



**Department
of Health**

What is the ability of natural immunity to protect against mild disease and severe disease?

(based on epidemiological data)

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Centers for Disease Control and Prevention

MMWR

Morbidity and Mortality Weekly Report

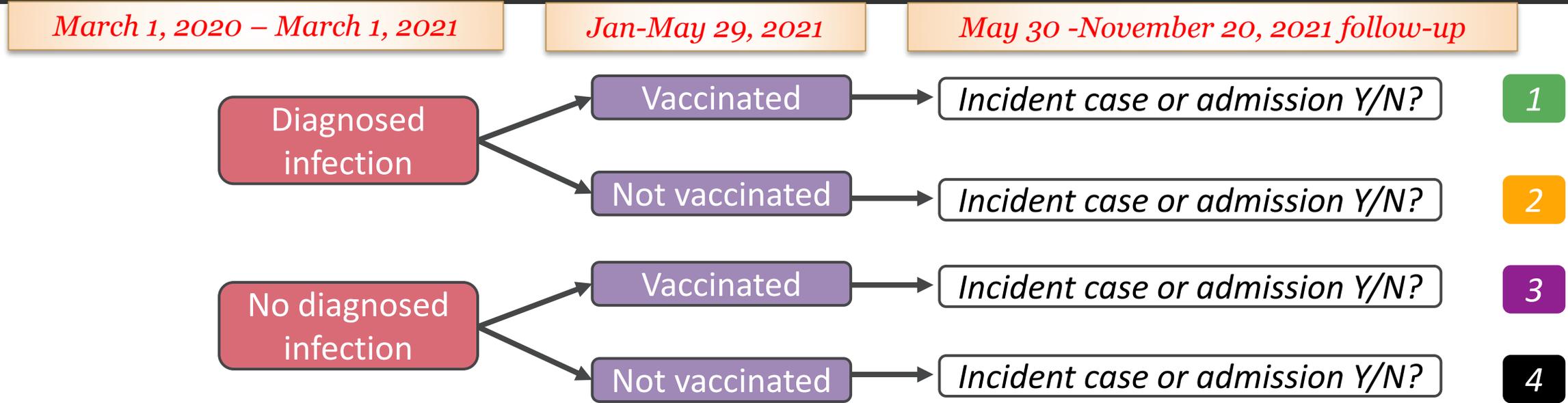
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COVID-19 Cases and Hospitalizations by COVID-19 Vaccination Status and Previous COVID-19 Diagnosis — California and New York, May–November 2021

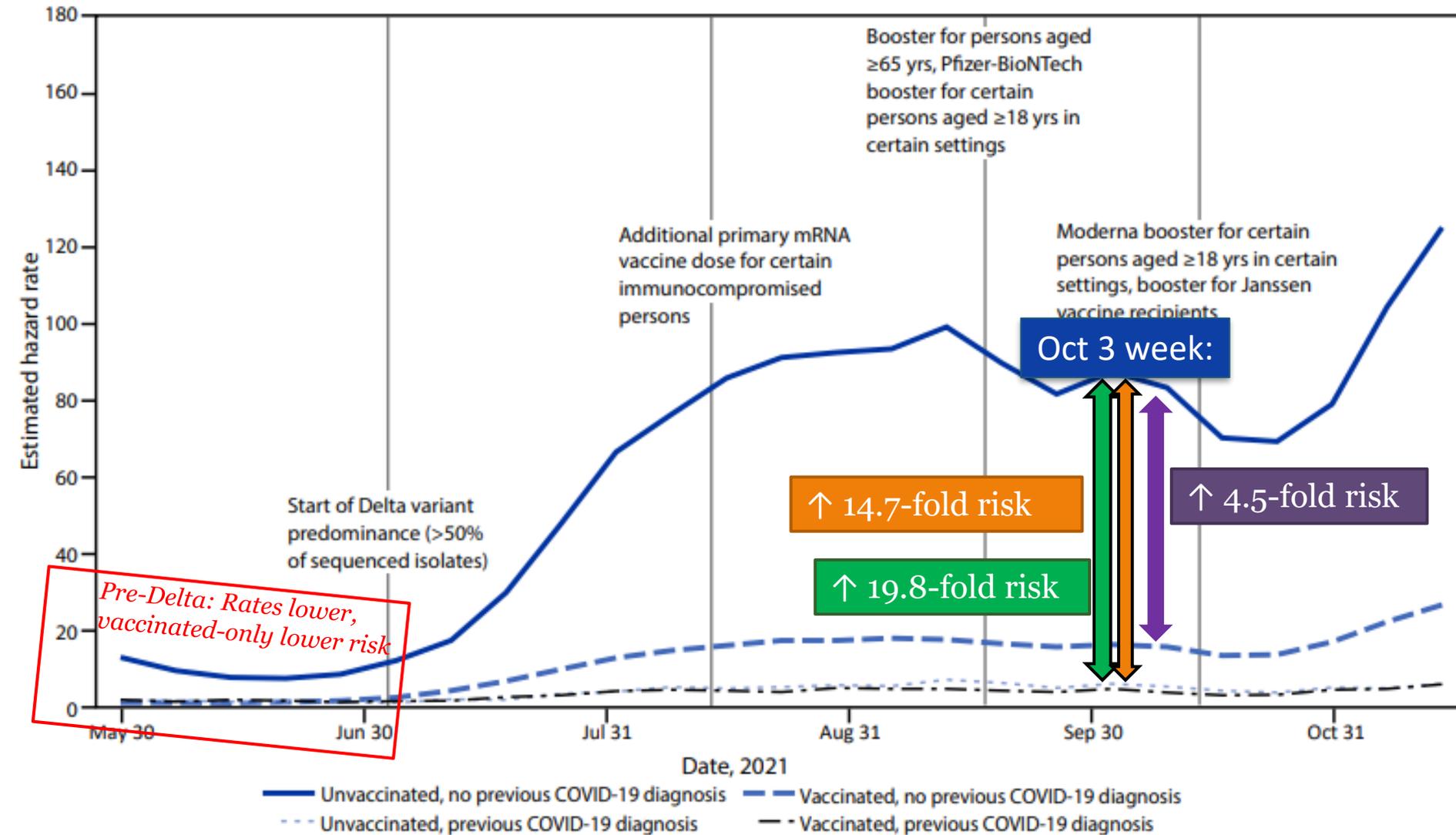
Tomás M. León, PhD¹; Vajeera Dorabawila, PhD²; Lauren Nelson, MPH¹; Emily Lutterloh, MD^{2,3}; Ursula E. Bauer, PhD²; Bryon Backenson, MPH^{2,3}; Mary T. Bassett, MD²; Hannah Henry, MPH¹; Brooke Bregman, MPH¹; Claire M. Midgley, PhD⁴; Jennifer E. Myers, MPH¹; Ian D. Plumb, MBBS⁴; Heather E. Reese, PhD⁴; Rui Zhao, MPH¹; Melissa Briggs-Hagen, MD⁴; Dina Hoefler, PhD²; James P. Watt, MD¹; Benjamin J. Silk, PhD⁴; Seema Jain, MD¹; Eli S. Rosenberg, PhD^{2,3}

Analytic framework



- Matched laboratory, immunization, hospitalization databases building on prior methodology (*Rosenberg et al MMWR, NEJM 2021*)
- Analysis represents 32 million NYS and CA residents 18+
- Life-table hazard rates of incident laboratory-confirmed COVID-19 cases and hospitalizations

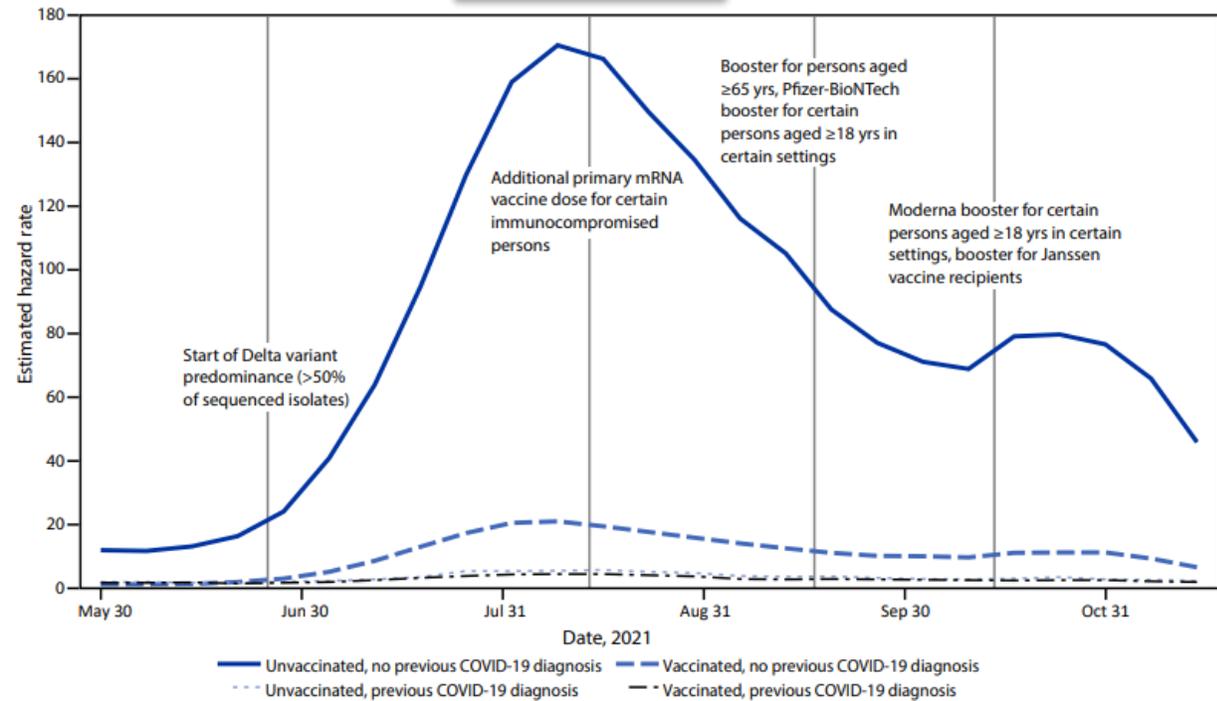
Results: New COVID-19 cases in NYS



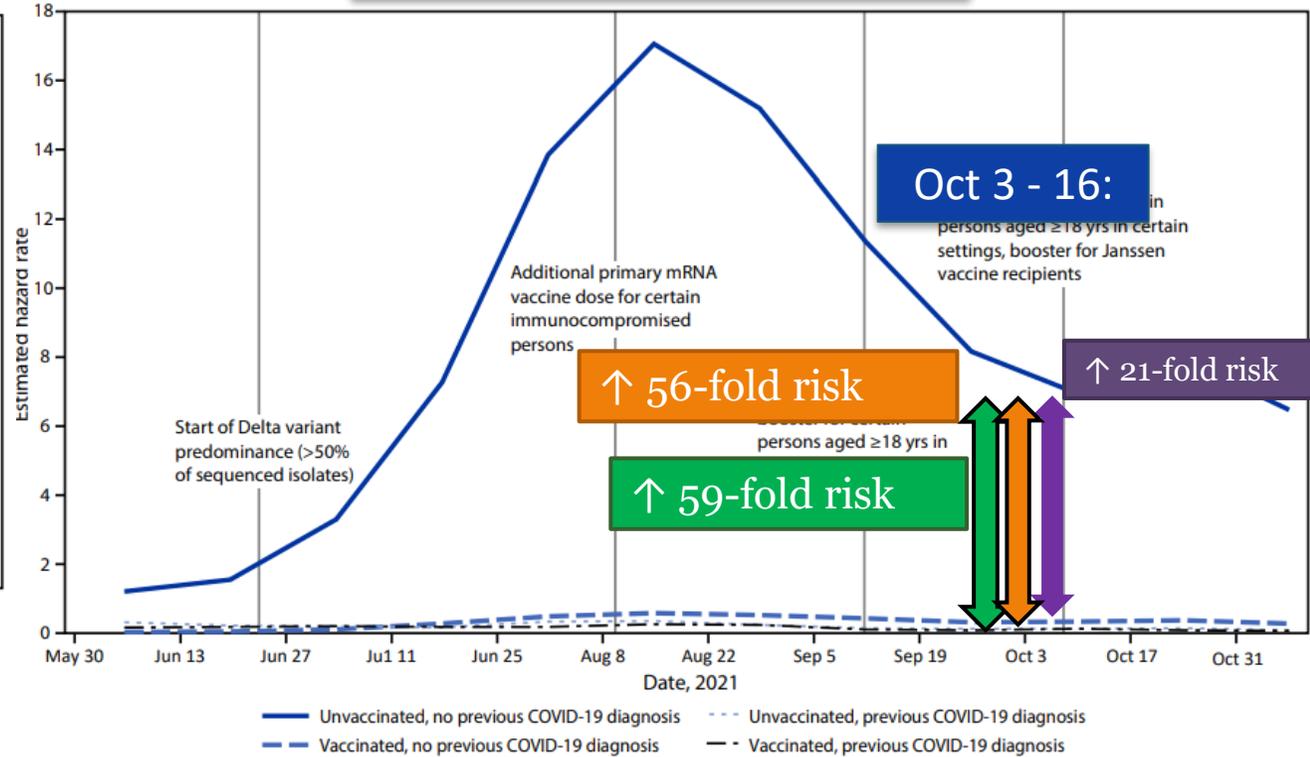
- Rate highest for no previous diagnosis & not fully vaccinated
- Rate lowest for persons previously diagnosed & vaccinated (Small advantage to vaccine after diagnosis)
- Differences emerged in post-Delta era when vaccine effectiveness declined
- Additional analyses: Little evidence of *waning* protection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

Similar results for CA COVID-19 cases & hospitalizations

Cases



Hospitalizations



Recent international results in alignment (all for cases)

- France: Nation-wide case-control study (*Grant et al, Lancet Reg. Health Nov 25*)
 - Relative to unvaccinated/no previous diagnosis, VE for symptomatic Delta variant cases
 - Lowest for those vaccinated/no previous diagnosis (67%).
 - Strong for those previously diagnosed within 2-6 months, whether vaccinated (VE = 96%) or unvaccinated (95%).
 - Decline in protection for “older” infections diagnosed >6 months ago (VE = 74%)
- United Kingdom: SIREN cohort of healthcare workers (*Hall et al, medrxiv Dec 1*)
 - Relative to unvaccinated/no previous diagnosis, estimated VE for cases:
 - Lowest for those vaccinated/no previous diagnosis (mid 60%s).
 - Strong if previously diagnosed within 2-6 months, whether vaccinated (VE > 90%) or not (VE mid 80%s).
 - Little decline in protection for “old” infections: Mid-80%s VE up to 15 months prior, mid 70% for those ≥15 months.
- Israel: National database cohort (*Goldberg et al, medrxiv Dec 5*)
 - Rates: (no previous diagnosis & vaccinated) < (previous diagnosis & unvaccinated) < (previous diagnosis & vaccinated)
 - Rates declined with time since vaccine and since infection
 - Signal of high benefit from boosters

Conclusions from New York and California analysis

- 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* may be relying on prior infection for protection
 - Essential to reach the other 80%
- Key limitations
 - Added value of boosters not demonstrated
 - Analysis ends before Omicron variant, for which primary series and prior infection may be less protective
- However, a number of new studies in recent two weeks ...

New UK SIREN results: post-Omicron, with boosters (Jan 14, for cases)

SARS-CoV-2 variants of concern and variants under investigation in England: Technical briefing 34

Table 3. Incidence of Omicron infections in the SIREN cohort between 1 December 2021 and 4 January 2022 by vaccination and prior infection status on 30 November 2021 (n=18,464)

Status	Number of participants	Number of days of follow up	Number of infections	Crude incidence rate (per 10,000 person days)	Vaccine effectiveness (%) (100 x1-IRR)	95% CI
No previous infection and vaccine status on 30 November 2021						
Unvaccinated	87	1,935	21	108.5	Ref	Ref
Vaccinated 2 dose	1,156	24,801	182	73.4	32%	-6%-57%
Vaccinated 3 dose	9,841	225,126	937	41.6	62%	41%-75%
Prior infection and vaccine status on 30 November 2021						
Unvaccinated	255	5,750	35	60.9	44%	4%-67%
Vaccinated 2 dose	1,333	28,255	123	43.5	60%	36%-75%
Vaccinated 3 dose	5,386	121,762	377	31.0	71%	56%-82%

Notes: IRR Incidence Rate Ratios. IRR are not adjusted.

Reinfections in NYS suggest changing protection from prior infection, post-Omicron

New York State: Reinfections Data last updated on: 1/26/2022 10:01:08 AM
Data as of: 01/25/2022

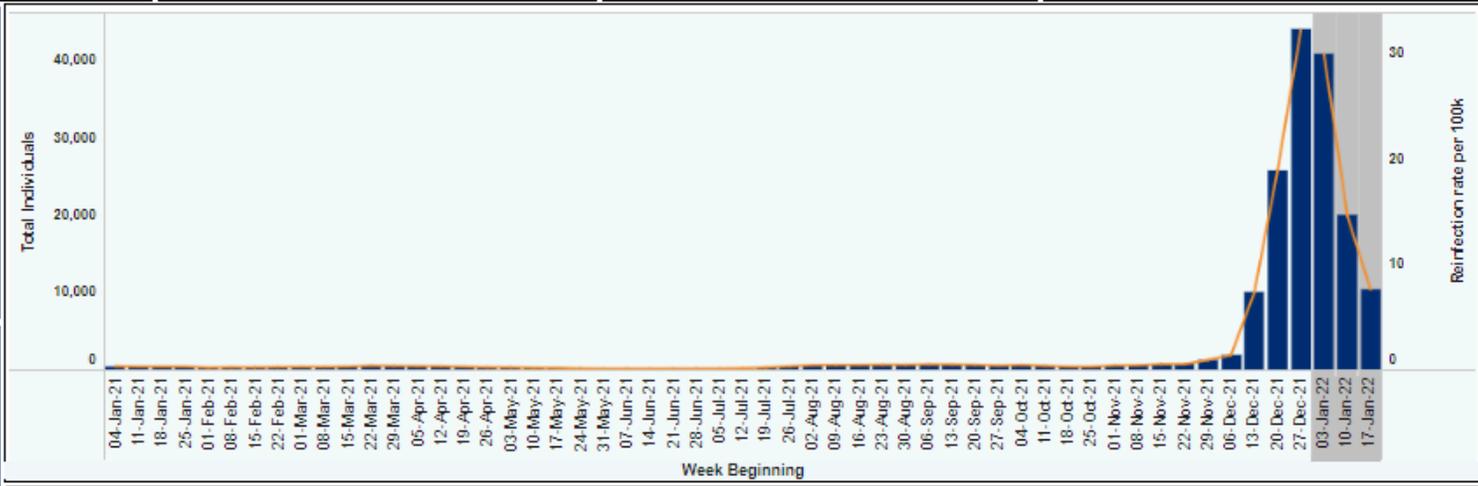
Time Period: **All** | Region: **(All)** | Reinfections All Infections

Legend: ■ Reinfections ■ Reinfection rate per 100k

Cumulative First Infections
4,711,368

Cumulative Reinfections
182,195

Cumulative Total Infections
4,893,563



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	4,711,368	182,195	132,294	10,506	97	8
Capital Region	195,899	5,031	8,343	574	110	8
Central New York	158,075	4,875	7,680	546	141	10
Finger Lakes	224,371	6,388	8,060	648	96	8
Long Island	795,410	35,430	17,162	1,817	86	9
Mid-Hudson	556,188	22,952	14,087	1,207	87	7
Mohawk Valley	97,287	2,894	4,259	411	125	12
New York City	2,204,540	90,936	53,727	3,819	91	6
North Country	70,525	1,373	3,735	238	127	8
Southern Tier	123,560	3,826	5,102	438	115	10
Western New York	285,513	8,490	10,139	808	105	8

- Extends past new MMWR into Omicron period
- 3.7% of 4.9 million positive results are reinfection
 - 83% occurred > Dec. 13
 - But still only a small portion of total cases

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

Thank you!

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With much thanks to the full collaborative NYS DOH, CA DPH, CDC team

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