson
Kings
Lewis
Livingston
Madison
Monroe
Montgomery

Tracker dashboard – continued evolution

COVID-19 Data in New York

OVERVIEW

Monitoring the Key Aspects of the Epidemic

New York State is closely monitoring the COVID-19 epidemic across data sources related to testing, hospitalization, fatalities, vaccination, and a variety of other topics. The dashboards, reports, and data sources contained below summarize key information on these topics.

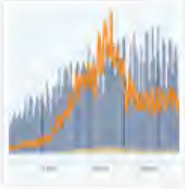
TESTING, CASES, AND VARIANTS

COVID-19 Testing Tracker

Statewide tests and positive cases

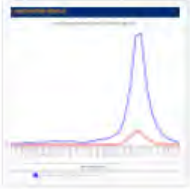
COVID-19 Variant Data

Variant prevalence across time



Positive Tests Over Time, by Region and County

Tests and positive cases by day



COVID-19 Breakthrough Data

Cases and hospitalizations by vaccination status

COVID-19 Reinfection Data

Reinfections over time, by region

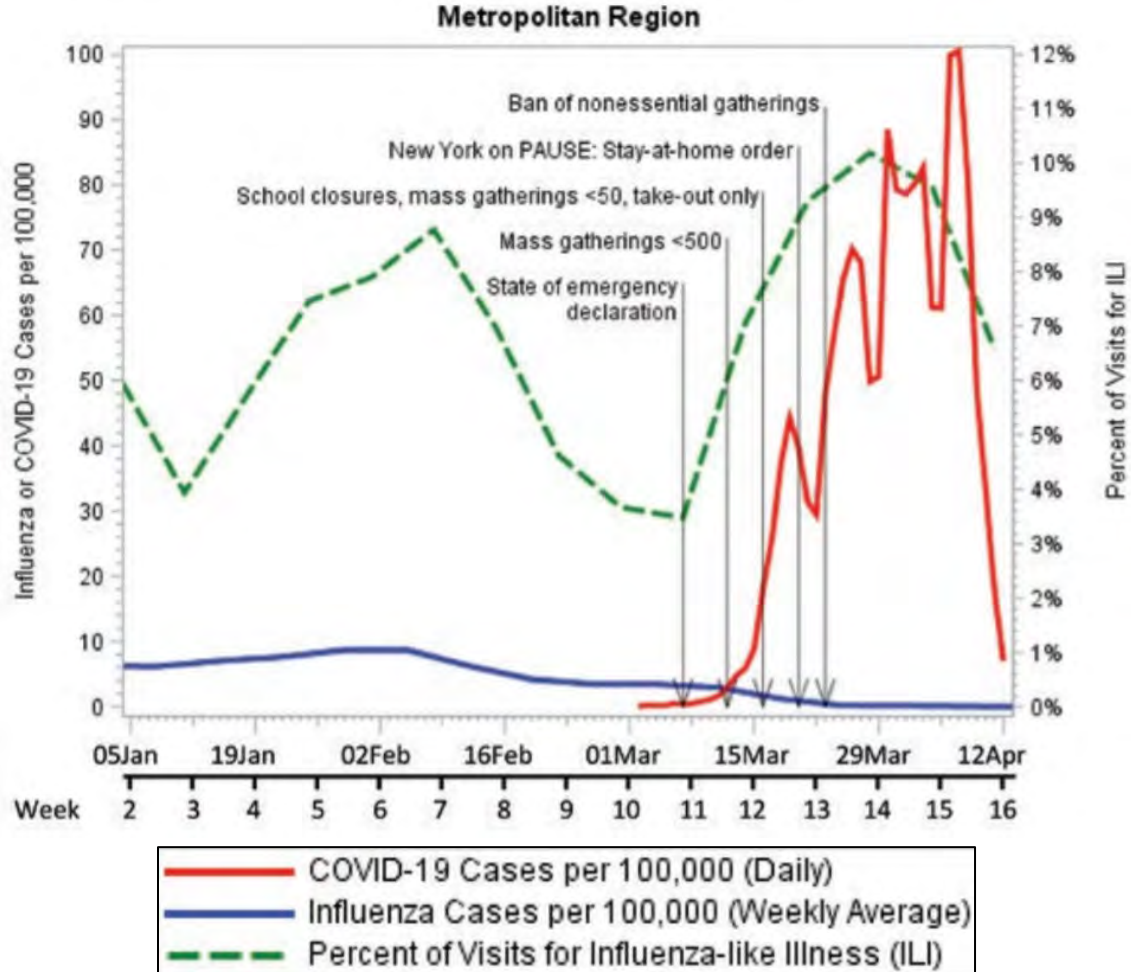
Innovating to track the outbreak

- Testing still provided incomplete picture…
- Leveraged the ILI-NET system
  - Persons with influenza-like illness syndrome attending statewide outpatient/ED network
  - Typically declines with flu season end
- Began to rise with and track slightly *ahead* of COVID-19 cases
  - Declines in slope following increased levels of closure
  - May also reflect changes in outpatient care
- Publication and weekly internal reports
- ILI and related CLI became part of White House's 2020 recommended metrics

Clinical Infectious Diseases

Monitoring Coronavirus Disease 2019 (COVID-19) Through Trends in Influenza-like Illness, Laboratory-confirmed Influenza, and COVID-19—New York State, Excluding New York City, 1 January 2020–12 April 2020

Eli S. Rosenberg,[1] Eric W. Hall,[2] Elizabeth M. Rosenthal,[1] Angela M. Maxted,[3] Donna L. Gowie,[3] Elizabeth M. Dufort,[3] Debra S. Blog,[3] Dina Hoefer,[3] Kirsten St. George,[3] Brad J. Hutton,[3] and Howard A. Zucker[3]; for the New York State Coronavirus 2019 Response Team



Innovating to track the outbreak: "grocery store" study

- But not everybody infected has symptoms, reports to care
  - How many New Yorkers had been infected?
  - What fraction diagnosed, died?
- First statewide study for *antibodies* enabled understanding all infection
  - 15,101 adults in 99 grocery stores, April 19-28: immense staff effort
  - Tested for IgG via dry blood spot at Wadsworth Center

Table 1. Reactivity and test-characteristic adjusted cumulative incidence of COVID-19, overall and by demographic factors and region

		Reactivity		Test-characteristic adjusted estimated cumulative incidence				
	% of adults in New York	Unweighted # Reactive / Total Sample	Weighted percent	%	(95% CI)	Infection-experienced adults [a]	(95% CI)	% of Infection-experienced adults	p-value
Overall	100.0	1,887/15,101	12.5	14.0	(13.3-14.7)	2,139,300	(2,035,800-2,242,800)	100.0	
Region									<.0001
New York City [b]	43.3	1,319/5,946	20.2	22.7	(21.5-24.0)	1,504,400	(1,421,300-1,587,500)	70.1	
Westchester/ Rockland Counties	6.4	134/980	14.4	16.1	(13.2-19.0)	156,500	(128,400-184,600)	7.3	
Long Island [c]	14.4	241/2,074	11.9	13.2	(11.4-15.1)	291,800	(250,600-332,900)	13.6	
Rest of NYS [d]	35.9	193/6,101	3.4	3.6	(3.0-4.1)	194,600	(162,600-226,600)	9.1	

- 9% diagnosed
- 0.6% infection fatality

- Aligned with 2 later studies of residual clinical serum by CDC & Mt. Sinai

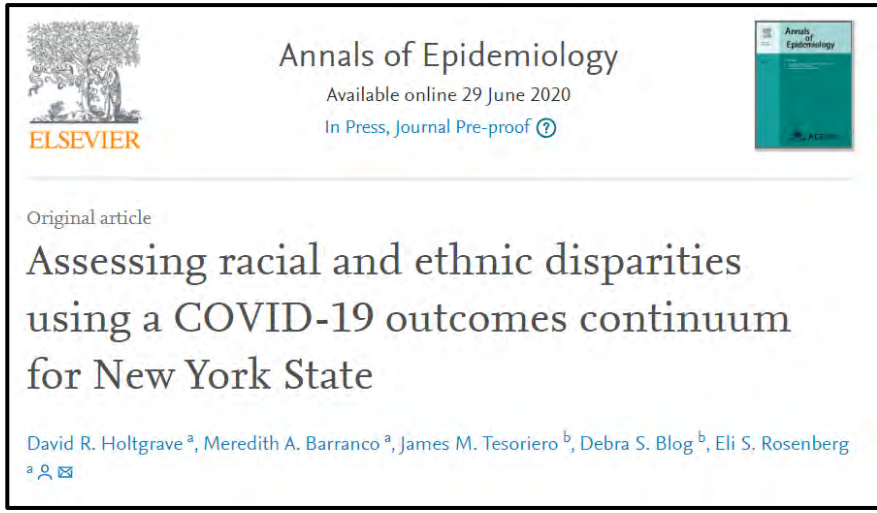
Innovating to track the outbreak: revealing extensive racial disparities

Table 1. Reactivity and test-characteristic adjusted cumulative incidence of COVID-19, overall and by demographic factors and region

		Reactivity		Test-characteristic adjusted estimated cumulative incidence				
	% of adults in New York	Unweighted # Reactive / Total Sample	Weighted percent	%	(95% CI)	Infection-experienced adults [a]	(95% CI)	% of Infection-experienced adults	p-value
Overall	100.0	1,887/15,101	12.5	14.0	(13.3-14.7)	2,139,300	(2,035,800-2,242,800)	100.0	
Sex									0.03
Male	47.6	918/6,635	13.2	14.8	(13.8-15.8)	1,076,500	(1,001,900-1,151,100)	50.3	
Female	52.4	969/8,466	11.9	13.3	(12.4-14.2)	1,062,200	(990,500-1,133,800)	49.7	
Race and Ethnicity									<.0001
Hispanic or Latino	17.4	757/2,735	25.8	29.2	(27.2-31.2)	775,800	(722,700-829,000)	36.6	
NH-White	58.0	623/9,545	7.3	8.1	(7.4-8.7)	715,400	(657,100-773,700)	33.7	
NH-Black/African American	13.9	388/1,913	18.0	20.2	(18.1-22.3)	428,000	(382,700-473,400)	20.2	
NH-Asian	8.6	75/629	11.1	12.4	(9.4-15.4)	161,700	(122,600-200,800)	7.6	
Multiracial/Other	2.1	44/279	10.7	11.9	(6.4-17.5)	38,800	(20,800-56,800)	1.8	

Assessing COVID-19 racial & ethnic disparities using a continuum approach

- In COVID-19, stark racial and ethnic **fatality** disparities quickly became evident
  - "Final" endpoint to measure, but tip-of-the-iceberg
  - Has most available data by race/ethnicity
  - Unclear where along continuum from infection to death disparities emerged and where to intervene



- The "HIV care continuum" has long offered a model for integrating data sources and understanding stages at which gaps emerge in health outcomes
  - Numerous NYS data sources' results merged …

Assessing COVID-19 racial & ethnic disparities: data sources

Data Source	Population represented	Date information	Reference
CDC National Center for Health Statistics Bridged Race File, Vintage 2018	Adults ≥18 years	2018	https://www.cdc.gov/nchs/nvss/bridged_race.htm
New York State Department of Health antibody seroprevalence study	Noninstitutionalized adults 18+	Conducted April 19-28, reflecting infections through approx. March 29th. Diagnoses through April 9	Rosenberg et al, Annals of Epidemiology 2020
New York City Department of Health and Mental Hygiene COVID-19 data report	Individuals diagnosed with COVID-19	Diagnoses through April 9th, 2020	https://www1.nyc.gov/assets/doh/downloads/pdf/imm/covid-19-deaths-race-ethnicity-05142020-1.pdf.
Retrospective cohort study of hospitalized New York COVID-19 patients	Random sample of individuals hospitalized with lab-confirmed COVID-19 in 25 hospitals	Admissions between March 15th-28th, 2020	Rosenberg et al, JAMA 2020
Online archive of officially reported New York State COVID-19 hospitalizations and deaths	All individuals reported hospitalized and died with COVID-19	As of April 9th (Hospitalization) and April 17th (fatality)	https://covidtracking.com/data/state/new-york

New York COVID-19 Outcomes Continuum

- Initial disparities in infection in the community
- Differences in diagnosis and hospitalization
- Culminating in substantial mortality disparities, per population
- Disparities in fatalities must be addressed earlier – in the community before infection occurs, and before hospitalization

Understanding other vulnerable groups: people living with HIV

- Are people with HIV (PLWHIV) more at-risk for COVID-19 diagnosis and poor outcomes?
- Should PLWHIV be prioritized in upcoming vaccination efforts?
- Limited population-based of COVID-19 outcomes among PLWHIV
- Two studies in NYS
  - Linkage study of HIV diagnosis registry and COVID-19 databases for diagnosis (ECLRS) & hospitalization (SHIN-NY).
  - Matched chart review study of persons hospitalized with COVID-19, comparing persons living with HIV vs. those without HIV

COVID-19 & HIV

- PLWHIV died with COVID-19 at 2.55x the rate as those without
  - **1-in-522 PLWHIV died in first 3.5 months**
- After adjusting for sex/age/region, this became 1.23x
- Explained by higher levels of severity (needing hospitalization), not mortality in hospital
  - Gradient with CD4 count

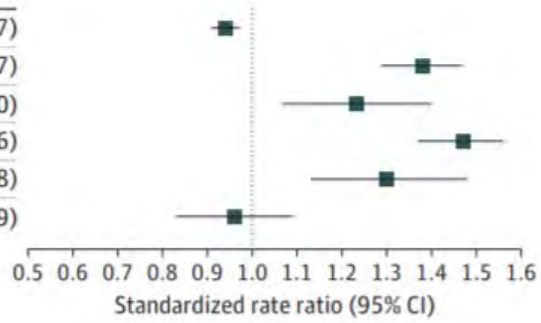
JAMA Network Open

Original Investigation | Infectious Diseases

COVID-19 Outcomes Among Persons Living With or Without Diagnosed HIV Infection in New York State

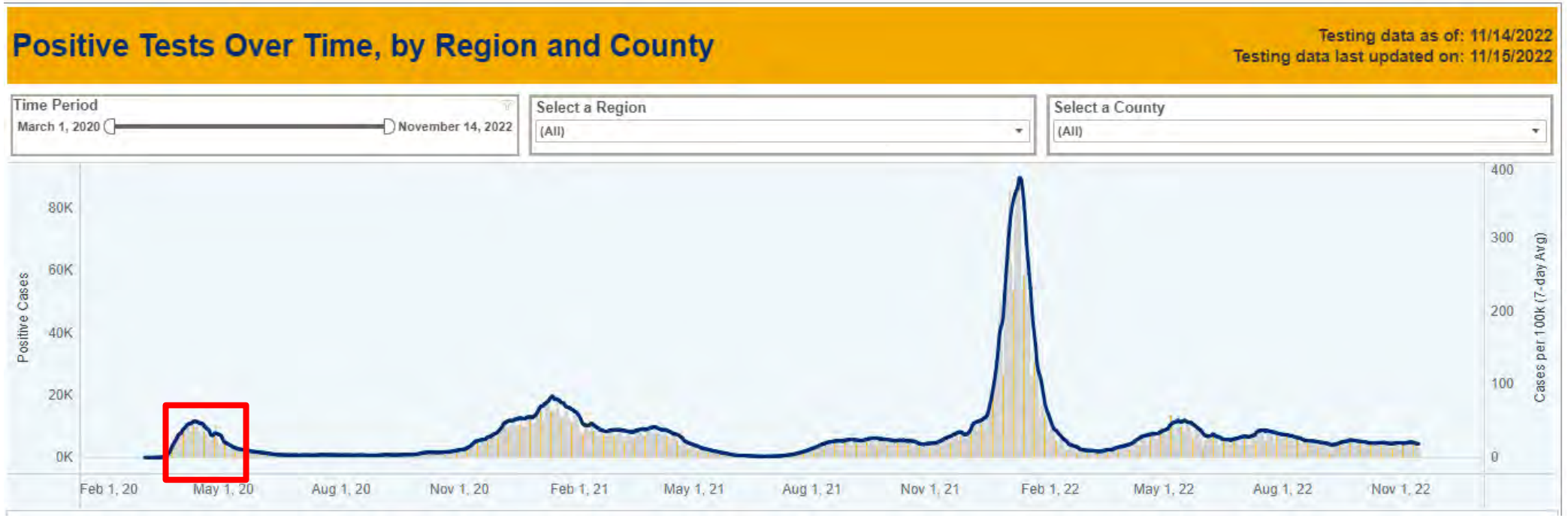
James M. Tesoriero, PhD; Carol-Ann E. Swain, PhD; Jennifer L. Pierce, BS; Lucila Zamboni, PhD; Meng Wu, PhD; David R. Holtgrave, PhD; Charles J. Gonzalez, MD; Tomoko Udo, PhD; Johanne E. Morne, MS; Rachel Hart-Malloy, PhD; Deepa T. Rajulu, MS; Shu-Yin John Leung, MA; Eli S. Rosenberg, PhD

Outcome	Unadjusted: PLWDH rate per 1000	Unadjusted: Non-PLWDH rate per 1000	Unadjusted: Rate ratio (95% CI)	Standardized rate ratio (95% CI)
Diagnosed with COVID-19, per population	27.7	19.4	1.43 (1.38-1.48)	0.94 (0.91-0.97)
Hospitalized with COVID-19, per population	8.3	3.2	2.61 (2.45-2.79)	1.38 (1.29-1.47)
In-hospital death with COVID-19, per population	1.9	0.8	2.55 (2.22-2.93)	1.23 (1.07-1.40)
Hospitalized with COVID-19, per diagnosis	299.9	163.5	1.83 (1.72-1.96)	1.47 (1.37-1.56)
In-hospital death with COVID-19, per diagnosis	69.3	38.7	1.79 (1.56-2.05)	1.30 (1.13-1.48)
In-hospital death with COVID-19, per hospitalization	231.0	236.6	0.98 (0.85-1.12)	0.96 (0.83-1.09)



HIV clarified as priority group in CDC and DOH recommendations

How do we know which potential therapies work against COVID-19?



March 16, 2020 (Monday)

Elon Musk ✓
@elonmusk

Maybe worth considering chloroquine for C19
docs.google.com/document/d/e/2...

4:31 PM · Mar 16, 2020 · Twitter for iPhone

11.1K Retweets **2,324** Quote Tweets **49.5K** Likes

Tweet your reply — Reply

Elon Musk ✓ @elonmusk · Mar 16, 2020
Replying to @elonmusk
This paper matches what I'm hearing from a lot of smart people
elsevier.com/__data/assets/...
344 1,402 9,737

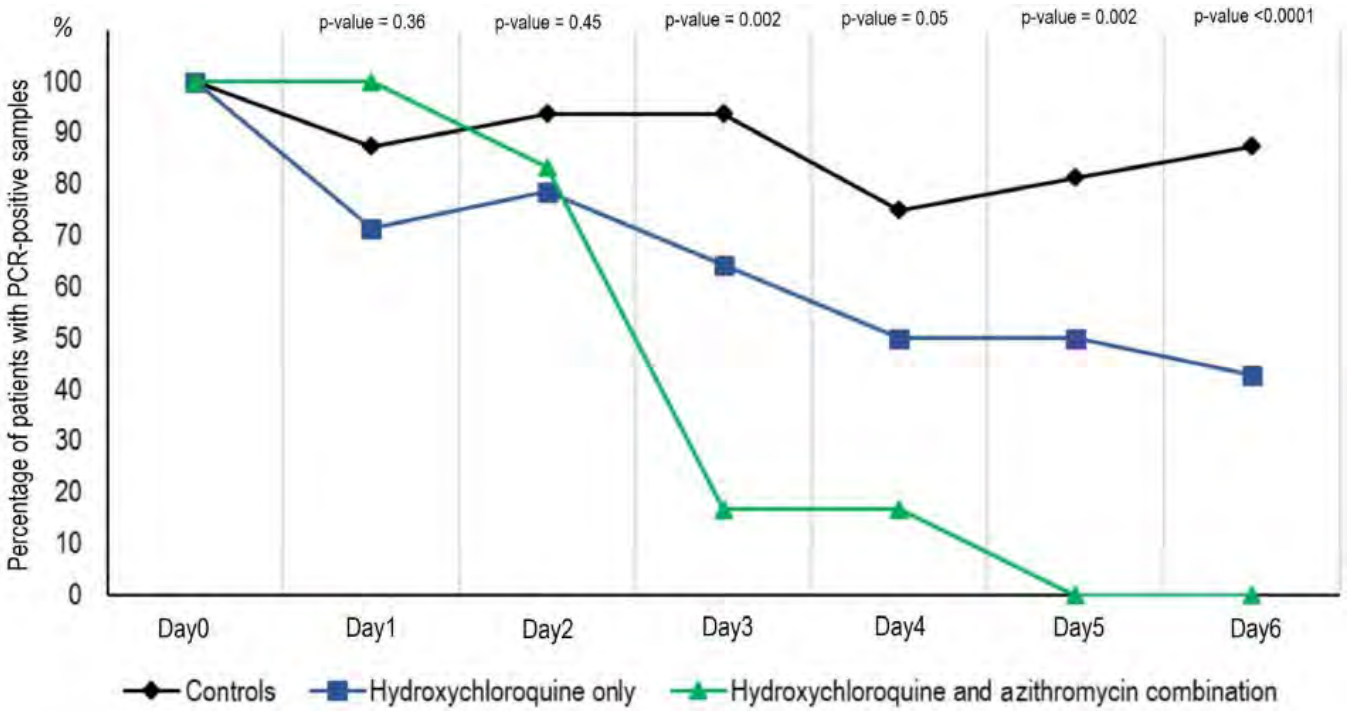
Elon Musk ✓ @elonmusk · Mar 16, 2020
That said, danger of panic still far exceeds danger of corona imo. If we over-allocate medical resources to corona, it will come at expense of treating other illnesses. Track graph at bottom of this page: cdc.gov/coronavirus/20...
1,391 2,499 12.9K

Elon Musk ✓ @elonmusk · Mar 17, 2020
Replying to @elonmusk
Hydroxychloroquine probably better
m.youtube.com/watch?feature=...

Didier Raoult

French microbiologist

Raoult's first open-label 'trial' on hospitalized patients (n=36)



Launches frenzy to distribute and treat with HCQ at hospitals

March 19, 2020 (Thursday) – President Trump's remarks

Now, a drug called chloroquine — and some people would add to it "hydroxy-." **Hydroxychloroquine**. So chloroquine or hydroxychloroquine. …. But it is known as a malaria drug, and **it's been around for a long time and it's very powerful**. But the nice part is, it's been around for a long time, so we know that if it — **if things don't go as planned, it's not going to kill anybody.**

When you go with a brand-new drug, you don't know that that's going to happen. You have to see and you have to go — long test. But this has been used in different forms — very powerful drug — in different forms. And it's shown very encouraging — very, very encouraging early results. And we're going to be able to make that drug available almost immediately. **And that's where the FDA has been so great. They — they've gone through the approval process; it's been approved.** And they did it — they took it down from many, many months to immediate. So we're going to be able to make that drug available by prescription or states.

I spoke with Governor Cuomo about it at great length last night, and he wants to be right on — on the — he wants to be first on line. And so I think that's a tremendous — there's tremendous promise, based on the results and other tests. **There's tremendous promise**. And **normally the FDA would take a long time** to approve something like that, and it's — it was approved very, very quickly and it's now approved, by prescription. **Individual states will handle it. They can handle it. Doctors will handle it. And I think it's going to be — I think it's going to be great.**

Then we're quickly studying this drug, and while we're continuing to study it — **but the studying is going to be also done in — as it's given out to large groups of people, perhaps in New York and other places. We'll study it there.**

March 21, 2020 (Saturday)

- Governor Cuomo:
  - “We're also implementing the trial drug. We have secured 70,000 hydroxychloroquine; 10,000 Zithromax from the federal government. I want to thank the FDA for moving very expeditiously to get us this supply. The President ordered the FDA to move and the FDA moved. We're going to get the supply and the trial will start this Tuesday.”

- Planning begins that day for observational study to understand efficacy/safety as drug rolled out

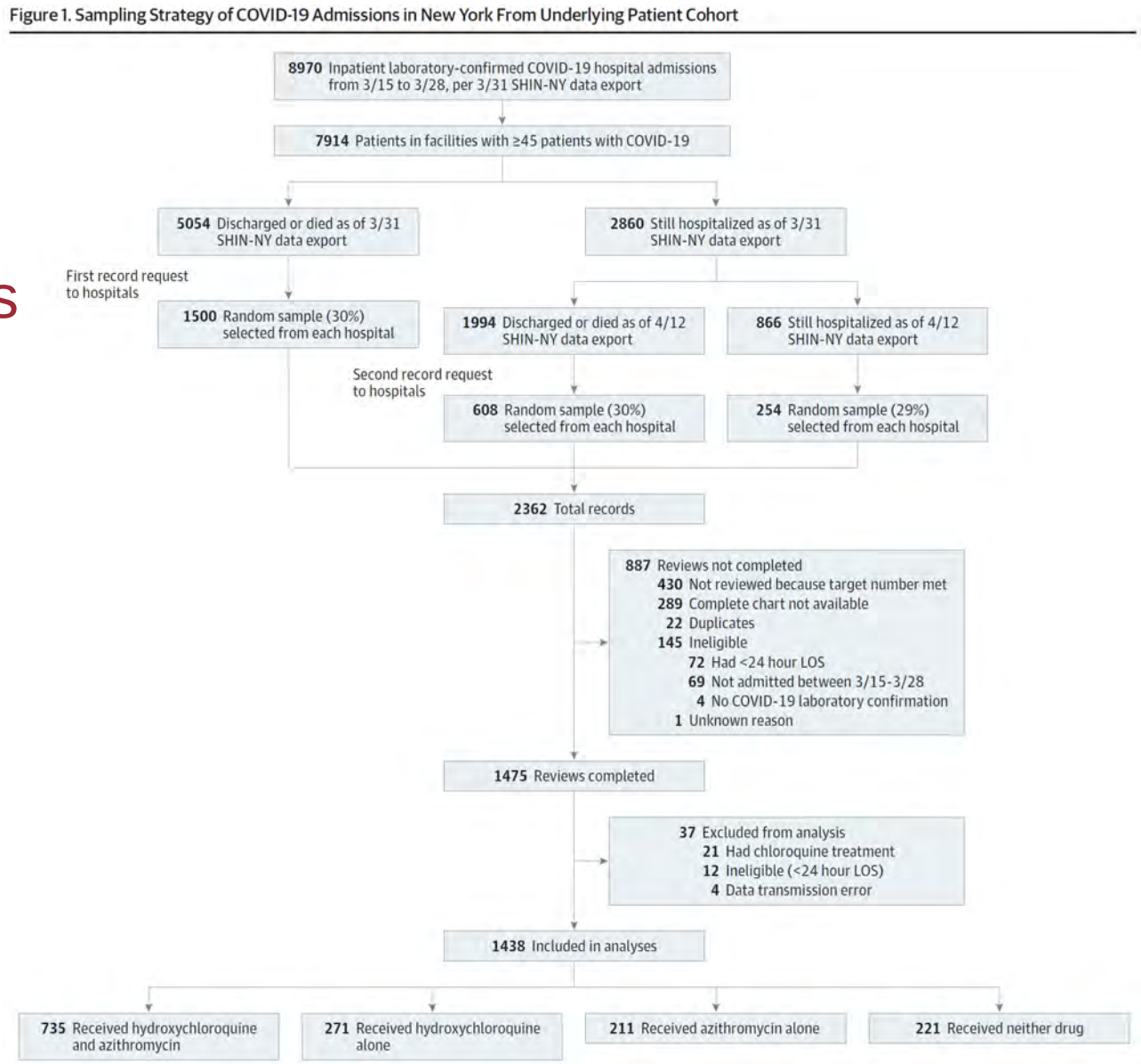
JAMA | Original Investigation

Association of Treatment With Hydroxychloroquine or Azithromycin With In-Hospital Mortality in Patients With COVID-19 in New York State

Eli S. Rosenberg, PhD; Elizabeth M. Dufort, MD; Tomoko Udo, PhD; Larissa A. Wilberschied, MS; Jessica Kumar, DO; James Tesoriero, PhD; Patti Weinberg, PA; James Kirkwood, MPH; Alison Muse, MPH; Jack DeHovitz, MD; Debra S. Blog, MD; Brad Hutton, MPH; David R. Holtgrave, PhD; Howard A. Zucker, MD

Hydroxychloroquine in NYS: Cohort design

- Cohort: Random sample of all NYC region inpatients with COVID-19 3/15-3/28, from SHIN-NY
  - 25 hospitals with ≥45 COVID-19 d/c's
  - Sample size 1,438
  - Represented 88% of patients in region with 88% of NYS diagnoses
- Electronic charts requested by NYS DOH and abstracted by nurse/epi team
- "Follow-up" through April 27



Hydroxychloroquine in NYS: cohort features

Table 1. Patient Characteristics by Treatment Group

	No./total No. (%)				
	Hydroxychloroquine + azithromycin (n = 735)	Hydroxychloroquine alone (n = 271)	Azithromycin alone (n = 211)	Neither drug (n = 221)	*P* value
Demographic characteristics					
Male sex	456 (62.0)	158 (58.3)	134 (63.5)	110 (49.8)	.006
Race/ethnicity					
White	167/694 (24.1)	40/256 (15.6)	53/204 (26.5)	61/214 (28.6)	
Black	199/694 (28.7)	76/256 (29.7)	46/204 (22.6)	50/214 (23.5)	
Hispanic	199/694 (28.7)	95/256 (37.1)	69/204 (33.8)	67/214 (31.5)	
Not listed above[a]	128/694 (18.5)	45/256 (17.6)	35/204 (17.2)	35/214 (16.4)	
Age, y					
<18	1 (0.1)	2 (0.7)	3 (1.4)	19 (8.6)	
18-30	23 (3.1)	13 (4.8)	9 (4.3)	8 (3.6)	
31-44	105 (14.3)	29 (10.7)	29 (13.7)	34 (15.4)	
45-64	284 (38.6)	90 (33.2)	72 (34.1)	58 (26.2)	
≥65	322 (43.8)	137 (50.6)	98 (46.5)	102 (46.2)	

Let's reflect on that for a moment…

- 51% received HCQ+AZM, 19% HCQ-alone, 15% AZM-only, 15% neither
- Patients receiving therapy more likely to be male
- Median patient age similar: HCQ+AZM, 61.4; HCQ-alone 65.5, AZM-alone, 62.5, neither 64.0

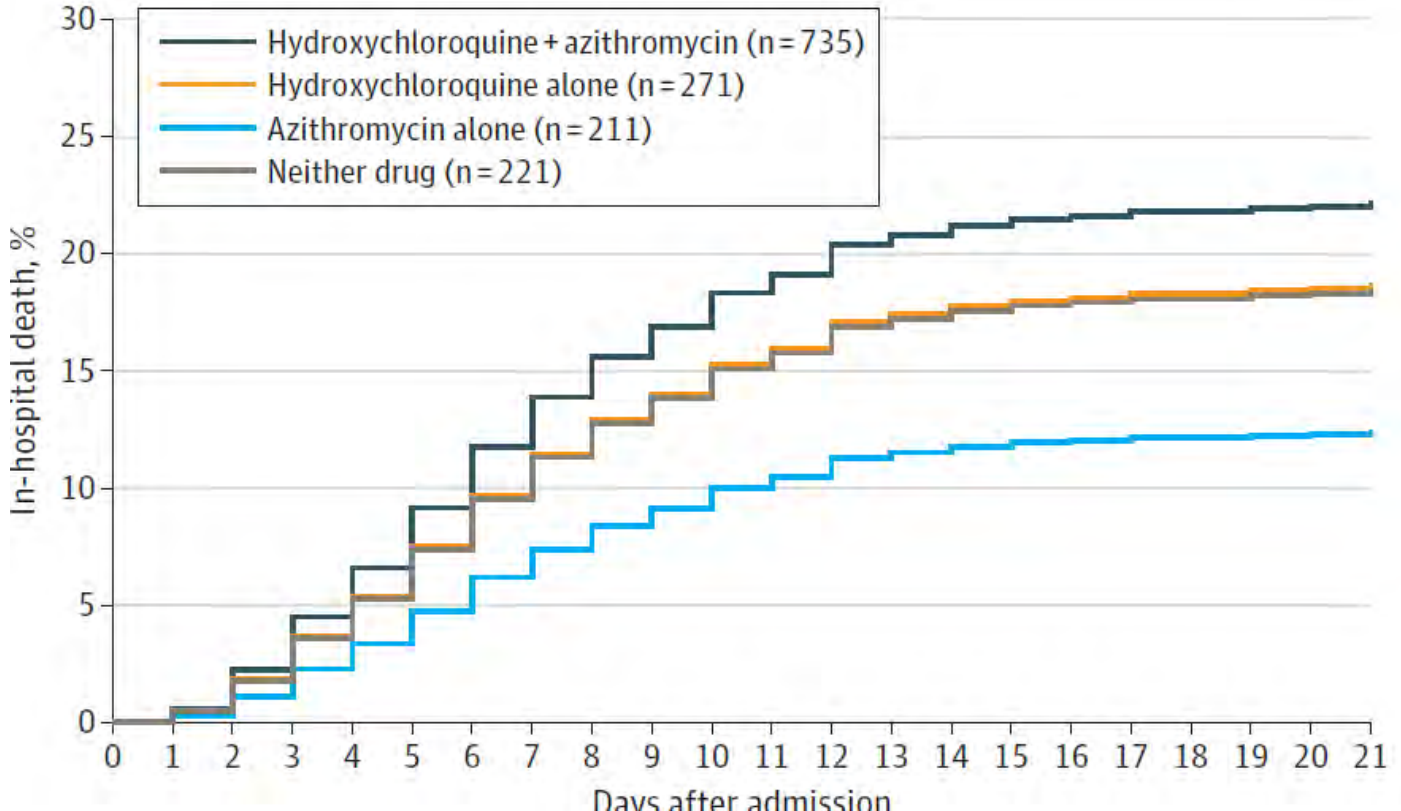
Hydroxychloroquine in NYS: adjusted results

- No significant differences in mortality
- Differences in cardiac outcomes diminished.
  - Higher cardiac arrest risk for patients receiving HCQ+AZM

Table 3. Model-Adjusted Risk of In-Hospital Death, Cardiac Arrest, and Arrhythmia

Outcome	Model type[a]	Estimate (95% CI)		
		Hydroxychloroquine + azithromycin vs neither drug	Hydroxychloroquine alone vs neither drug	Azithromycin alone vs neither drug
In-hospital death (hazard ratio)	Cox proportional hazards	1.35 (0.76-2.40)	1.08 (0.63-1.85)	0.56 (0.26-1.21)

Figure 2. Model-Adjusted Estimated In-Hospital Mortality, by Treatment Group



Late April/Early May: Concurrent actions and observational results

FDA

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FDA NEWS RELEASE

Coronavirus (COVID-19) Update: FDA Reiterates Importance of Close Patient Supervision for 'Off-Label' Use of Antimalarial Drugs to Mitigate Known Risks, Including Heart Rhythm Problems

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For Immediate Release:

April 24, 2020

THE CORONAVIRUS CRISIS

NIH Panel Recommends Against Drug Combination Promoted By Trump For COVID-19

npr

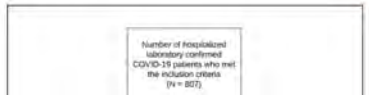
April 21, 2020 · 4:15 PM ET

Med

CellPress

Clinical Advances

Outcomes of Hydroxychloroquine Usage in United States Veterans Hospitalized with COVID-19



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Observational Study of Hydroxychloroquine in Hospitalized Patients with Covid-19

Joshua Geleris, M.D., Yifei Sun, Ph.D., Jonathan Platt, Ph.D., Jason Zucker, M.D., Matthew Baldwin, M.D., George Hripcsak, M.D., Angelena Labella, M.D., Daniel K. Manson, M.D., Christine Kubin, Pharm.D., R. Graham Barr, M.D., Dr.P.H., Magdalena E. Sobieszczyk, M.D., M.P.H., and Neil W. Schluger, M.D.

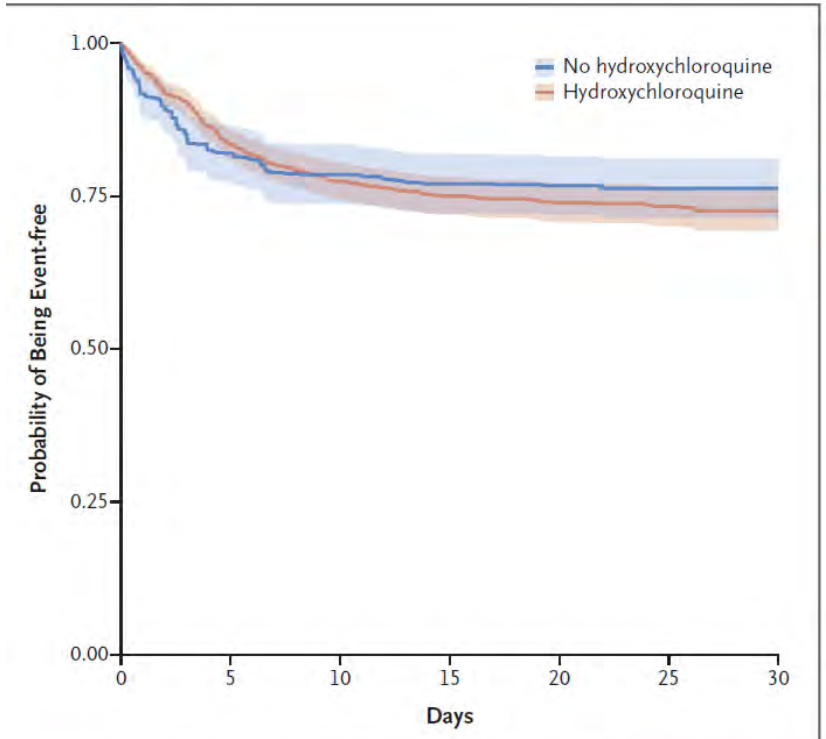
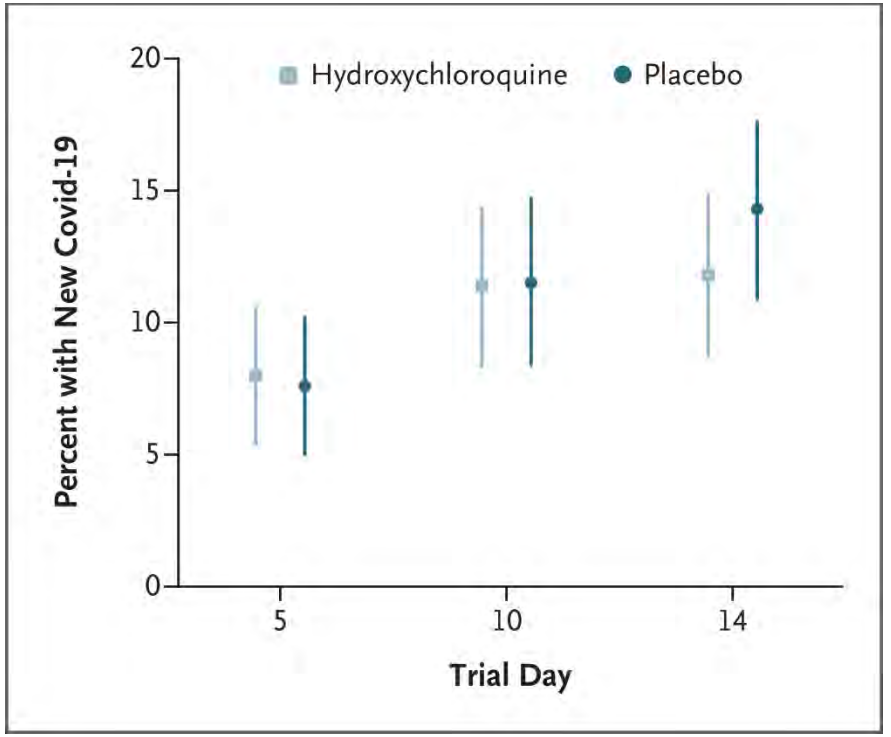


Figure 2. Freedom from Composite End Point of Intubation or Death.

The shaded areas represent pointwise 95% confidence intervals.

June: Randomized trials confirm HCQ not effective

- Boulware et al – 2 randomized controlled trials
  - Pre- and post-exposure prophylaxis
  - At-home design with self-reported incidence



- 3 treatment RCT stopped early for no benefit

RECOVERY
Randomised Evaluation of COVID-19 Therapy

UNIVERSITY OF OXFORD

HOME FOR PATIENTS FOR SITE STAFF RESULTS NEWS Search

News | No clinical benefit from use of hydroxychloroquine in hospitalised patients with COVID-19

No clinical benefit from use of hydroxychloroquine in hospitalised patients with COVID-19

5 June 2020

Media Advisory Saturday, June 20, 2020

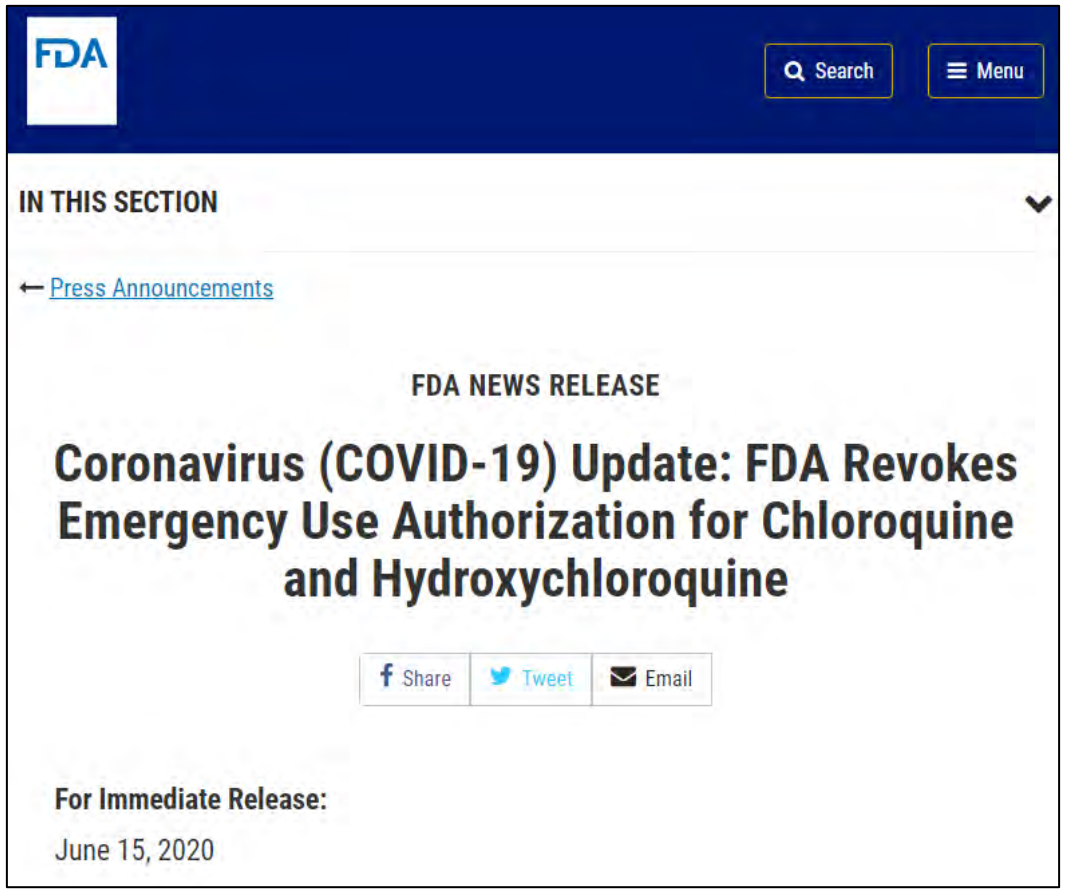
NIH halts clinical trial of hydroxychloroquine

Study shows treatment does no harm, but provides no benefit

World Health Organization

WHO discontinues hydroxychloroquine and lopinavir/ritonavir treatment arms for COVID-19

June: FDA revokes emergency use authorization


FDA

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FDA NEWS RELEASE

Coronavirus (COVID-19) Update: FDA Revokes Emergency Use Authorization for Chloroquine and Hydroxychloroquine

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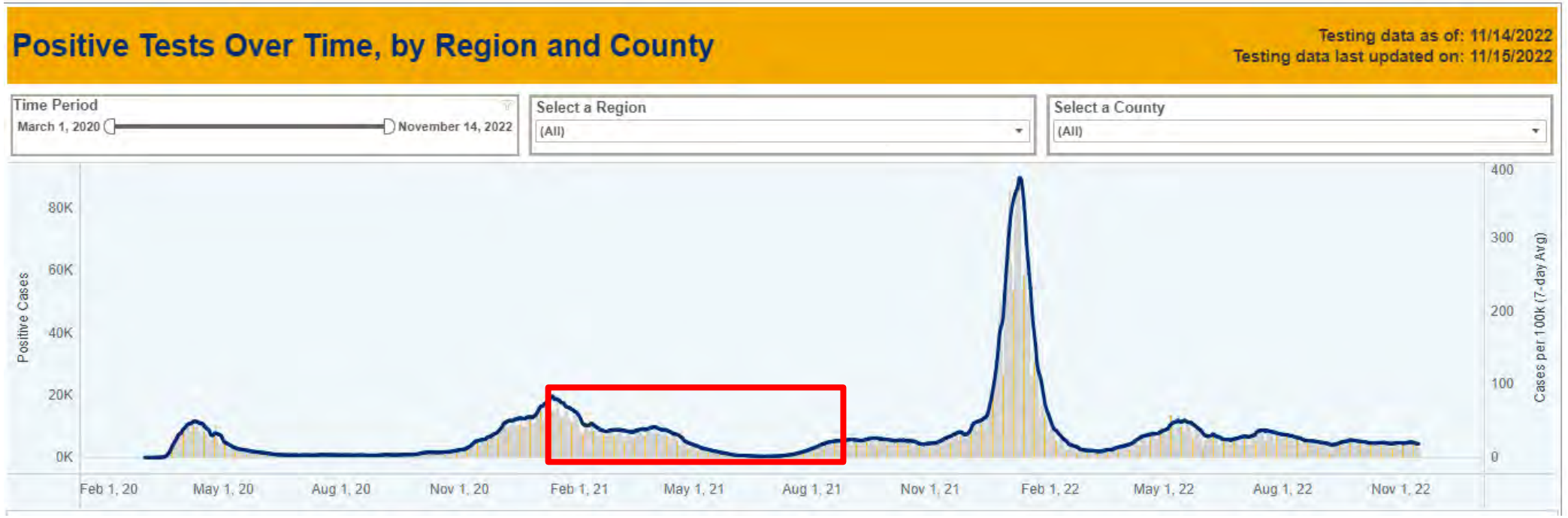
For Immediate Release:

June 15, 2020

- Rapid rise and fall of worthless treatment, driven by rapid observational research
- Cautionary tale for US drug regulation in time of crisis

Are COVID-19 vaccines working?



Following summer (2021), COVID vaccines available for 6 months

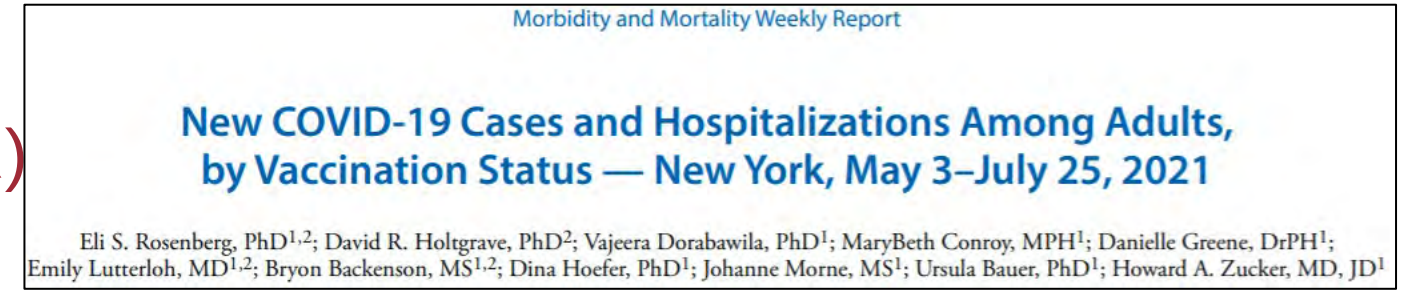
- December 2020: Randomized trials for Pfizer, Moderna, J&J show efficacious against infection, leading to FDA EUA and staged rollout over next 6 months
  - Real-world data on effectiveness and against more rare severe outcomes limited
  - Some data released from Israel, but smaller population & Pfizer only
  - During summer 2021, “breakthrough infections” start to be noted in large numbers

- Q. How well are COVID-19 vaccines working in practice against infection and severe disease?
  - For which groups?
  - Differences between products?
  - For how long?
  - Delta variant emerged in summer 2021 - could changes in variants be involved?

  - NYS data able to address these questions…

First state analysis of COVID-19 vaccine effectiveness

- Match of 3 statewide databases
  - Vaccine registries (NYSIIS/CIR)
  - Laboratory testing (ECLRS)
  - Hospital admissions (HERDS)



Morbidity and Mortality Weekly Report

New COVID-19 Cases and Hospitalizations Among Adults, by Vaccination Status — New York, May 3–July 25, 2021

Eli S. Rosenberg, PhD[1,2]; David R. Holtgrave, PhD[2]; Vajeera Dorabawila, PhD[1]; MaryBeth Conroy, MPH[1]; Danielle Greene, DrPH[1]; Emily Lutterloh, MD[1,2]; Bryon Backenson, MS[1,2]; Dina Hoefer, PhD[1]; Johanne Morne, MS[1]; Ursula Bauer, PhD[1]; Howard A. Zucker, MD, JD[1]

- For fully-vaccinated vs. unvaccinated adults…
  - Age-specific rates of cases and hospitalization estimated weekly
  - Compared using VE = 1 – IRR

- **Open cohort** approach
  - Unvaccinated persons can become vaccinated → contribute person-time and outcomes in either vaccine state.
  - Maximally utilizes population and transparent, with potential bias tradeoffs

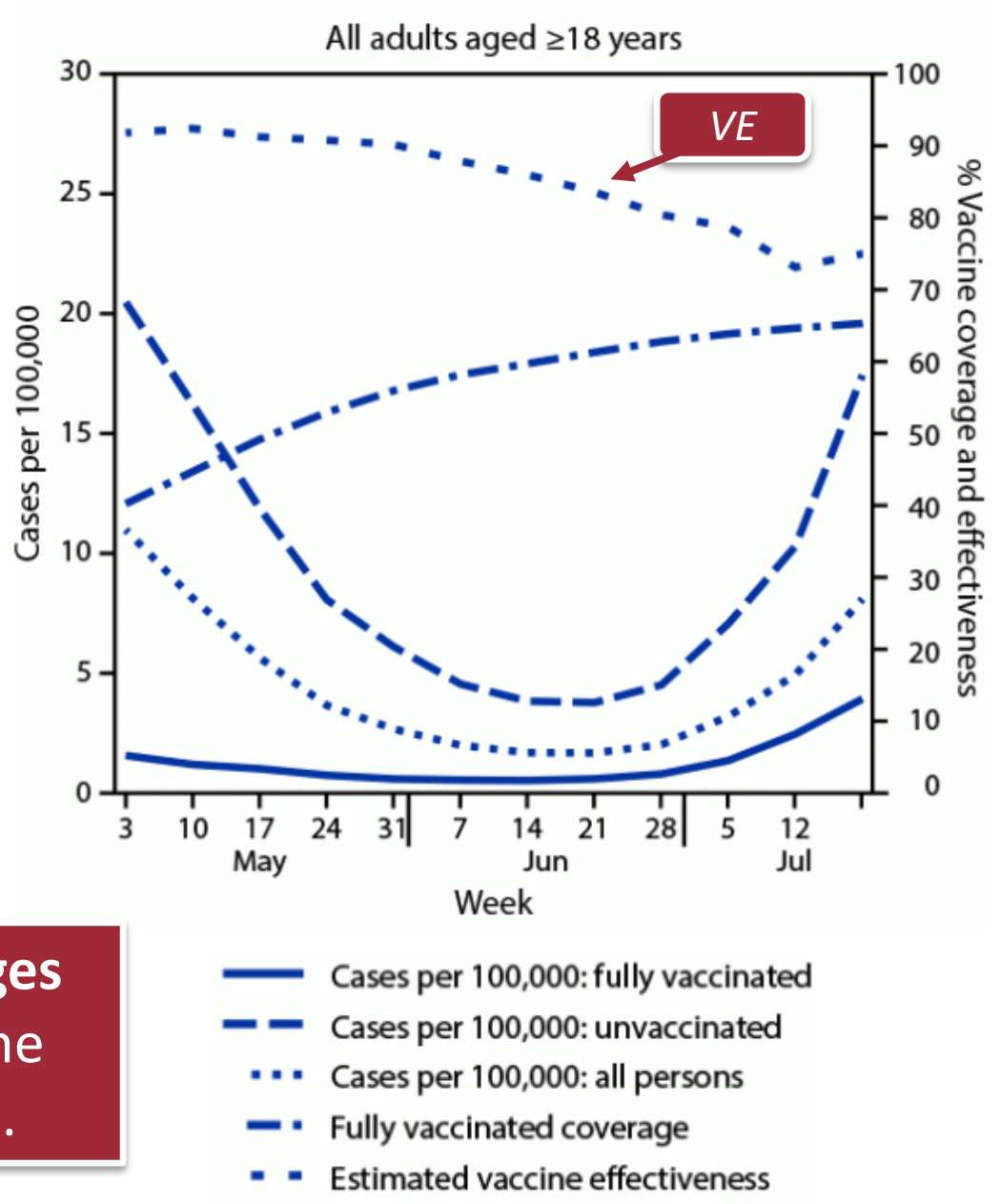
Results from this method

Laboratory-confirmed cases

- May 3 week: VE = 91.8%
- Decline coincides with Delta variant increase to >99%,
- Mid-July minimum, small rebound thereafter

Hospitalization

- Consistent VE between 89.5% and 95.2%



Challenging to understand sources of VE changes

Products, time since vaccination ("waning"), time period when variants and behaviors changed …

August 18, 2021: NYS DOH release of findings

NEW YORK STATE

Services News Government COVID-19

Department of Health

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Home Page > 2021 Press Releases > New York State Department of Health Releases First-In-The-Nation Data and Analysis On Covid-19 Vaccine Effectiveness and Breakthrough Infections

New York State Department of Health Releases First-In-The-Nation Data and Analysis On Covid-19 Vaccine Effectiveness and Breakthrough Infections

DOH Study Published by the Centers for Disease Control and Prevention Found Vaccines Greatly Reduced COVID-19 Cases and Hospitalizations

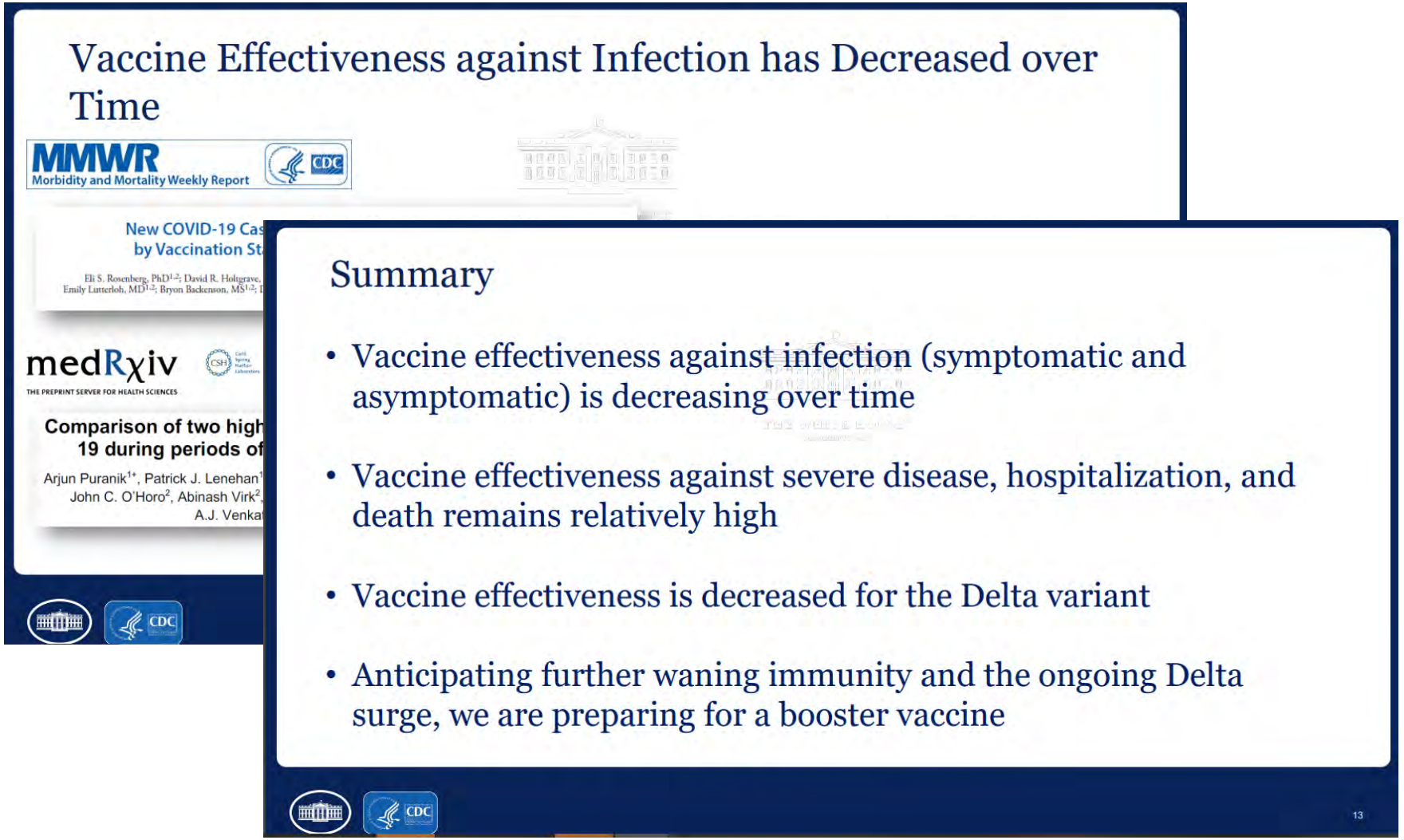
Vaccines Were Found to Be Up To 95 Percent Effective in Reducing Hospitalizations

August 18, 2021: Federal release of findings

THE WHITE HOUSE
WASHINGTON

CDC Update

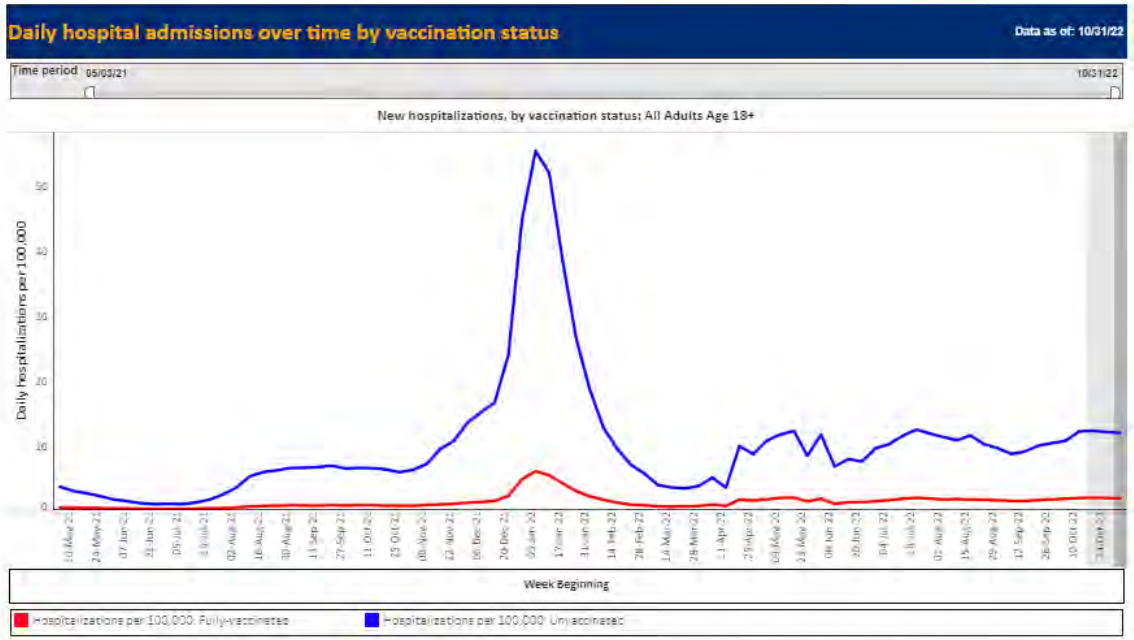
Dr. Rochelle P. Walensky



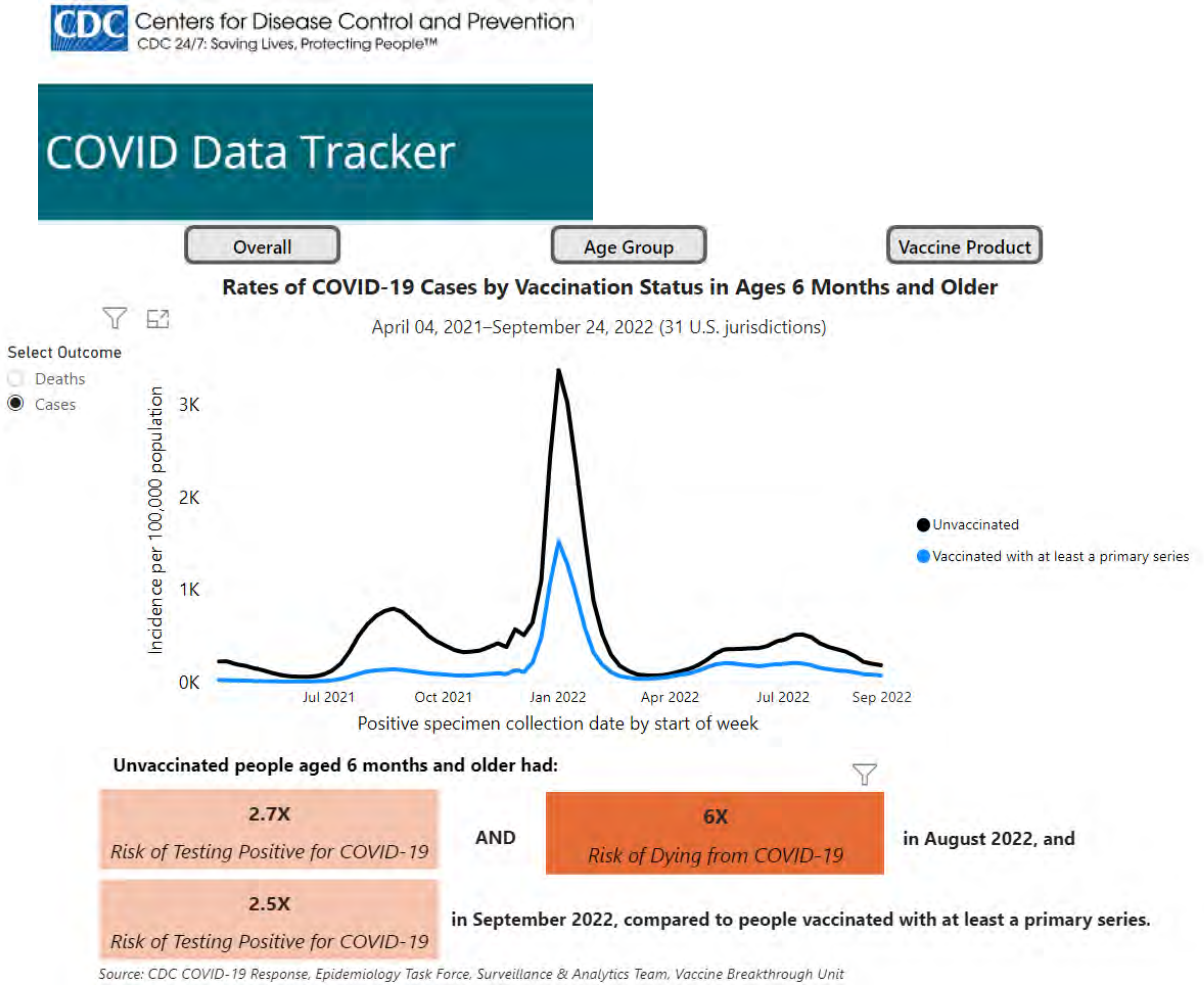
- Small declines in VE interpreted as waning, used to support new booster effort

Data dashboards & template for national approach

Figure 2: New hospitalizations with laboratory-confirmed COVID-19 among fully vaccinated and unvaccinated adults, age 18 years or older.



**Grey shading has been applied to recent weeks for which data are still accruing, with a darker grey representing data with the largest amount of uncertainty. Estimates in darker grey are likely an undercount and are subject to most change.*



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

Digging deeper to understand declines in VE

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Covid-19 Vaccine Effectiveness in New York State

Eli S. Rosenberg, Ph.D., Vajeera Dorabawila, Ph.D., Delia Easton, Ph.D., Ursula E. Bauer, Ph.D., Jessica Kumar, D.O., Rebecca Hoen, Dr.P.H., Dina Hoefer, Ph.D., Meng Wu, Ph.D., Emily Lutterloh, M.D., Mary Beth Conroy, M.P.H., Danielle Greene, Dr.P.H., and Howard A. Zucker, M.D., J.D.

Enhanced approach to focus on roles of products and timing

- **Closed cohort** approach
  - Closed cohorts, defined by combinations of:
    - Age (18-49, 50-64, ≥65 years)
    - Product (Pfizer-BioNTech, Moderna, Janssen)
    - Time of full-vaccination (January/February, March, April)
    - Comparison groups: Not vaccinated by Sept 23 (for each age group)
  - **Follow-up**: **May 1** to **September 3** (cases), **August 31** (hospitalization)
- Laboratory-confirmed COVID-19 cases *(1 per person)*
  - Time-to-diagnosis, life-table method (7 day intervals)
- Laboratory-confirmed COVID-19 hospitalizations *(repeats possible within person, ~9% of admissions)*
  - Aggregate "$events/PT$" rates (1 month intervals)

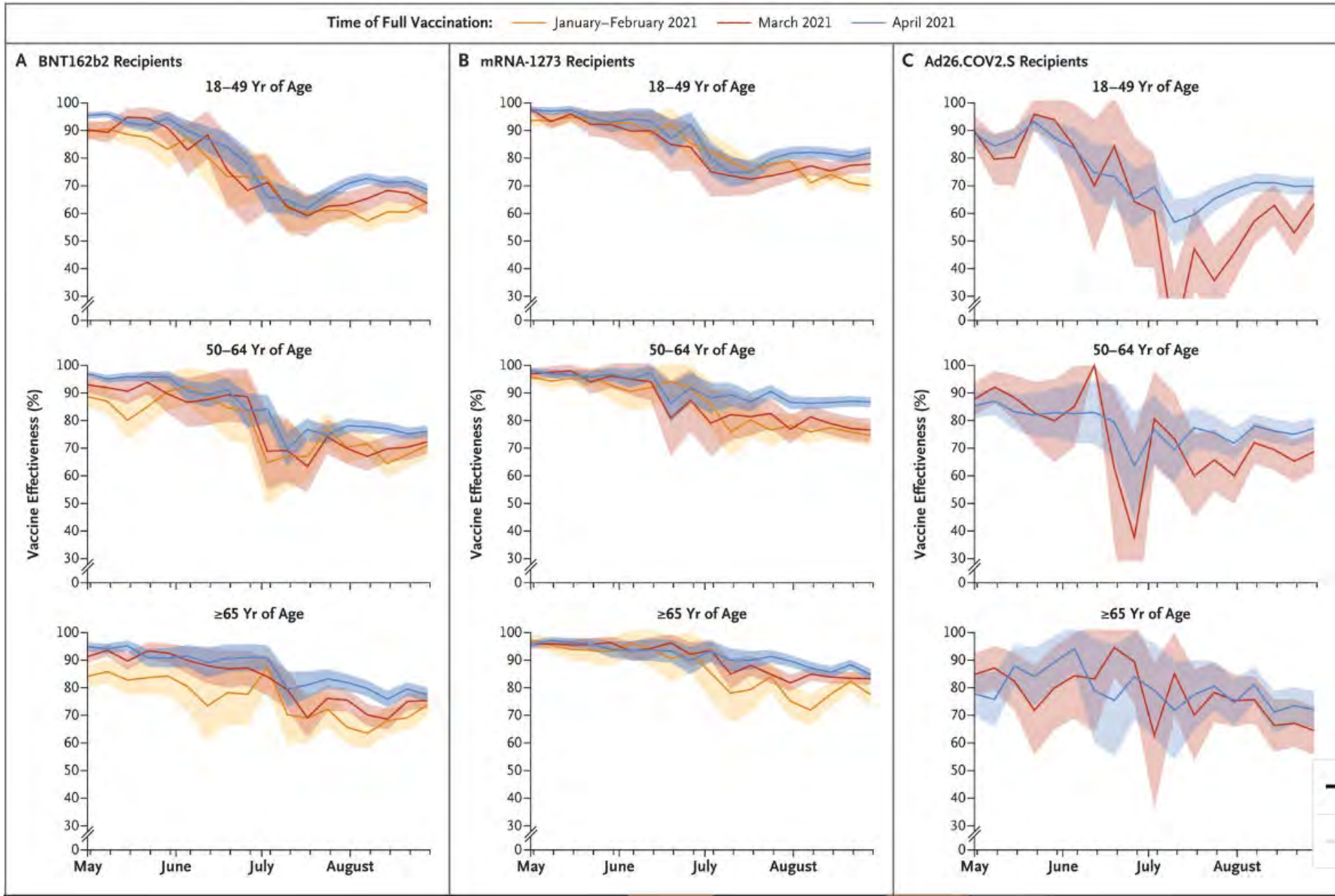
Results: Vaccine effectiveness against diagnosed infection

Simultaneous drop-off in VE against cases for all cohorts

- When Delta increased & mask guidance changed
- Not ~1 month offset, consistent with waning

- Drop-off ceased when Delta reached >90%, followed by revised mask guidance

Gradient by time-cohort in August, supportive of waning, but lesser magnitude than earlier drop



Conclusions

Cases

- Declines in VE observed across product, age, timing-cohort
  - Slowed in August when Delta reached >85%, guidance changed
  - May be more linked to Delta increase, behavioral, or other changes than time-since-vaccination

Hospitalizations

- 18-49, 50-64 years: consistently high VE across age & products
- For ≥65 years
  - Modest declines evident for both Pfizer and Moderna
  - Lowest VE for Janssen, but no decline

COVID-19 vaccines still provided strong protection against Delta variant, but some role for boosters in late 2021

Does prior infection provide protection too?

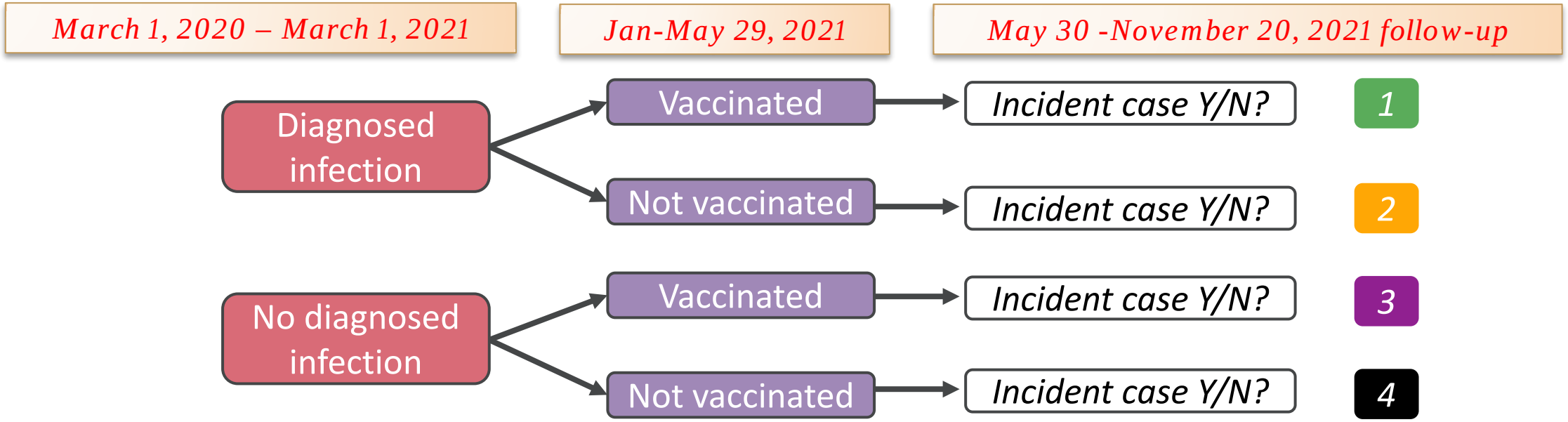
Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Early Release / Vol. 71
January 19, 2022

COVID-19 Cases and Hospitalizations by COVID-19 Vaccination Status and Previous COVID-19 Diagnosis — California and New York, May–November 2021

Tomás M. León, PhD[1]; Vajeera Dorabawila, PhD[2]; Lauren Nelson, MPH[1]; Emily Lutterloh, MD[2,3]; Ursula E. Bauer, PhD[2]; Bryon Backenson, MPH[2,3]; Mary T. Bassett, MD[2]; Hannah Henry, MPH[1]; Brooke Bregman, MPH[1]; Claire M. Midgley, PhD[4]; Jennifer F. Myers, MPH[1]; Ian D. Plumb, MBBS[4]; Heather E. Reese, PhD[4]; Rui Zhao, MPH[1]; Melissa Briggs-Hagen, MD[4]; Dina Hoefer, PhD[2]; James P. Watt, MD[1]; Benjamin J. Silk, PhD[4]; Seema Jain, MD[1]; Eli S. Rosenberg, PhD[2,3]

Does prior infection provide protection too?

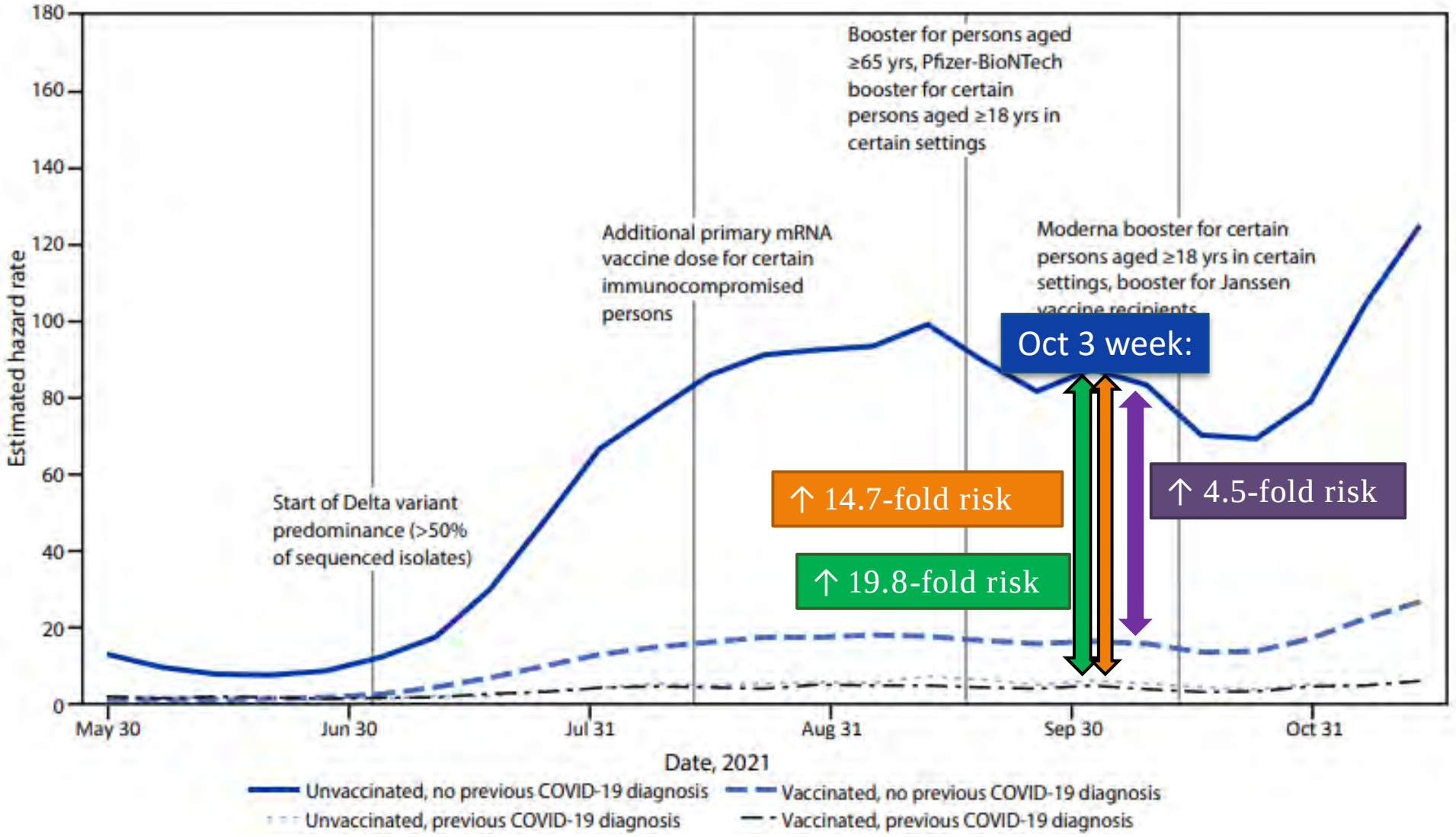
- Can prior infection be substituted for the protection of COVID vaccines?
  - Impacts vaccine requirements…



- Matched laboratory surveillance + immunization databases, building on prior methodology in *MMWR*, *NEJM* studies

- Analysis represents 32 million NYS and CA residents 18+

Results: New COVID-19 cases in NYS



- Rate highest for no previous diagnosis & not fully vaccinated
- Rate lowest for persons previously diagnosed & vaccinated
  (Small advantage to vaccine after diagnosis)
- Differences emerged in post-Delta era when vaccine effectiveness declined
- <u>Additional analyses</u>:
  Little evidence of *waning* protection from prior infection

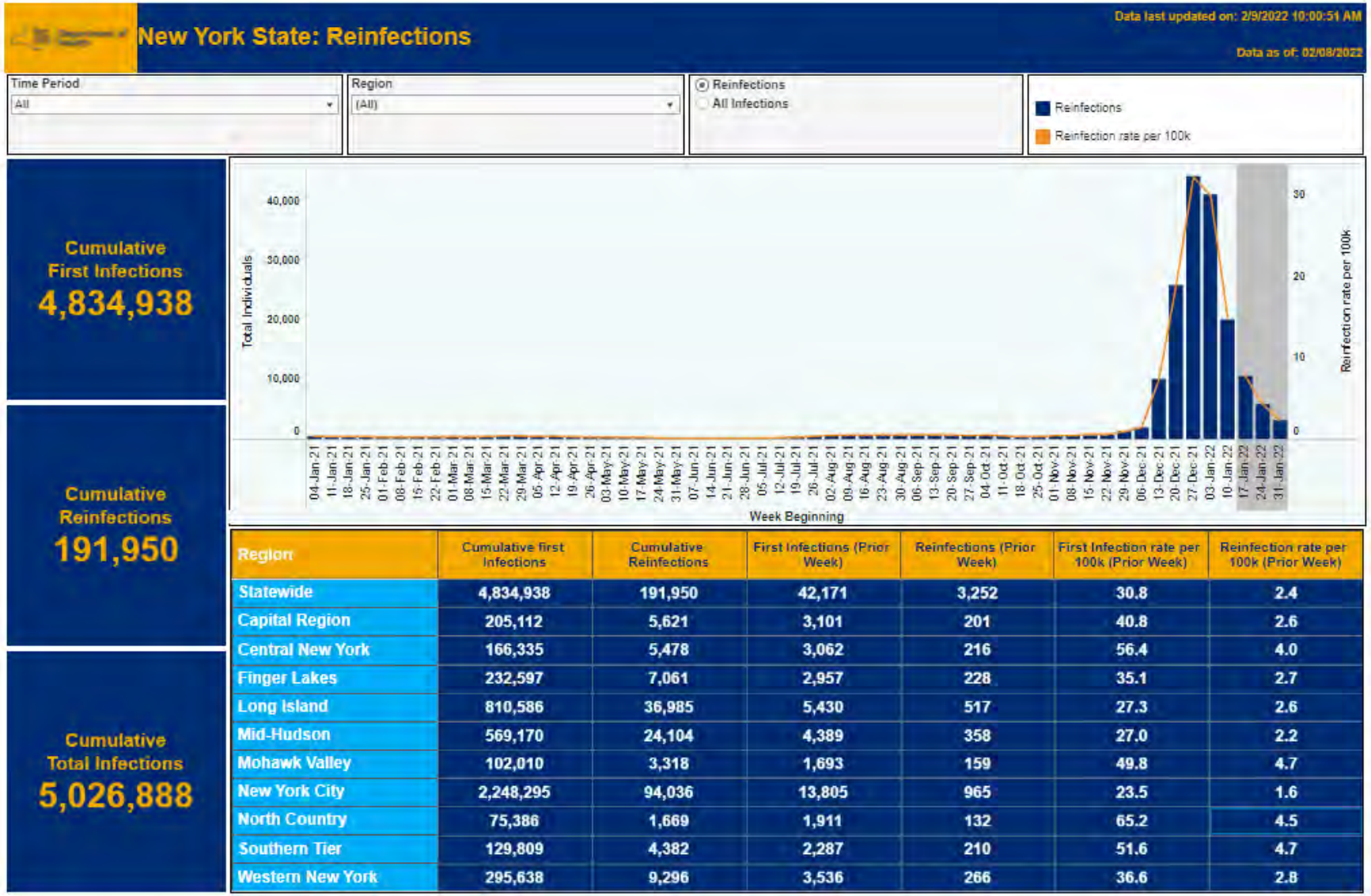
Prior Infection Conclusions

- Both vaccination and having survived COVID-19 provided protection
  - Surviving previous infection more protective than vaccination alone, during Delta era
  - Yet initial SARS-CoV-2 infection has significant risks for severe illness, death
  - Only vaccination and staying up-to-date boosters is recommended

- Very high risks for unvaccinated
  - Among unvaccinated, 20% previously diagnosed = only *some* could have been relying on prior infection for protection
  - Essential to reach the other 80%

- Key limitations
  - Added value of boosters not demonstrated
  - Analysis ended before Omicron variant, for which primary series and prior infection were ultimately less protective

Data dashboard: Reinfections in NYS



Region	Cumulative first infections	Cumulative Reinfections	First Infections (Prior Week)	Reinfections (Prior Week)	First Infection rate per 100k (Prior Week)	Reinfection rate per 100k (Prior Week)
Statewide	4,834,938	191,950	42,171	3,252	30.8	2.4
Capital Region	205,112	5,621	3,101	201	40.8	2.6
Central New York	166,335	5,478	3,062	216	56.4	4.0
Finger Lakes	232,597	7,061	2,957	228	35.1	2.7
Long Island	810,586	36,985	5,430	517	27.3	2.6
Mid-Hudson	569,170	24,104	4,389	358	27.0	2.2
Mohawk Valley	102,010	3,318	1,693	159	49.8	4.7
New York City	2,248,295	94,036	13,805	965	23.5	1.6
North Country	75,386	1,669	1,911	132	65.2	4.5
Southern Tier	129,809	4,382	2,287	210	51.6	4.7
Western New York	295,638	9,296	3,536	266	36.6	2.8

*Grey shaded regions of figures and tables reflect recent weeks for which data are still accruing and estimates are subject to most change.

- Complements traditional COVID case data
- Extends into Omicron period
  - 4.0% of 4.8 million positive results were reinfection
  - 84% of these occurred since December 13

https://coronavirus.health.ny.gov/covid-19-reinfection-data

What about pediatric vaccines?

Risk of Infection and Hospitalization Among Vaccinated and Unvaccinated Children and Adolescents in New York After the Emergence of the Omicron Variant

Vajeera Dorabawila, PhD[1]; Dina Hoefer, PhD[1]; Ursula E. Bauer, PhD[1]; Mary T. Bassett, MD[1]; Emily Lutterloh, MD[1]; Eli S. Rosenberg, PhD[1]

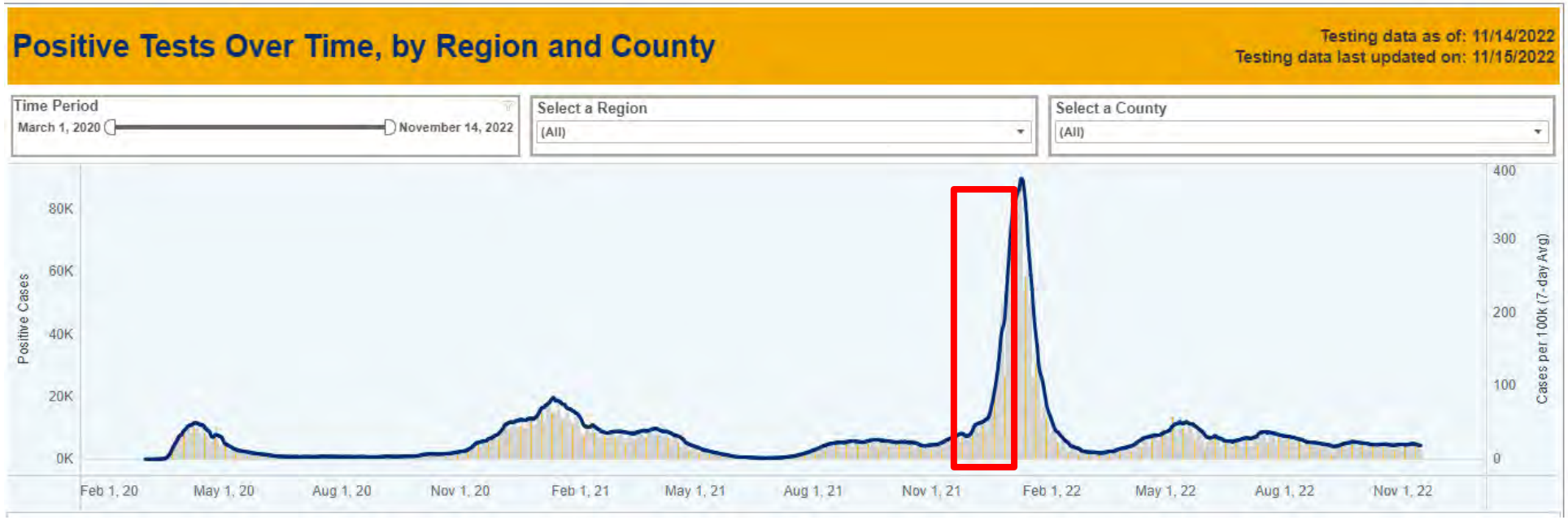
» Author Affiliations | Article Information

JAMA. 2022;327(22):2242-2244. doi:10.1001/jama.2022.7319

What about pediatric vaccines?

- By December 2021, FDA authorized Pfizer/BioNTech BNT162b2 for children 5-11 years

- Rollout coincided with Omicron BA.1/BA.1.1 wave
  - Highly-transmissible variant
  - Thought to evade immune protection from vaccination and prior infection



What about pediatric vaccines?

- NYS DOH advisories and data reports: alarming increases of pediatric cases and hospital admissions
  - How protective was vaccination in this wave?

NEW YORK STATE OF OPPORTUNITY. Department of Health

KATHY HOCHUL
Governor

MARY T. BASSETT, M.D., M.P.H.
Acting Commissioner

KRISTIN M. PROUD
Acting Executive Deputy Commissioner

HEALTH ADVISORY: Increase in COVID-19 Pediatric Hospitalizations Across New York State

NEW YORK STATE Department of Health

Special Report

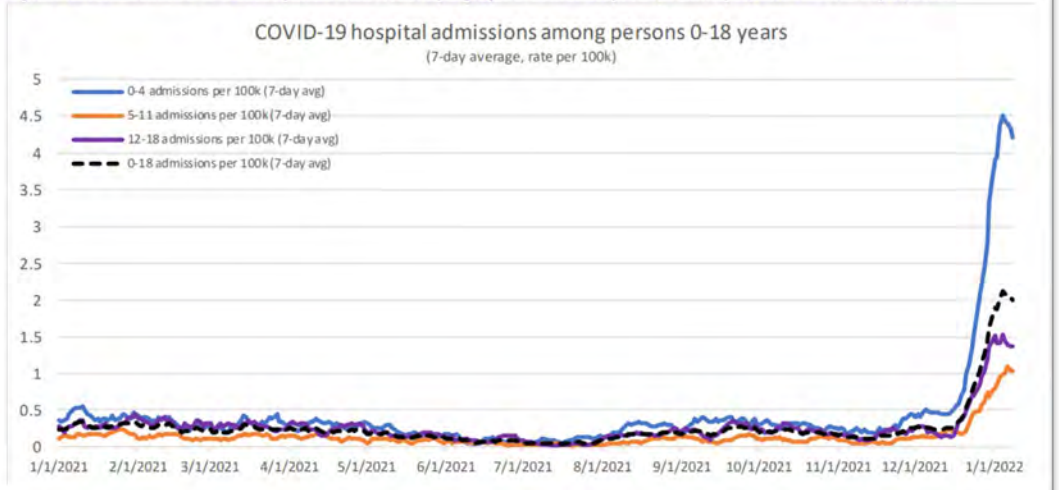
Pediatric COVID-19 update: January 14, 2022

HOSPITAL ADMISSIONS – Key Takeaways

From the week of December 5-11, 2021 to the week of January 2-8, 2022, hospital admissions for or with COVID-19 among people aged ≤ 18 years increased more than 7-fold statewide (e.g. more than +700%, or an 8-times relative change), while those for all age groups combined increased only 3-fold statewide. Across the state, hospital admissions for or with COVID-19 increased approximately:

- 16-fold for those ≤ 18 years and 8-fold for all age groups in NYC,
- 9-fold for those ≤ 18 years and 4-fold for all age groups in mid-Hudson and Long Island,
- 1.9-fold for those ≤ 18 years and 0.4-fold for all age groups in other regions of New York.

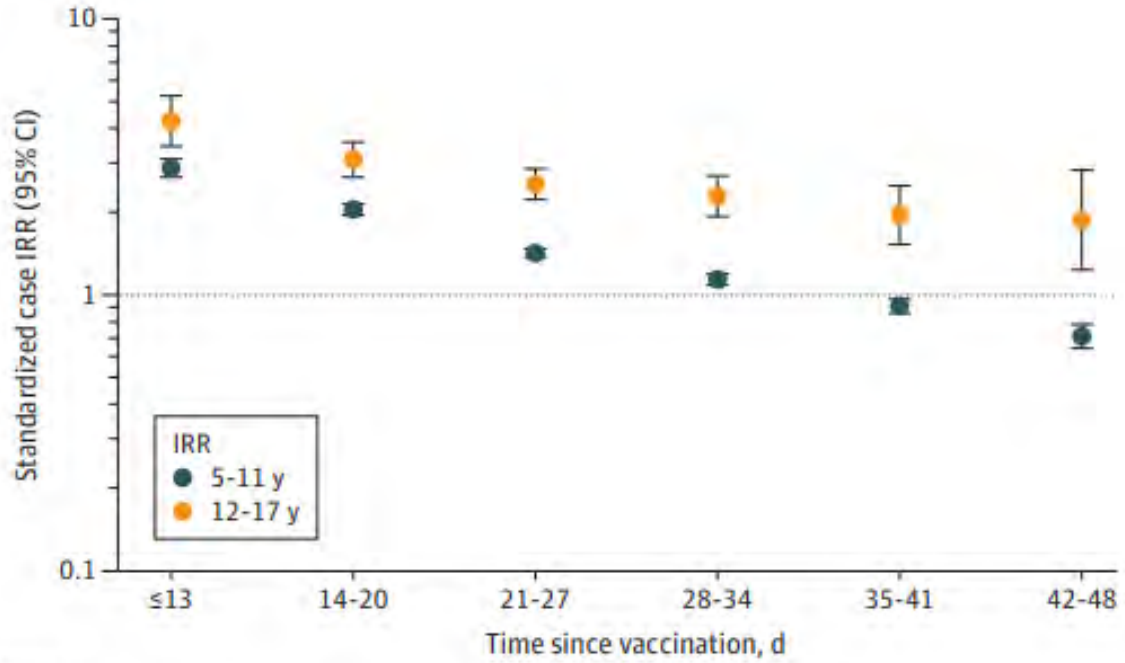
Figure 3. Trends in COVID-19 hospital admissions by age, focus on 0-18 years, January 1, 2021 – January 8, 2022



Vaccine effectiveness among children in New York State

- Again linked 3 statewide databases
  - Laboratory testing (ECLRS)
  - Hospital admissions (HERDS)
  - Vaccine registries (NYSIIS/CIR)
- Approach permitted rapid analyses within 1 month of authorization
  - During Omicron wave, found rapid decline in protection against cases for children 5-17 years
  - Faster among those 5-11, suggesting dose as factor
  - Some decline in protection against hospitalization, but still high protection (42%-79% VE)

Figure. New COVID-19 Cases Among Unvaccinated Children vs Fully Vaccinated Children by Time Since Vaccination and Age Group



IRR (95% CI)						
12-17 y	4.3 (3.4-5.3)	3.1 (2.7-3.6)	2.5 (2.2-2.9)	2.3 (1.9-2.7)	1.9 (1.5-2.5)	1.9 (1.2-2.8)
5-11 y	2.9 (2.7-3.1)	2.0 (1.9-2.1)	1.4 (1.4-1.5)	1.1 (1.1-1.2)	0.9 (0.9-1.0)	0.7 (0.6-0.8)

Vaccine effectiveness among children in New York State

- Early results presented to CDC, which later confirmed signal from NYS surveillance using multiple study approaches

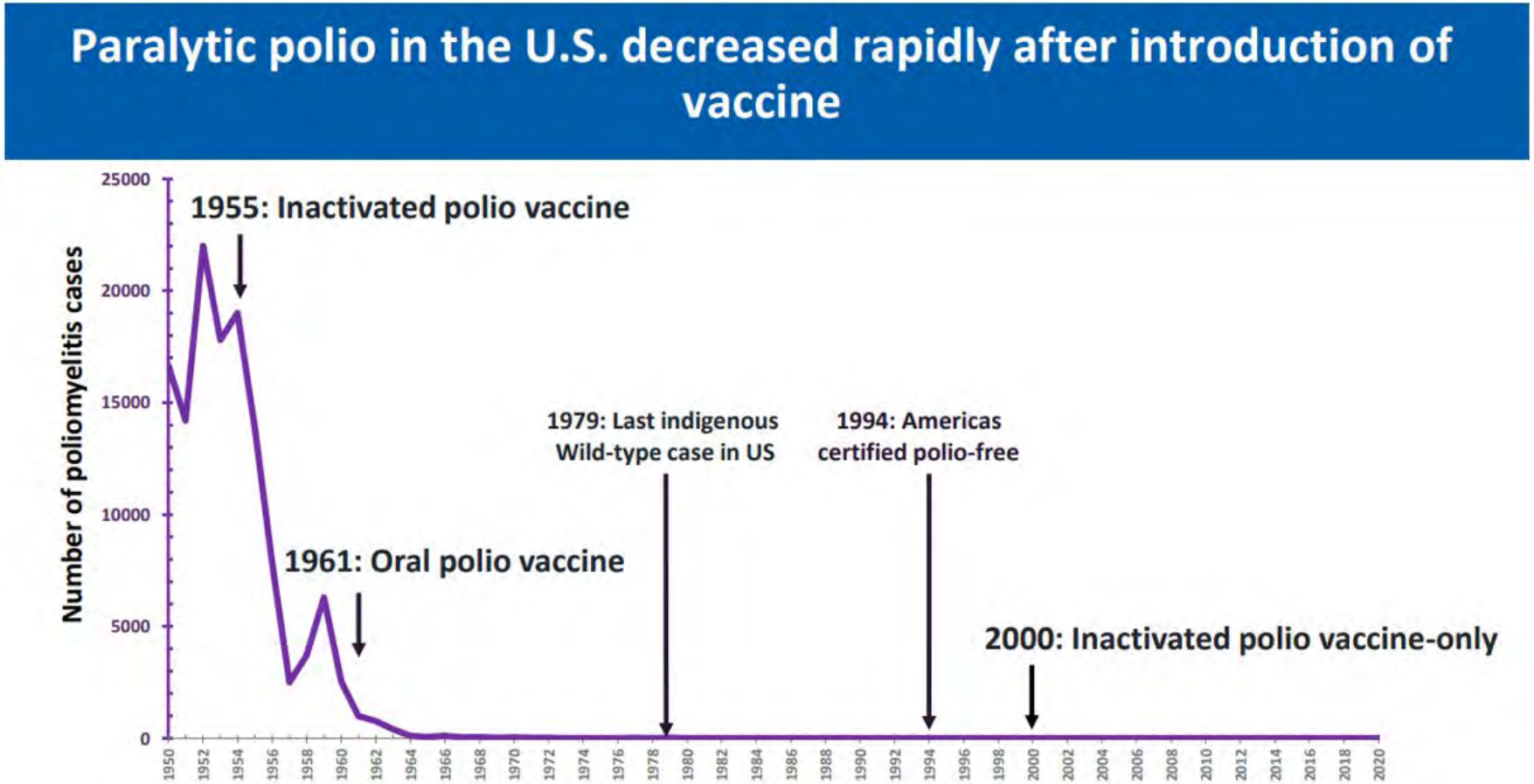
- Challenging balance act to communicating findings
  - Contextualize loss of protection against infection with adult VE data, which was also showing loss of protection due to new variants

  - Important role for vaccination remains for children
    - Protection against hospitalization, MIS-C, long COVID, onwards transmission
    - Necessity of primary series for subsequent boosters

  - Yet reinforced continued role for masking and other prevention policies

Where is polio spreading and how should we respond?

Polio in the US



1979 – last case of wild polio

1994 – Americas declared polio-free by WHO

2000 – US switches to IPV only

2005 – last identification of community transmission of poliovirus (VDPV1)

2022 – VDPV2 acquired in New York with community transmission

https://emergency.cdc.gov/coca/ppt/2022/090122_slides.pdf

Case Detection

- June 2022: Unvaccinated, young adult developed fever, neck stiffness, back and abdominal pain, and constipation
  - Three days later developed lower extremity weakness
  - Two days after weakness began, presented to an ED and admitted to the adult neurology service with flaccid weakness

- Wadsworth Center received stool, NP swab, OP swab, and CSF
  - Stool specimens positive by enterovirus PCR
  - Subsequent sequencing identified vaccine-derived poliovirus, type 2

- Evidence this was *locally acquired*
  - No international travel during the 21 days before onset of paralysis
  - Attended a large gathering 8 days before onset of first symptoms

Case Investigation

Morbidity and Mortality Weekly Report (*MMWR*)

CDC

Public Health Response to a Case of Paralytic Poliomyelitis in an Unvaccinated Person and Detection of Poliovirus in Wastewater — New York, June–August 2022

Weekly / August 19, 2022 / 71(33);1065-1068

On August 16, 2022, this report was posted online as an MMWR *Early Release.*

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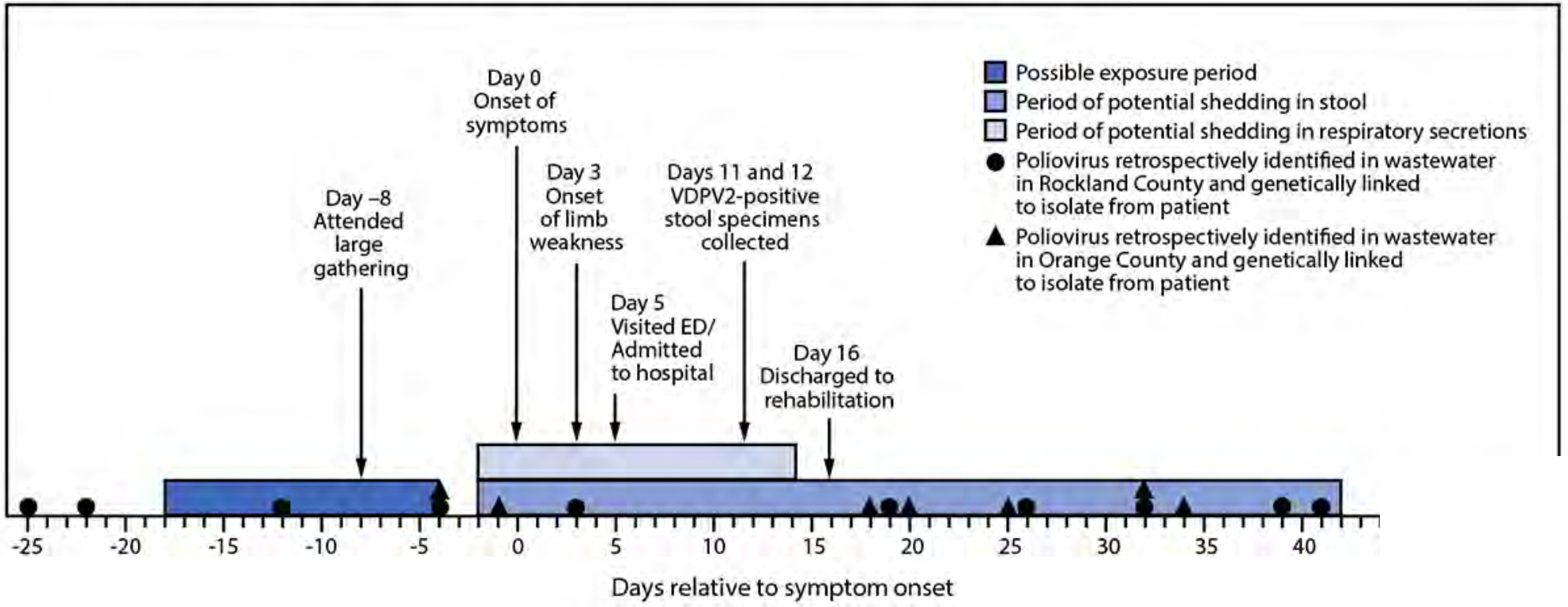
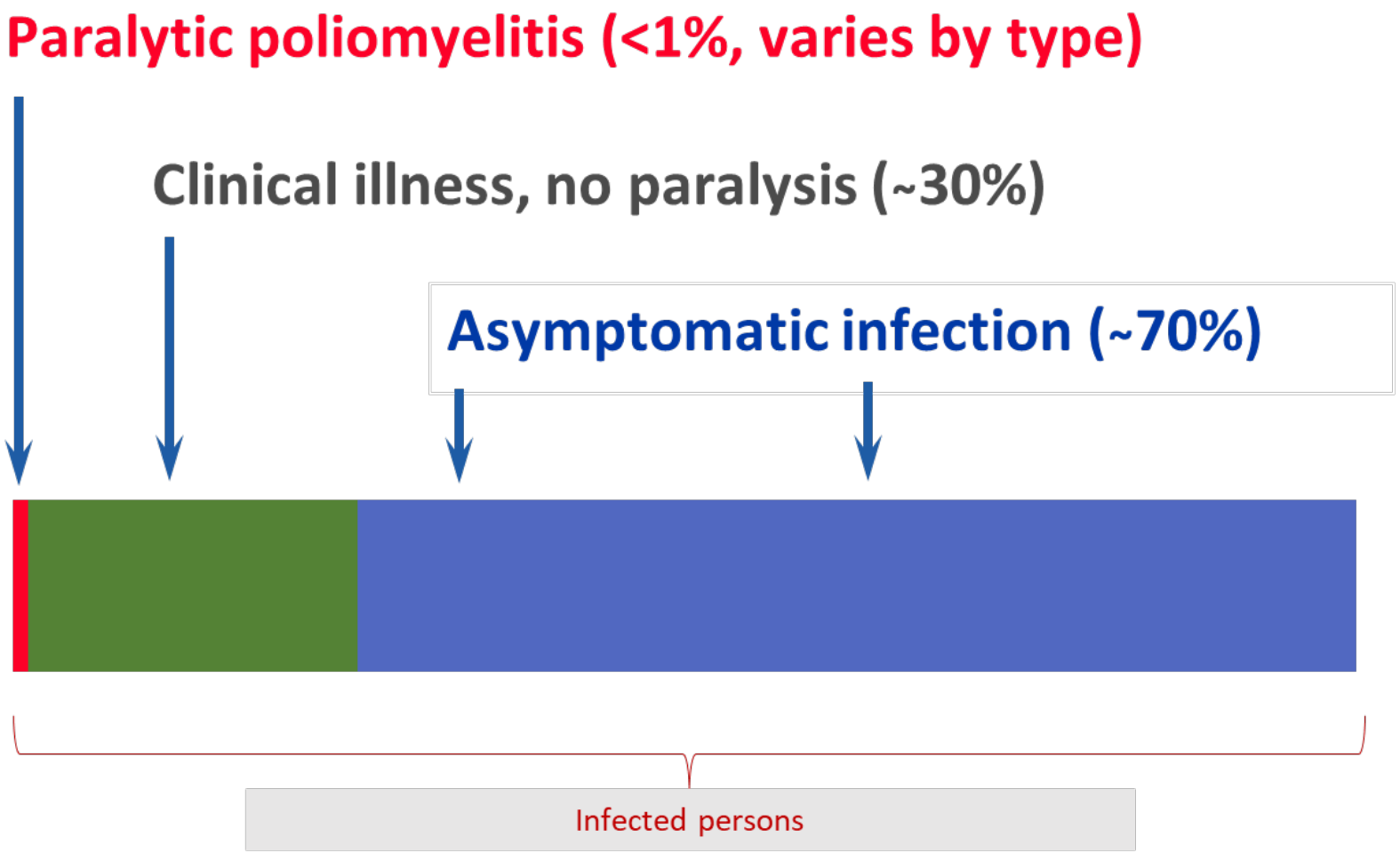
FIGURE. Timeline of patient activities, potential poliovirus exposures, shedding, and poliovirus-positive wastewater* samples† genetically linked to a patient with a case of type 2 vaccine-derived poliovirus — New York, May–August 2022

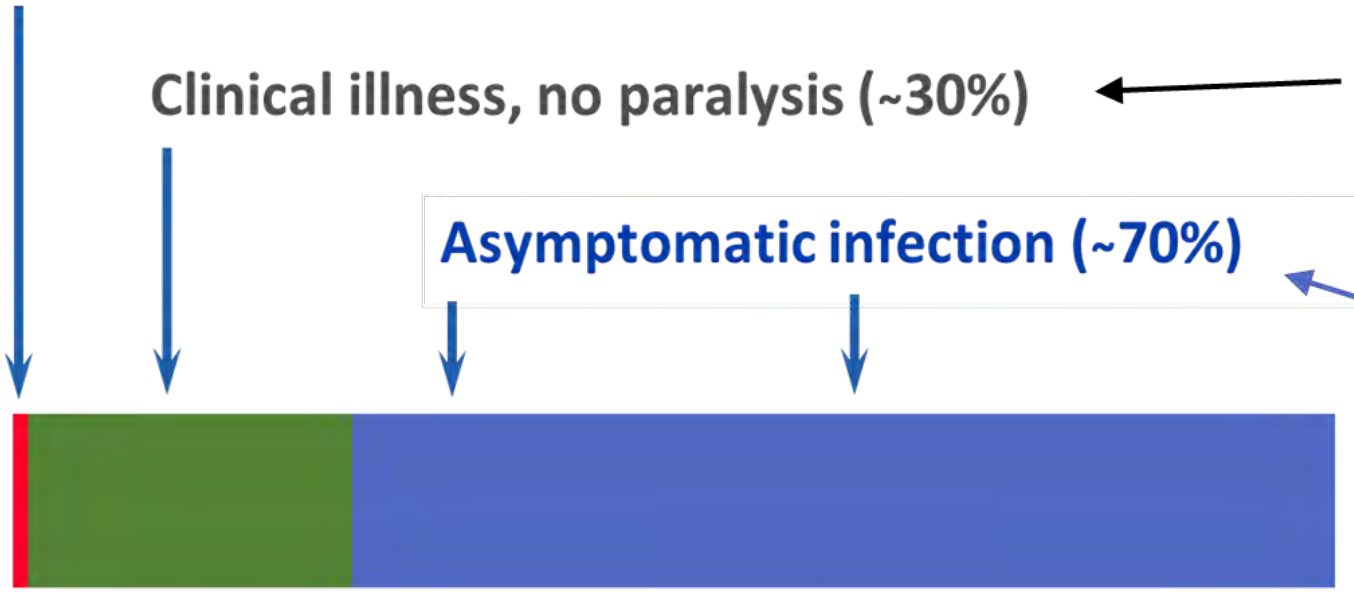


Poliomyelitis

- Transmitted by fecal-oral and oral-oral (respiratory) routes



Surveillance strategies to capture the full picture and extent of spread



Active case finding
(e.g., via syndromic surveillance)
Continued AFM/paralytic disease surveillance

Enhanced surveillance for enterovirus-positive illness, particularly in unimmunized individuals in affected counties

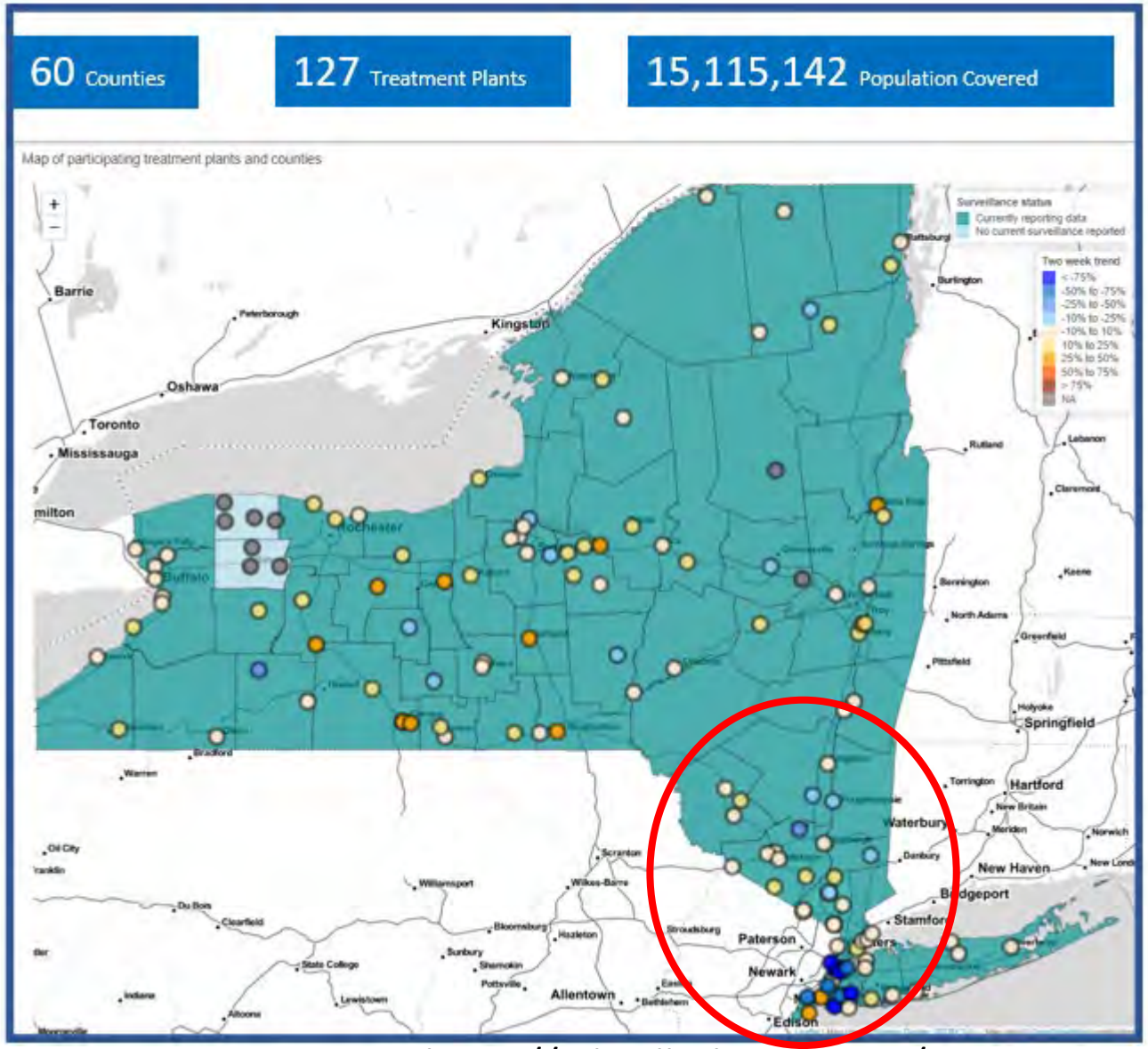
Prevalence of asymptomatic infection in affected areas (e.g., stool samples from diapers at pediatrician offices)

Wastewater surveillance in Rockland County and the surrounding areas

Wastewater surveillance: Characterizing extent of community spread

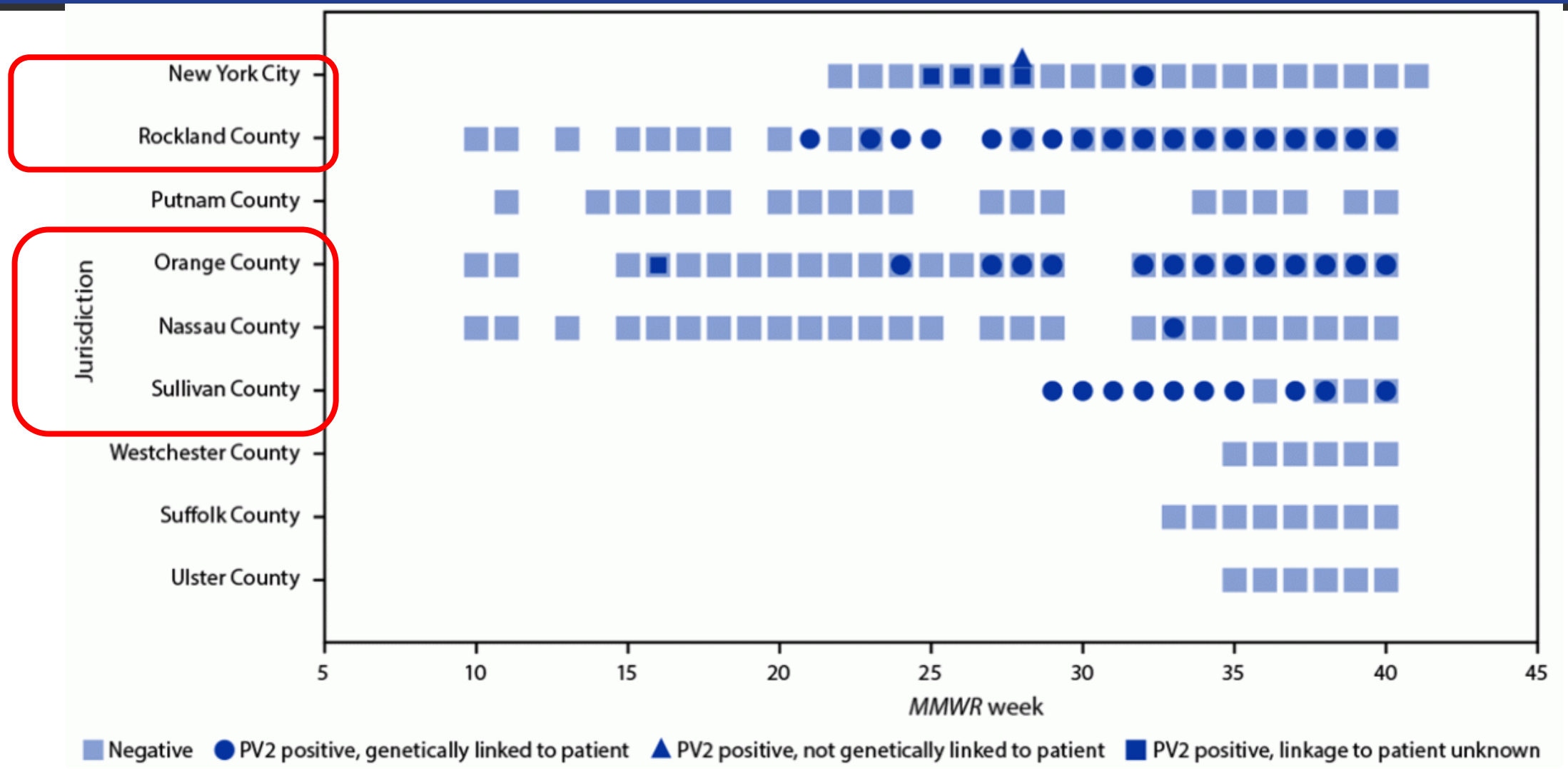
- Polio testing in subset of NYS SARS-CoV-2 Wastewater Network facilities
  - Beginning with Rockland county, now including 13 metro NY counties (48 sewersheds), ~11.4 million persons
  - Mixture of prospective and retrospective samples, collected 1-2x/week
- Sample processing in NYS
  - Ultracentrifugation or polyethylene glycol precipitation
  - Nucleic acid extraction
- Testing at CDC
  - pan-PV RT-PCR assay
  - PV-positive sample sequenced to determine:
    - PV2
    - VDPV2
    - VDPV2, linked to case patient

SARS-CoV-2 NYS Wastewater Surveillance Network



https://mbcolli.shinyapps.io/SARS2EWSP

County-level wastewater findings: March 9–October 11, 2022 (N=1,053)

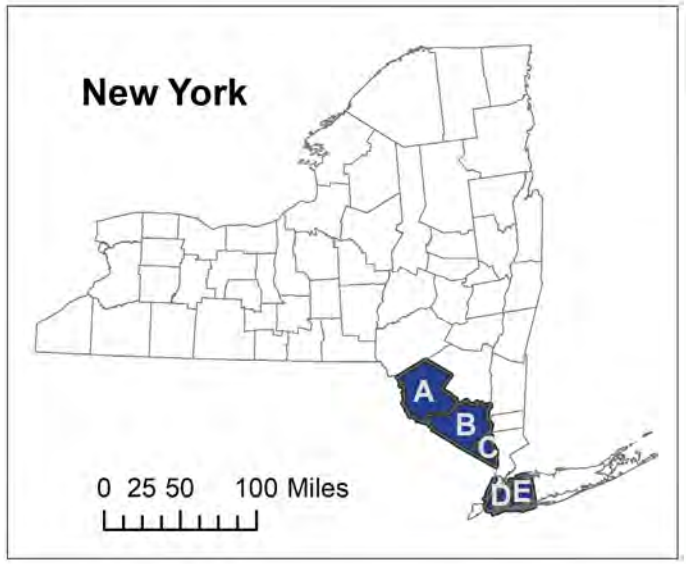


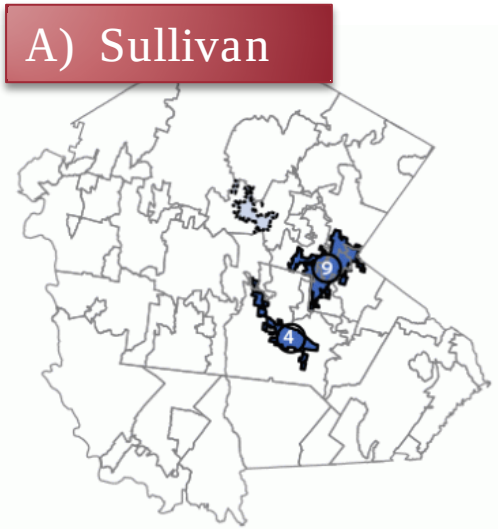
- 89 (8.3%) samples in 10 sewersheds positive for PV-2
  - Outside of NYC, 81 of 82 linked to case, 1 inadequate sequence
  - Within NYC, 6 of 7 inadequate sequence, 1 linked to case via enhanced sensitivity method

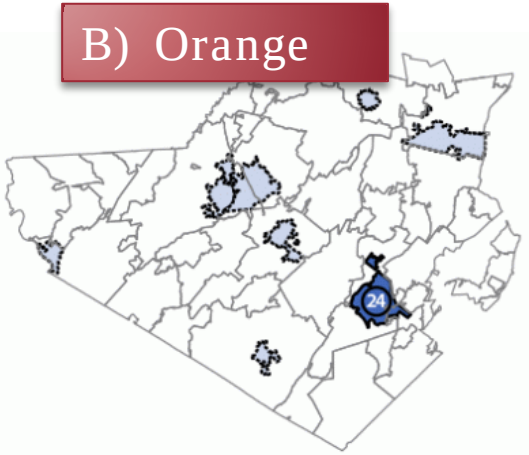
Reported to WHO in September as cVDVP2

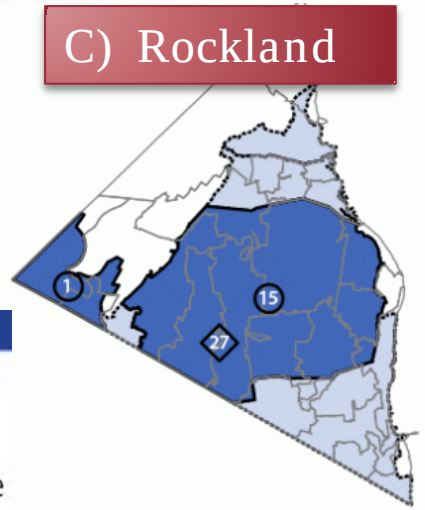
County-level wastewater findings: Areas of detection

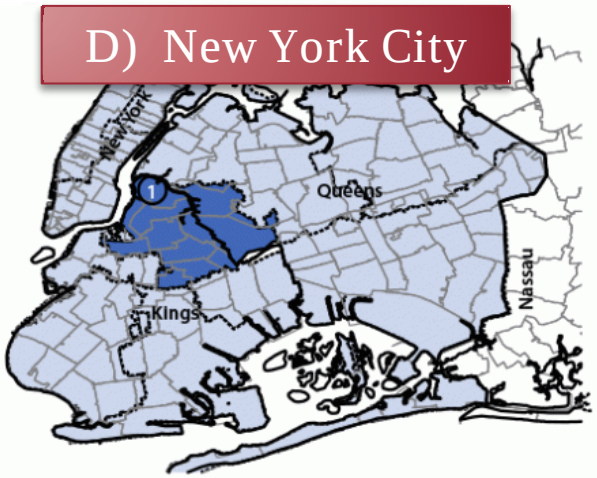
- WHO guidelines: ideal wastewater testing in areas with high-risk populations and population <300,000
- Concerns around method sensitivity in higher-population areas…











Morbidity and Mortality Weekly Report (*MMWR*)

CDC

Wastewater Testing and Detection of Poliovirus Type 2 Genetically Linked to Virus Isolated from a Paralytic Polio Case — New York, March 9–October 11, 2022

Early Release / October 28, 2022 / 71

A. Blythe Ryerson, PhD[1,*]; Daniel Lang, MS[2,*]; Mohammed A. Alazawi, PhD[2]; Milagros Neyra, MPH[3]; Dustin T. Hill, PhD[3]; Kirsten St. George, PhD[2,4]; Meghan Fuschino, MS[2]; Emily Lutterloh, MD[2]; Bryon Backenson, MS[2]; Samuel Rulli[5]; Patricia Schnabel Ruppert, DO[5]; Jacqueline Lawler, MPH[6]; Nancy McGraw, MPH[7]; Andrew Knecht, DO[8]; Irina Gelman, DPM[8]; Jane R. Zucker, MD[1,9]; Enoma Omoregie, PhD[3]; Sarah Kidd, MD[1]; David E. Sugerman, MD[1]; Jaume Jorba, PhD[1]; Nancy Gerloff, PhD[1]; Terry Fei Fan Ng, PhD[1]; Adriana Lopez, MHS[1]; Nina B. Masters, PhD[1,10]; Jessica Leung, MPH[1]; Cara C. Burns, PhD[1]; Janell Routh, MD[1]; Stephanie R. Bialek, MD[1]; M. Steven Oberste, PhD[1,*]; Eli S. Rosenberg, PhD[2,11,*]; 2022 U.S. Poliovirus Response Team (VIEW AUTHOR AFFILIATIONS)

Tested sewershed, positive

Tested sewershed, negative

No. of positive links

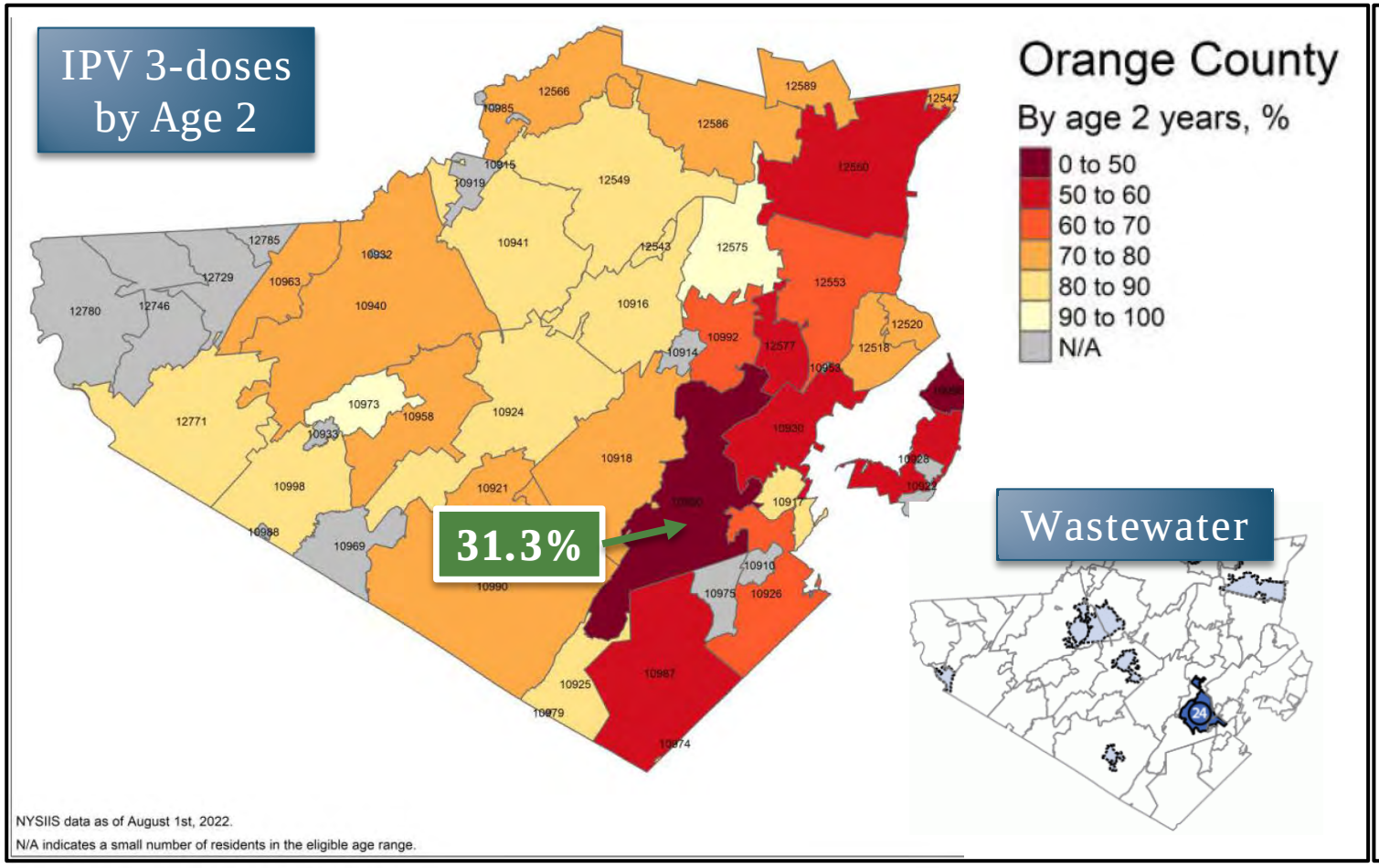
Sewershed

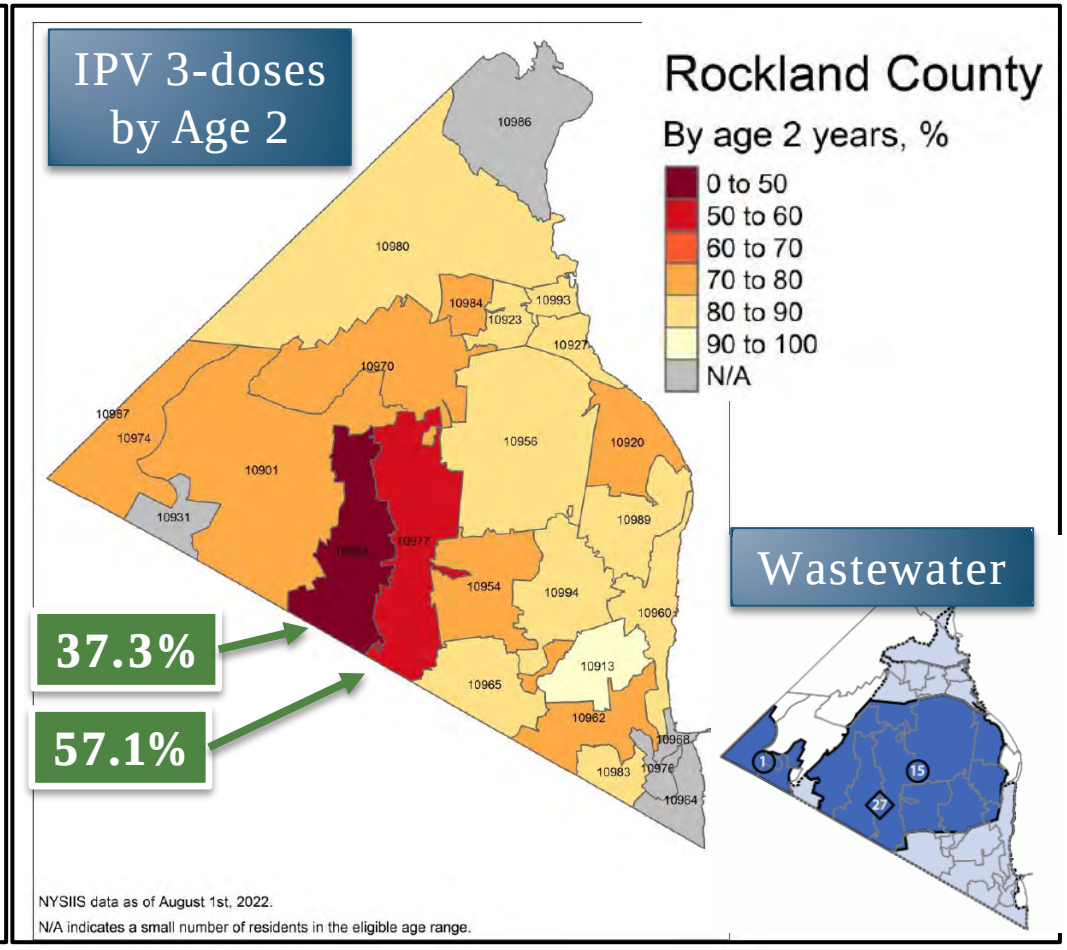
Sub-sewershed

County boundary

Zip code boundary

Areas of wastewater detection coincide with low IPV coverage by 2 years





- **Circulating virus + low IPV coverage = significant, ongoing paralytic disease concern**
- Areas with large Hasidic Jewish populations
  - Same communities experienced large measles outbreak in 2018-2019
  - Some low coverage reflects delays until school entrance, following removal of K-12 religious exemption
  - Vaccine confidence issues complex; communities have been experienced vaccine mis/disinformation efforts
  - **Close partnering with communities to understand, empathize, address needs is core to our public health strategy**

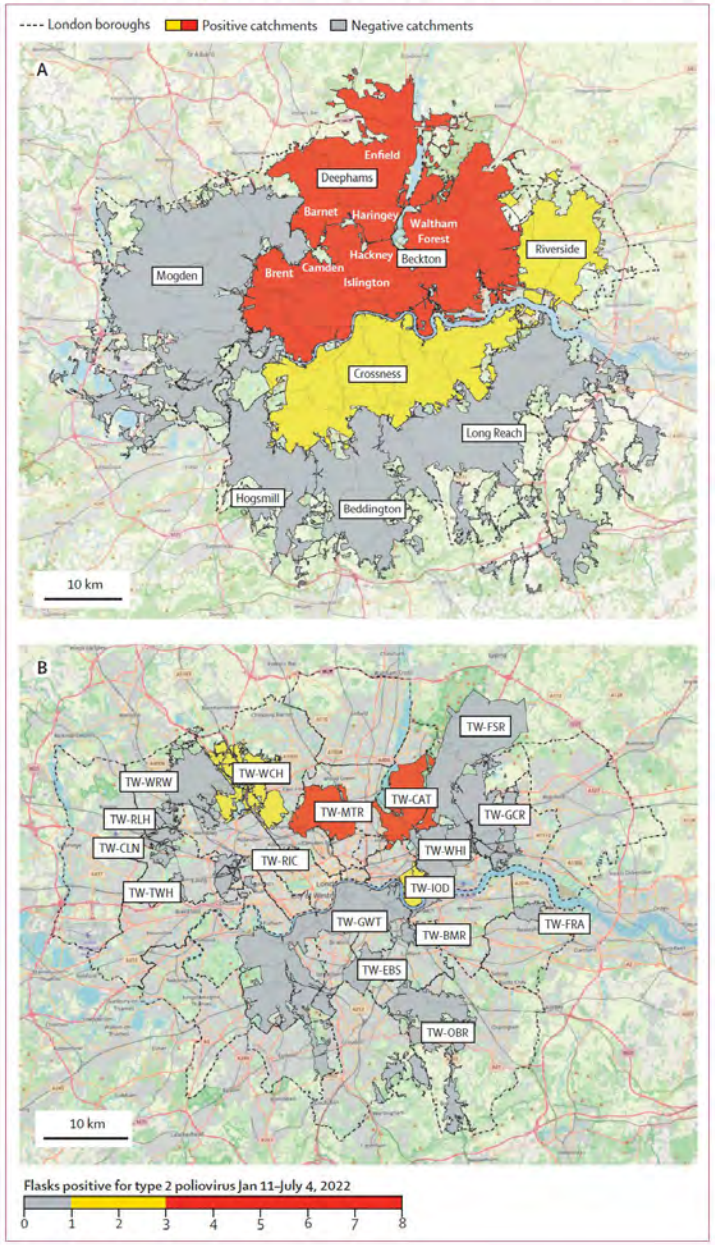
NYS case strain linked to UK and Israel wastewater detections

- United Kingdom
  - Detection of linked VDPV2 strain in London wastewater February - July 2022 (21 of 52 samples)
  - No cases to-date

- Israel
  - Detection of linked VDPV2 strain in Jerusalem wastewater January – June 2022
  - No cases to-date

  - Following VDPV3 outbreak earlier in 2022:
    - Paralytic case in 3-year old child in March, following 2021-2022 wastewater detection

Figure 1: Location of London sewage sites sampled for poliovirus detection



References

- Klapsa et al, *Lancet*, October 2022
- https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON366
- https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON408

Limitations of wastewater and remaining questions

- Wastewater surveillance helpful for highlighting areas needing further surveillance, communication and intervention actions, however:

- Challenges to negative predictive value
  - Incomplete coverage of communities and counties
  - Sensitivity and dilution effects of large populations and complex system features not fully characterized

- Challenges to positive predictive value
  - Locations of detection may represent persons away from home → repeat detections add confidence
  - Signal is qualitative “detect/not detect” only. Unclear how many people.

- Other challenges re: resource needs, broader scaling, timeliness, decision rules for translating findings into public health actions

- = Important to supplement with other clinical and epi surveillance efforts

Stool surveillance activity

- Testing of stool samples underway at pediatric provider offices in focal communities
  - Diaper-wearing children and older children with diarrhea
  - Additional, free diagnostic testing for poliovirus and EV's offered to families
  - Specimen processing by providers, NYSDOH team
  - Enterovirus PCR and sequencing at Wadsworth Center

- Advantages of approach
  - Quantitative view of (asymptomatic) prevalence, situated between wastewater and enhanced clinical/AFM surveillance
  - Targeted to age segment excluded from wastewater, with lowest IPV coverage, in areas of greatest concern
  - Case detection as tool to increase community urgency beyond single adult case

Public Health Response: NYS DOH polio response goals

Goal 1: Adequately understand the scope of problem (vaccination and disease), in terms of person, place, time

Goal 2: Protect people from paralytic poliovirus disease with IPV

Goal 3: Interrupt transmission with behavioral/environmental interventions

Goal 4: Enhance vaccination for all vaccine-preventable diseases as part of improved child prevention and wellness

Wrap-up: Be first. Be right. Be credible.

- Possible and important to produce high-quality evidence during public health emergencies.
  - Even if the results are mixed
  - Can choose data and designs to balance “right” and “first”
  - Important evidence seldom in a vacuum: necessarily involves political, communications, other complexities

- Insights from this evidence take on multiple paths
  - Building scientific and medical understanding
  - Guiding policy decisions
  - Informing public and communicating how to best protect health

- Doing the above well builds credibility

Thank you!

Eli Rosenberg, PhD
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NEW YORK STATE | Department of Health

With great appreciation for the countless dedicated staff at DOH and in our public health workforce who have contributed to the creation of these data, studies, dashboards, and public health actions under pressure.

Extra slides

New York State Department of Health Releases First-In-The-Nation Data and Analysis On Covid-19 Vaccine Effectiveness and Breakthrough Infections

DOH Study Published by the Centers for Disease Control and Prevention Found Vaccines Greatly Reduced COVID-19 Cases and Hospitalizations

Vaccines Were Found to Be Up To 95 Percent Effective in Reducing Hospitalizations

ALBANY, NY (August 18, 2021) -- The New York State Department of Health today released data showing the effectiveness of vaccines in the fight against COVID-19. The results of the Department's first-in-the-nation vaccine effectiveness study, based on actual data, show vaccinations remain the best way for New Yorkers to protect themselves, families and communities from COVID-19 and its most severe outcomes such as hospitalization. The study, which was published by the Centers for Disease Control and Prevention (CDC), found that unvaccinated New Yorkers were eleven times more likely to be hospitalized and eight times more likely to be diagnosed with COVID-19 than those who were fully vaccinated.

"The findings of our research are clear: Vaccines provide the strongest protection for New Yorkers against getting infected or becoming hospitalized due to COVID-19," **said senior author and State Health Commissioner Dr. Howard Zucker.** "I applaud the research and work done by our scientists and continue to encourage all New Yorkers to get vaccinated as soon as possible. Our study indicates while breakthrough cases of COVID-19 are rare, fully vaccinated New Yorkers still need to remain vigilant as the Delta variant has led to increases in COVID-19 cases and hospitalizations. We are proud that our research is informing our federal partners on policy decisions affecting people across the nation."

New York State Department of Health Study Shows Continued Effectiveness of COVID-19 Vaccines

Largest U.S. Study by Vaccine Type and Timing of Vaccination

Modest Declines in Vaccine Effectiveness for Infections May be Due More to Delta Variant and Behaviors Than Immunological Waning

Vaccine Effectiveness for Hospitalizations Remains High

ALBANY, N.Y. (October 11, 2021) – The New York State Department of Health today announced the release of a new study addressing one of the most critical questions regarding COVID-19 – the extent to which vaccine effectiveness is declining and whether these changes are due to waning immunity or other factors such as the predominance of the Delta variant.

The study, which expands upon the work of the Department's first-in-the-nation vaccine effectiveness study published by the Centers for Disease Control and Prevention (CDC) in August, concluded that declines in vaccine effectiveness (VE) for cases may have been driven primarily by the Delta variant or factors other than immunological waning, such as reduced use of masks. In contrast, VE for hospitalizations remained high, with modest declines limited to Pfizer-BioNTech and Moderna recipients 65 years of age and older. This finding supports targeted booster dosing recommendations.

"This latest study conducted by our renowned scientists here at DOH is the largest to examine in-depth changes in vaccine effectiveness over time broken down by all three COVID-19 vaccines types currently authorized for use in the United States," **said senior author and Health Commissioner Dr. Howard Zucker.** "It clearly demonstrates what we've been saying all along – getting a COVID-19 vaccine continues to be the best way out of this pandemic, and the best way for New Yorkers to prevent serious illness and hospitalization**.** We urge all New Yorkers to remain vigilant and get vaccinated against COVID-19 if you have not already done so."

New York State Department of Health Announces New Study and New Data Website On COVID-19 Reinfection

Largest Study of Its Kind Conducted in Collaboration with California and Published by the Centers for Disease Control and Prevention

Vaccination Remains Safest Way to Prevent COVID-19 Infections and Severe Outcomes

ALBANY, N.Y. (January 19, 2022) – The New York State Department of Health today announced the publication of the largest comparative study of its kind on immunity to COVID-19 from vaccines and from previous infection, continuing its groundbreaking work on vaccine effectiveness.

The study, which also contains new data on reinfections, was conducted in collaboration with researchers from the California Department of Public Health and the Centers for Disease Control and Prevention (CDC), and published in the CDC's Morbidity and Mortality Weekly Report (MMWR). It found that both vaccination and a prior infection provided protection against future infection and hospitalization.

Researchers found that from May to November 2021, COVID-19 cases and related hospitalization were substantially lower among those who had been vaccinated and/or survived a previous infection, compared to those who were unvaccinated and without a previous infection. The study concluded that although after the Delta variant emerged, new infections and hospitalizations were lowest among people with prior infection, especially those who were also vaccinated.The results showvaccination remains the safest way to prevent future COVID-19 infections and severe outcomes, including death.Since the beginning of the pandemic,more than 63,500 New Yorkers have died from COVID-19.

"This study conducted by our premier scientists continues to underscore the importance of vaccination as a critical tool in the COVID-19 response," **said study co-author and Acting State Health Commissioner Dr. Mary T. Bassett.** "Although the epidemiology of this virus may continue to change as new variants emerge, vaccination remains the safest way to prevent infection, hospitalization and death. We continue to urge every eligible New Yorker to get vaccinated and boosted, wear a mask and take every step possible to protect yourselves and your loved ones."

Statement from New York State Department of Health Commissioner Dr. Mary Bassett on Latest Data On COVID-19 Vaccine Effectiveness

"Today the New York State Department of Health's latest data related to the effectiveness of COVID-19 vaccine among children 5-11 and 12-17 years old in New York after the emergence of the Omicron variant was released on MedRxiv. This latest analysis conducted by the Department found declines in vaccine effectiveness of BioNTech, Pfizer vaccine (BNT162b2) during the Omicron wave for children, particularly those 5-11 years of age. The data are not surprising as the vaccine was developed in response to an earlier COVID-19 variant and reduced effectiveness of 2 doses against the Omicron variant has been seen to some degree with all vaccines and ages. It is critical to stress that vaccination is still recommended for everyone 5 years and older, including children 5-11. These data also demonstrate that COVID-19 vaccines reduce the risk of more severe illness and hospitalization for children 5-11, and I encourage parents and guardians to consult their pediatrician about getting their children vaccinated, and boosted if eligible, as soon as they can. We have shared this data with our partners at the CDC and FDA to help assist them with determining the best ways to protect the public from COVID-19."

- The New York State Department of Health's full analysis is available here.
- Parents and guardians can learn more about COVID-19 vaccines for children and adolescents here.