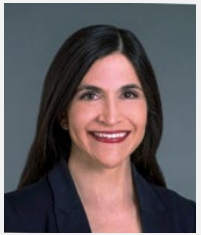
CDC/IDSA Clinician Call

Sept. 24, 2022

Welcome & Introductions



Dana Wollins, DrPH, MGC
Vice President
Clinical Affairs & Guidelines
Infectious Diseases Society of America

- 93rd in a series of calls, initiated in 2020 as a forum for information sharing among frontline clinicians caring for patients with COVID-19.
- The views and opinions expressed here are those of the presenters and do not necessarily reflect the official policy or position of the CDC or IDSA. Involvement of CDC and IDSA should not be viewed as endorsement of any entity or individual involved.
- This webinar is being recorded and can be found online at www.idsociety.org/cliniciancalls.

1. COVID-19: Situation Update, Emerging Variants & Implications for Therapeutics

Update on COVID-19 Epidemiology

Pragna Patel, MD, MPH
Captain, U.S. Public Health Service
Chief Medical Officer (acting)
Coronavirus and Other Respiratory Diseases Division (proposed)
National Center for Immunization and Respiratory Diseases
U.S. Centers for Disease Control & Prevention

COVID-19 Therapeutics Update

Meghan E. Pennini, PhD
Director, Therapeutics
HHS Coordination Operations and Response Element (H-CORE)/
Administration for Strategic Preparedness and Response
U.S. Department of Health and Human Services

2. Monkeypox: Clinical Characteristics and Treatment Options for Severe Disease

Introduction

Agam Rao, MD, MPH
Captain, U.S. Public Health Service
Poxvirus Subject Matter Expert
Multinational Monkeypox Response
U.S. Centers for Disease Control and Prevention

Severe Monkeypox in a Patient With Newly Diagnosed HIV

Robert L. Atmar, MD, FIDSA
Chief, Infectious Diseases, Ben Taub Hospital
Professor, Medicine-Infectious Disease
Baylor College of Medicine

Encephalitis in a Patient With Severe Monkeypox

Matthew J. Copeland, DO
Assist. Professor of Medicine, Georgetown University Medical Center
Attending Physician, Division of Infectious Diseases, Medstar Georgetown University Hospital

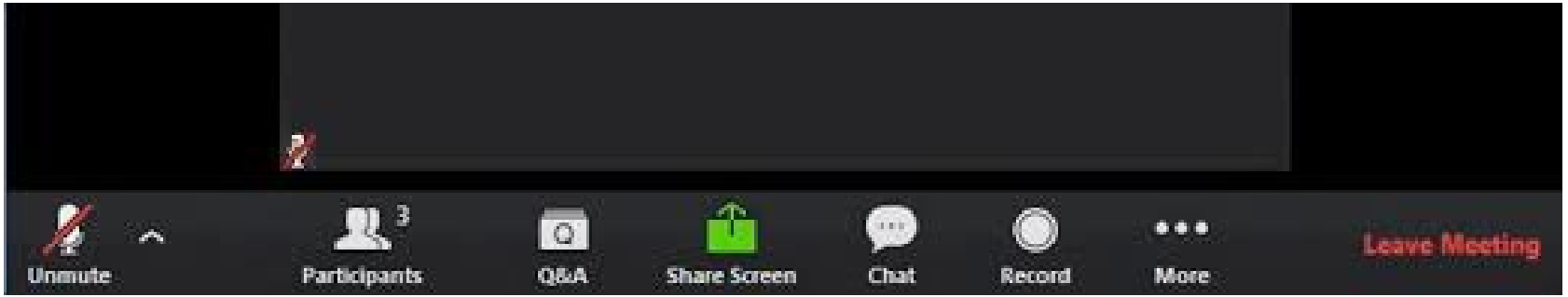
Ocular Monkeypox

Vivian Huang, MD, MPH
Assist. Medical Director, Office of Epidemiology and Data Services
Maricopa County Department of Public Health

Nelson Nicolasora, MD
Clinical Assist. Professor, Division of Infectious Disease
Banner University Medical Center – Phoenix
University of Arizona

Question?
Use the “Q&A” Button

Comment?
Use the “Chat” Button

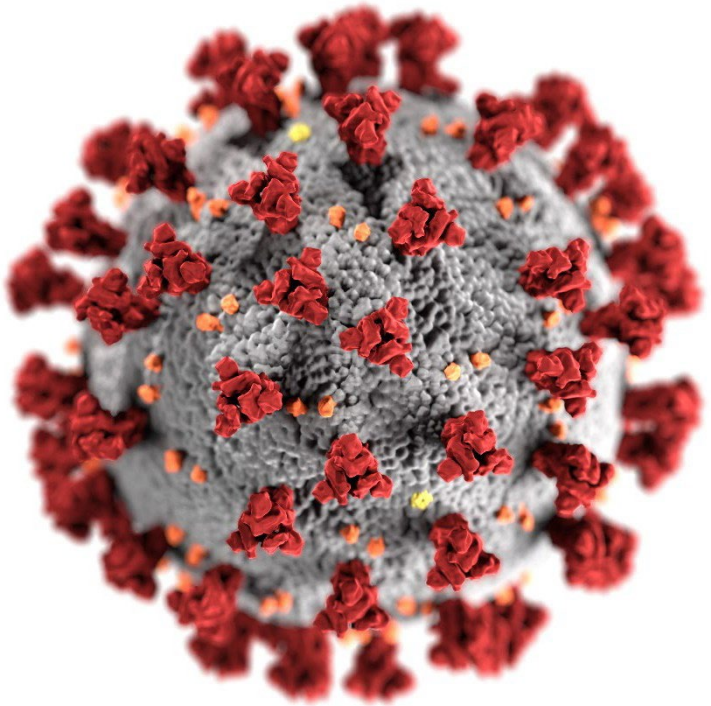


Update on COVID-19 Epidemiology

Pragna Patel, MD MPH
Acting Chief Medical Officer
Coronavirus and Other Respiratory Viruses Division (proposed), NCIRD, CDC

CDC/IDSA Clinician Call

September 24, 2022

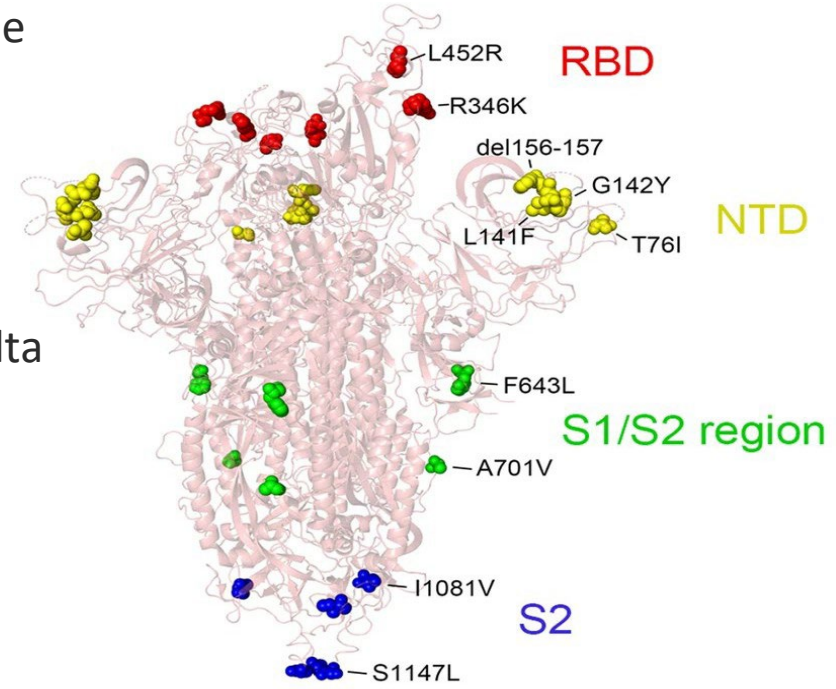


cdc.gov/coronavirus

Omicron variant

- Unusually large number of mutations across the SARS-CoV-2 genome
  - **45-52 amino acid changes, deletions, or insertions:**

    15 within receptor binding domain
- More infectious and transmissible than the Delta variant
- Resist neutralization by vaccine- and infection-induced antibodies
- Evade innate immunity
- Resistance to some therapeutics



Ou, J., Lan, W., Wu, X. *et al.* Tracking SARS-CoV-2 Omicron diverse spike gene mutations identifies multiple inter-variant recombination events. *Sig Transduct Target Ther* **7**, 138 (2022). https://doi.org/10.1038/s41392-022-00992-2

Daily Change in COVID-19 Cases, United States

January 22, 2020* - September 22, 2022

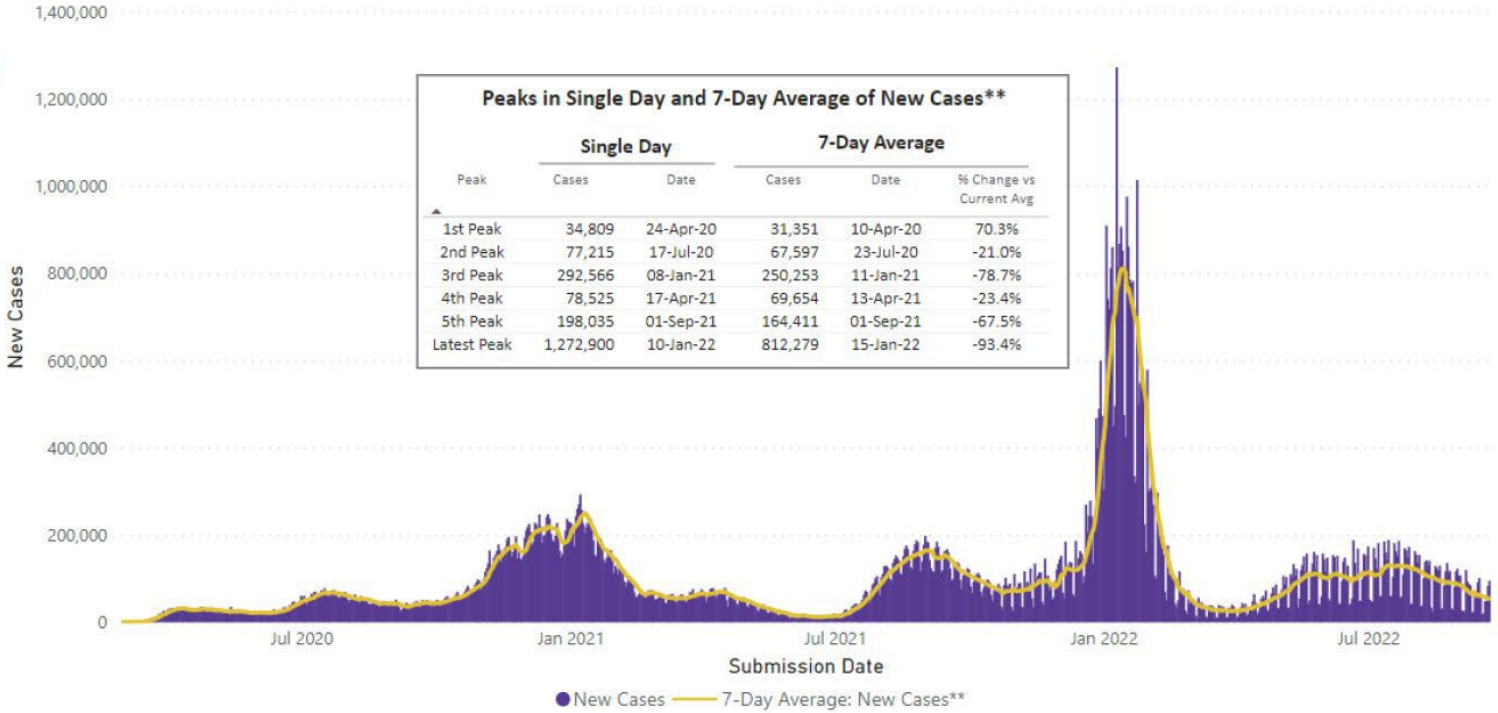
95,795,378
Total Cases Reported

95,014
New Cases Reported**

53,377
Current 7-Day Average**
Sep 16, 2022 - Sep 22, 2022

62,578
Prior 7-Day Average**
Sep 09, 2022 - Sep 15, 2022

-14.7%
Change in 7-Day Average



Peaks in Single Day and 7-Day Average of New Cases**

Peak	Single Day Cases	Single Day Date	7-Day Average Cases	7-Day Average Date	% Change vs Current Avg
1st Peak	34,809	24-Apr-20	31,351	10-Apr-20	70.3%
2nd Peak	77,215	17-Jul-20	67,597	23-Jul-20	-21.0%
3rd Peak	292,566	08-Jan-21	250,253	11-Jan-21	-78.7%
4th Peak	78,525	17-Apr-21	69,654	13-Apr-21	-23.4%
5th Peak	198,035	01-Sep-21	164,411	01-Sep-21	-67.5%
Latest Peak	1,272,900	10-Jan-22	812,279	15-Jan-22	-93.4%

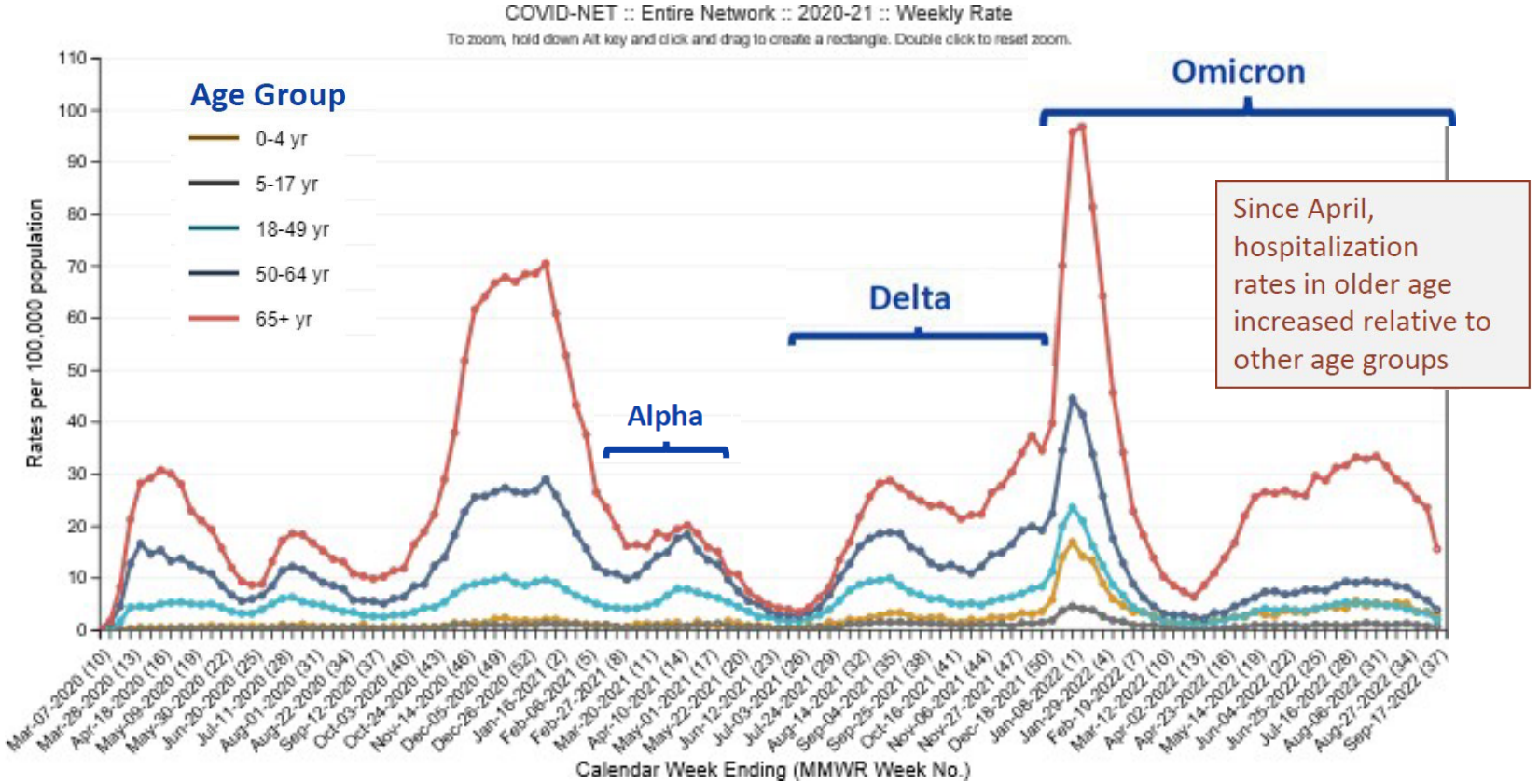
*Graph displays data for Mar 01, 2020, to date. The totals include cases reported since Jan 22, 2020.

** The histogram, total of new cases in the last 24 hours, and 7-day averages do not include historical cases retroactively that are not yet attributed to the correct date of report.
Of 658,910 historical cases reported retroactively, none were reported on Sep 22, 2022; none in the current week; and 8 in the prior week.

Last Updated: Sep 23, 2022, 09:50

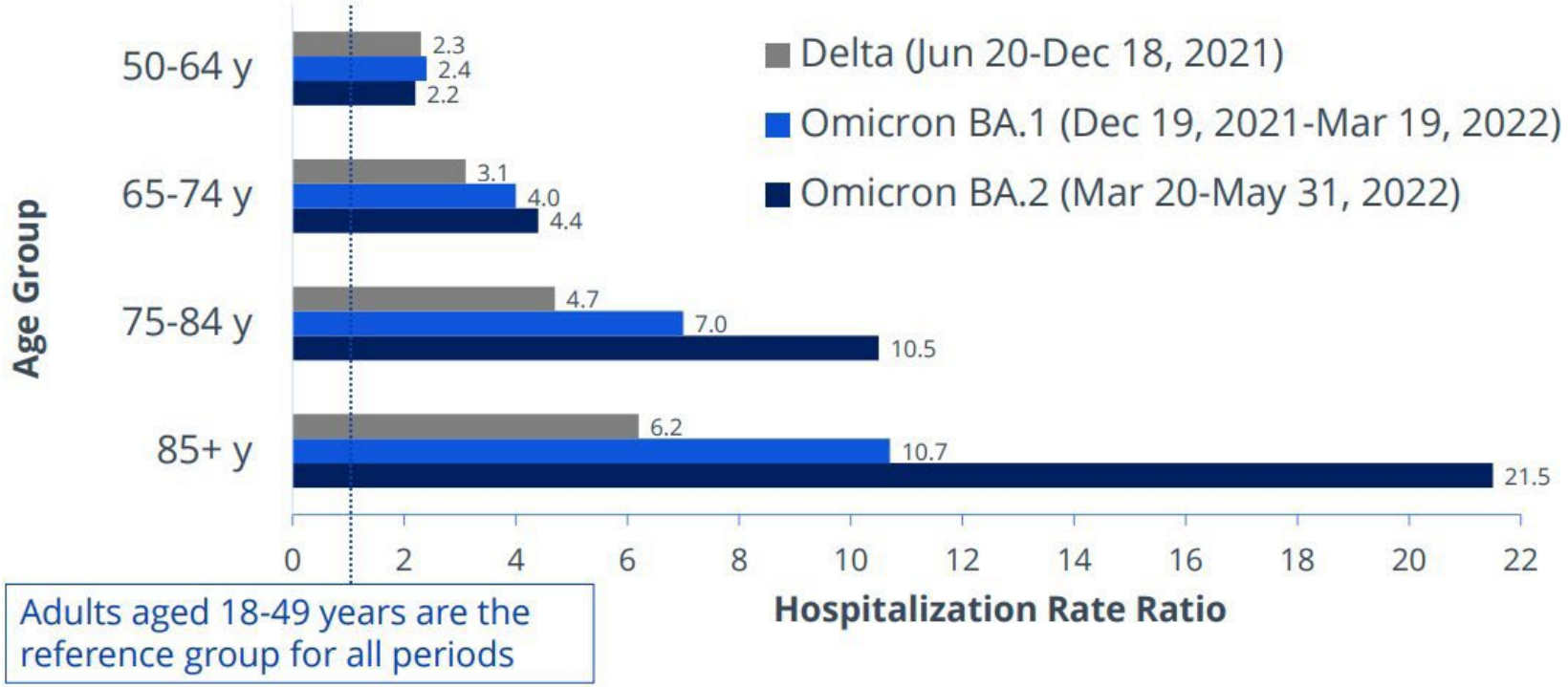
Data Source: CDC Case Surveillance, state-level aggregated COVID-19 Cases, HHS Protect; Visualization: CC CPR DEO Situational Awareness Public Health Science Team

Weekly Trends in COVID-19 Associated Hospitalization Rates by Age group



Hospitalization Rate Ratios by Age Group

COVID-NET, June 2021 – May 31, 2022



Havers et al. MMWR 2022; 71(34);1085–1091. https://www.cdc.gov/mmwr/volumes/71/wr/mm7134a3.htm?s_cid=mm7134a3_w

Characteristics of hospitalized adults ≥18 years

COVID-NET, June 20, 2021 – May 31, 2022

Characteristic	% of Total Hospitalizations		
	Delta Jun 20, 2021–Dec 18, 2021 (n=5,234)	**Omicron BA.1** Dec 19, 2021–Mar 19, 2022 (n=1,804)	**Omicron BA.2** Mar 20, 2021–May 31, 2022 (n=1,228)
Age Median (years)	59.9	63.8	70.5
Likely COVID-19–related*	95.5	87.8	85.4
Risk Factors			
Any underlying medical condition	89.3	91.7	95.1
Immunosuppressive condition	11.0	16.0	19.2
Long-term care facility	5.7	9.0	14.2
Outcomes			
Length of stay (days, median)	4.8	3.9	3.3
ICU admission	24.3	17.9	13.2
Mechanical ventilation	13.5	7.6	5.7
In-hospital death	12.4	7.5	5.1

Trends during BA.1 & BA.2

- Median age increased
- Underlying conditions more prevalent
- Clinical outcomes less severe

* COVID-19–related illness as a likely reason for admission is indicated by COVID-19 diagnosis or symptoms consistent with COVID-19 as the chief complaint or reason for admission in the history of present illness. Non–COVID-19 reasons for admission included planned inpatient surgery or procedures, psychiatric admission needing acute medical care, trauma, other, and unknown. Havers et al. MMWR 2022; 71(34);1085–1091. https://www.cdc.gov/mmwr/volumes/71/wr/mm7134a3.htm?s_cid=mm7134a3_w

Factors Associated with Severe Outcomes Among Immunocompromised Adults Hospitalized for COVID-19 — COVID-NET, 10 States, March 2020–February 2022

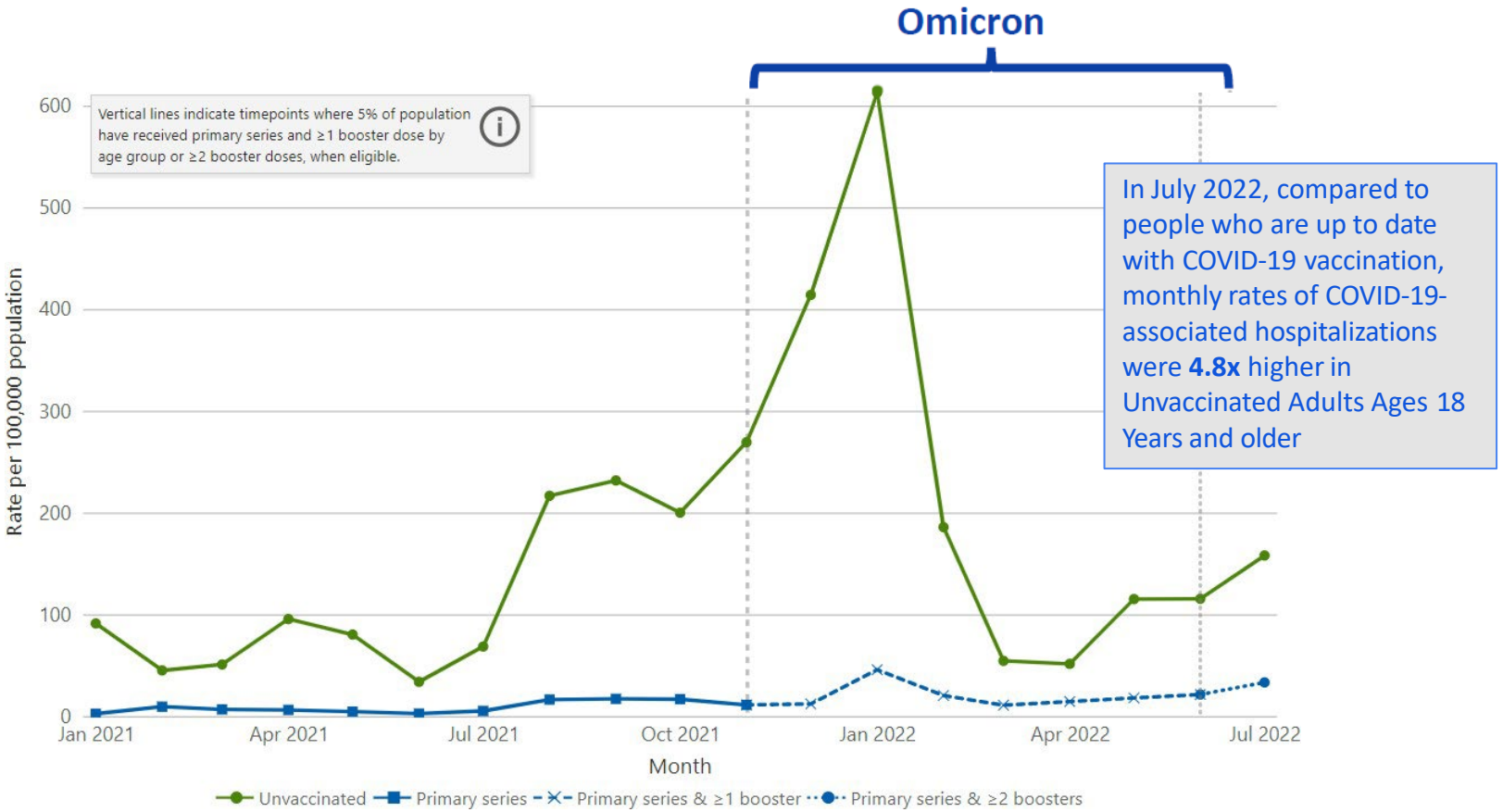
SUPPLEMENTARY TABLE 2. Association of immunocompromise and vaccination status* with in-hospital death among patients hospitalized for COVID-19, by SARS-CoV-2 variant predominant period† — COVID-NET, 10 States, § March 1, 2020–February 28, 2022

	aOR of in-hospital death (95% CI) by SARS-CoV-2 variant predominant period		
Comparison groups	**Pre-Delta**	**Delta**	**Omicron**
Immunocompromised versus nonimmunocompromised			
Unvaccinated¶	1.37 (1.02-1.82)**	1.31 (0.74-2.30)	1.04 (0.57-1.91)
Vaccinated*,††	2.91 (1.69-5.02)§§	2.51 (1.30-4.83)§§	0.99 (0.61-1.63)
Vaccinated versus unvaccinated*			
Immunocompromised¶¶	1.76 (0.82-3.75)	1.23 (0.57-2.64)	1.09 (0.44-2.72)
Nonimmunocompromised***	0.44 (0.23-0.84)**	0.42 (0.28-0.64)§§	0.84 (0.46-1.57)

Abbreviations: aOR, adjusted odds ratio; COVID-NET = COVID-19–Associated Hospitalization Surveillance Network.

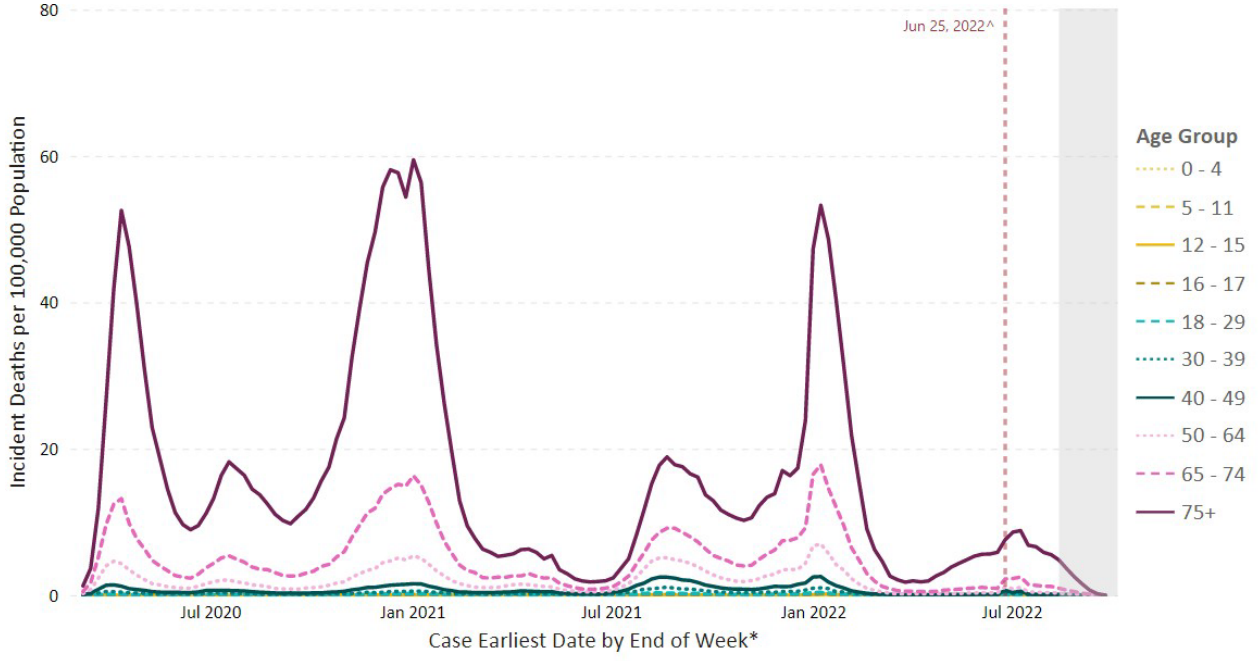
Pre-Delta period, March 1, 2020–June 26, 2021; Delta period, June 27–December 18, 2021; Omicron period December 19, 2021–February 28, 2022. ** p-value <0.05. Singson et al. MMWR 2022 71 (27) https://www.cdc.gov/mmwr/volumes/71/wr/pdfs/mm7127a3-H.pdf

Age-Adjusted Rates of COVID-19 Associated Hospitalizations by Vaccination Status and Receipt of Booster Dose, COVID-NET, January 2021 – July 2022



In July 2022, compared to people who are up to date with COVID-19 vaccination, monthly rates of COVID-19-associated hospitalizations were **4.8x** higher in Unvaccinated Adults Ages 18 Years and older

COVID-19 Weekly Deaths per 100,000 Population

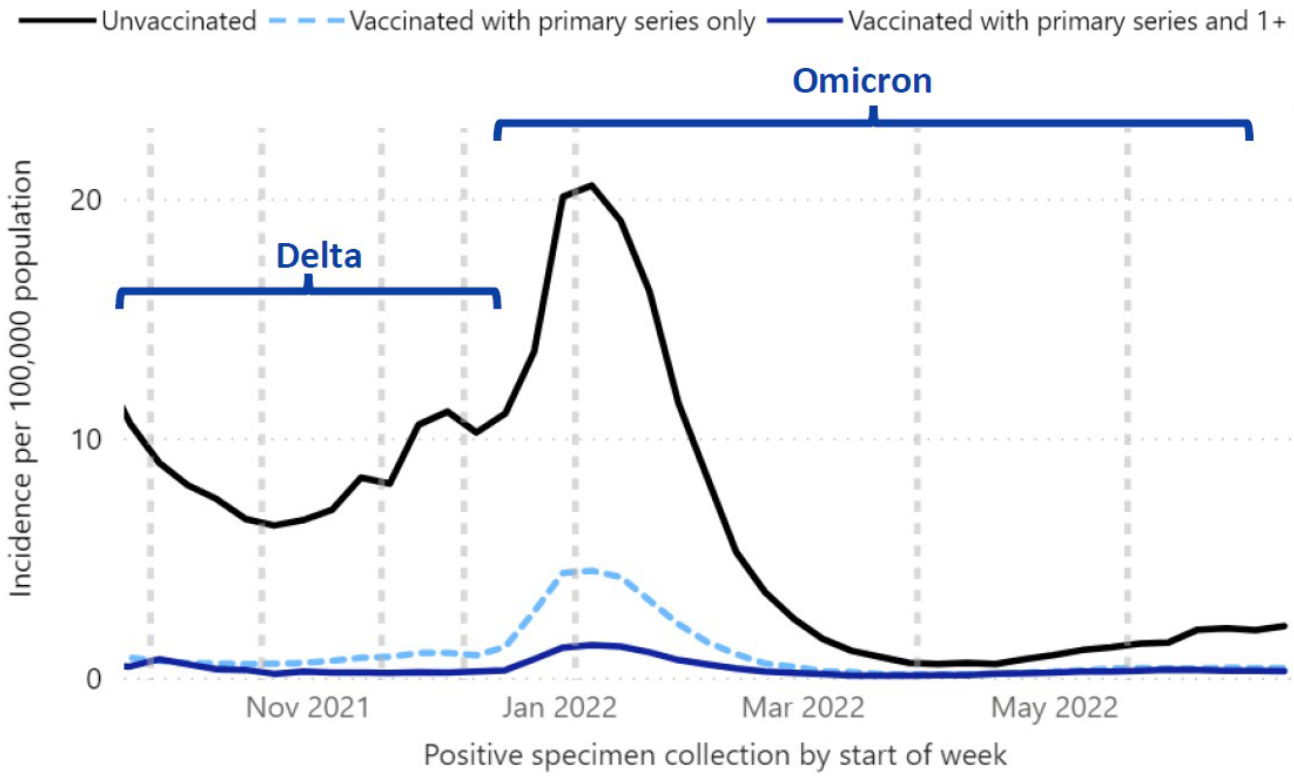


US: The most recent case record was reported during the week ending on Sep 24, 2022. Percentage of deaths among reported cases - 1.03%. Percentage of deaths reporting age by date - 99.91%.
US territories are included in case and death counts but not in population counts. Potential six-week delay in case reporting to CDC denoted by gray bars. Weekly data with five or less deaths have been suppressed.
*Case Earliest Date is the earliest of the clinical date (related to illness or specimen collection and chosen by a defined hierarchy) and the Date Received by CDC. The date for the current week extends through Saturday. ^The death rate for Texas during the week ending Jun 25, 2022, are reflective of a data reporting artifact.

Source: CDC COVID-19 Case Line-Level Data, 2019 US Census, HHS Protect; Visualization: Data, Analytics & Visualization Task Force and CDC CPR DEO Situational Awareness Public Health Science Team

https://covid.cdc.gov/covid-data-tracker/#demographicsovertime

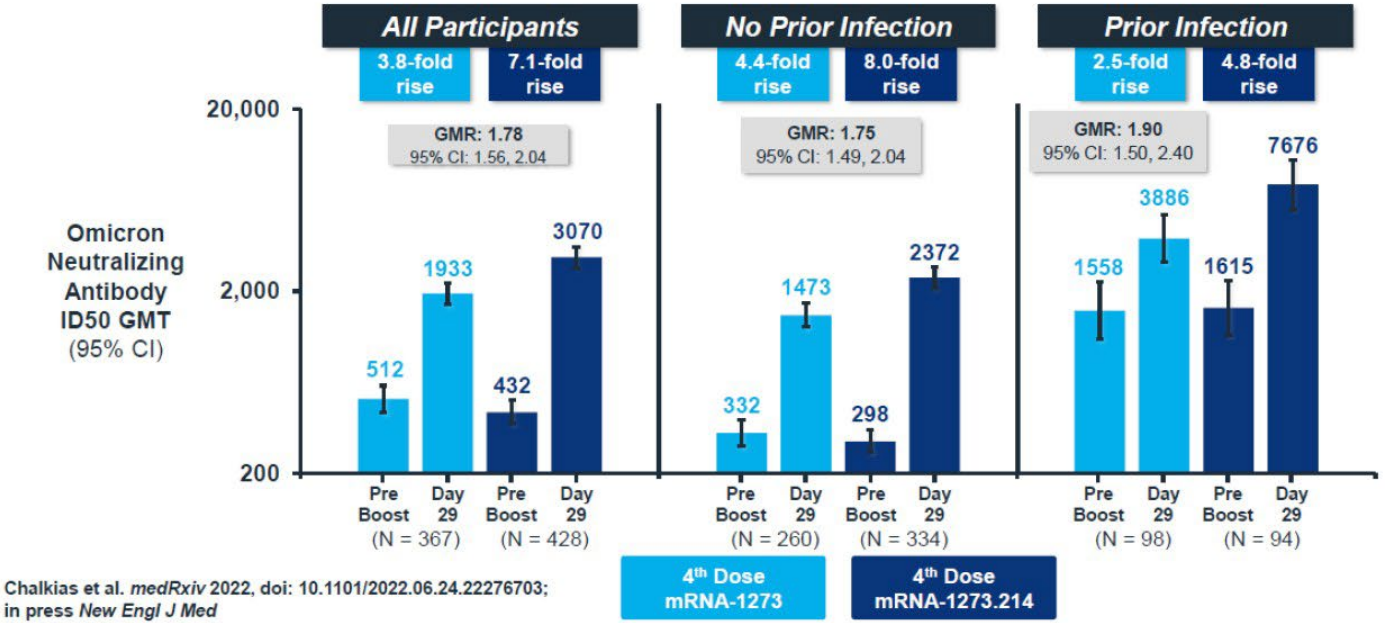
Age-Adjusted Rates of COVID-19-Associated Deaths by Vaccination Status and Receipt of Booster Dose,* September 19, 2021 – July 2, 2022 (29 U.S. Jurisdictions)



In June 2022, **unvaccinated** people ages ≥5 years had **8X higher** COVID-19-associated death rates compared to those with at least **one booster dose**

This was a decrease from ~**20X** during January-March 2022

Immunogenicity: Moderna bivalent booster



Chalkias et al. *medRxiv* 2022, doi: 10.1101/2022.06.24.22276703; in press *New Engl J Med*

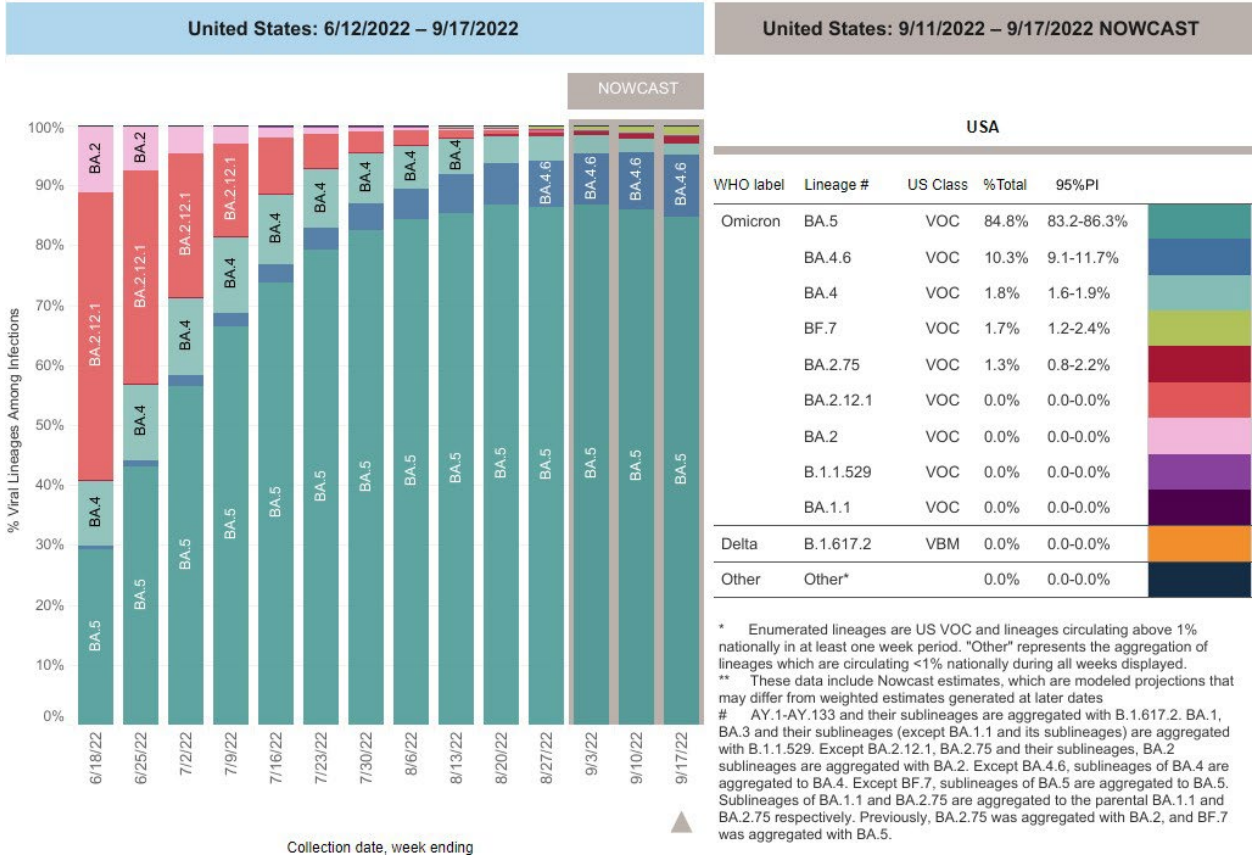
- Met superiority criteria* in participants ≥18 years with or without evidence of infection on day 29

*Superiority criterion: the lower bound of the 95% CI for GMR is >1.0

https://www.medrxiv.org/content/10.1101/2022.06.24.22276703v1.full.pdf

Surveillance for Variants of Concern - NOWCAST

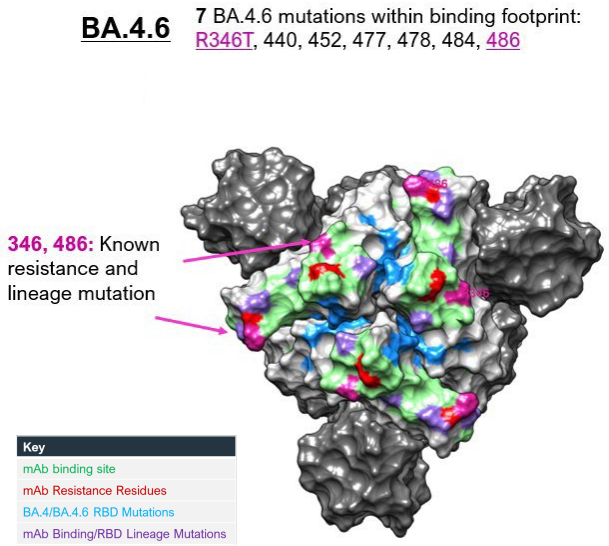
- **BA.5**
  - Predominant in all regions
- **BA.4.6**
  - More prevalent in east and southeast, and HHS Region 7
- **BF.7**
  - Most prevalent in HHS Region 1
- **BA 2.75.2**

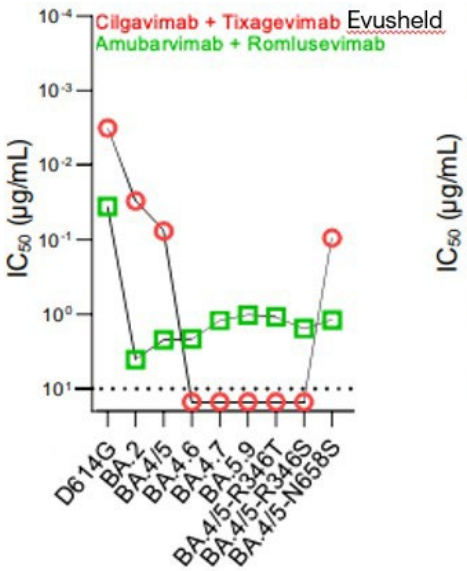


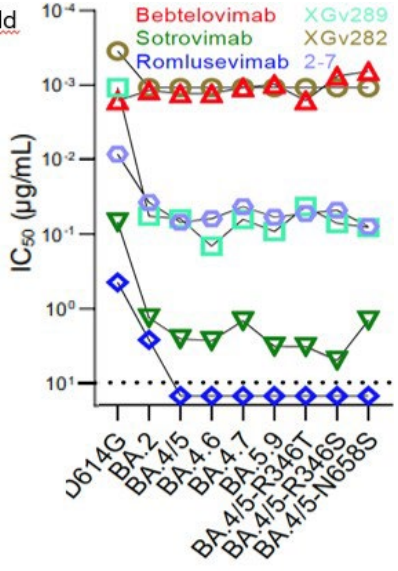
https://covid.cdc.gov/covid-data-tracker/#variant-proportions

Variants of Concern: Spike Protein R346T Mutation

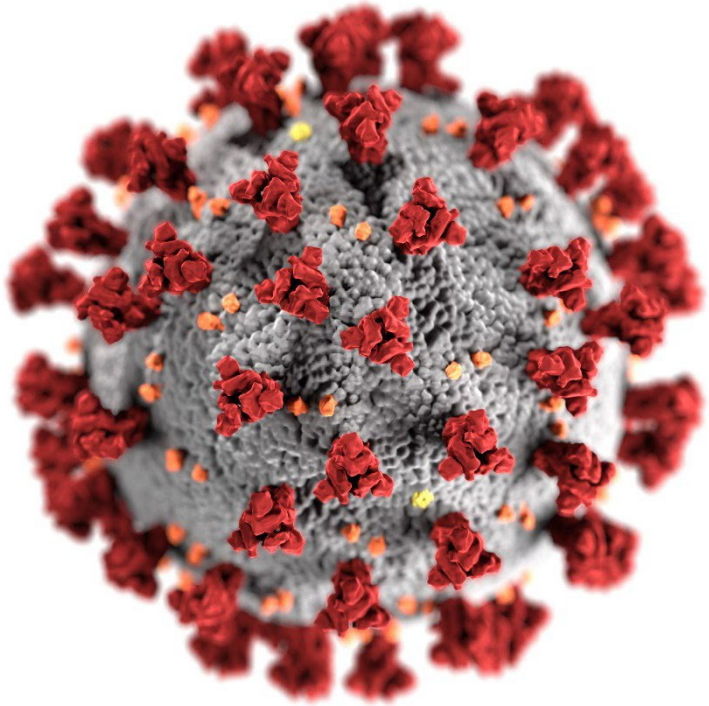
- Evusheld is expected to have reduced potency against lineages with R346T substitutions (BA.4.6, BF.7, BA.2.75.2)
- Bebtelovimab retains potency







Wang.Resistance of BA 4.6 to antibody neutralization.bioRxiv.2022



For more information, contact CDC
1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

U.S. Department of Health and Human Services

ASPR Administration for Strategic Preparedness & Response

COVID-19 Therapeutics Update

Meghan Pennini, PhD
Director, Therapeutics
HHS Coordination Operations and Response Element (H-CORE)/ASPR

September 24, 2022

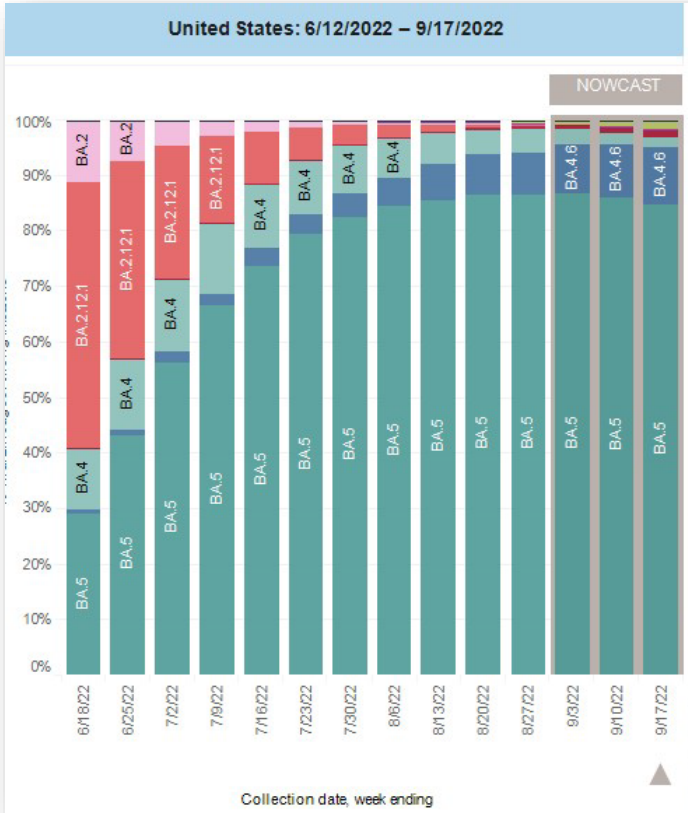
https://aspr.hhs.gov/COVID-19/Therapeutics/Pages/default.aspx

Unclassified/For Public Distribution

CDC Nowcast – 9/17/22

CDC NOWCAST for the week ending 17 Sep 22:

- **BA.5 –84.8%**
  - Predominant all regions
- **BA.4.6 – 10.3%**
  - Highest in R7 (17.8%)
  - R346T spike RBD substitution + N658S
- **BF.7 (1.7%) separated from BA.5**
  - R346T
- **BA.2.75 (1.3%) separated from BA.2**
  - Some with R346T (BA.2.75.2)



United States: 9/11/2022 – 9/17/2022 NOWCAST

USA

WHO Label	Lineage	US Class	%Total	95%PI
Omicron	BA.5	VOC	84.8%	83.2-86.3%
	BA.4.6	VOC	10.3%	9.1-11.7%
	BA.4	VOC	1.8%	1.6-1.9%
	BF.7	VOC	1.7%	1.2-2.4%
	BA.2.75	VOC	1.3%	0.8-2.2%
	BA.2.12.1	VOC	0.0%	0.0-0.0%
	BA.2	VOC	0.0%	0.0-0.0%
	B.1.1.529	VOC	0.0%	0.0-0.0%
	BA.1.1	VOC	0.0%	0.0-0.0%
Delta	B.1.617.2	VBM	0.0%	0.0-0.0%
Other	Other*		0.0%	0.0-0.0%

* Enumerated lineages are US VOC and lineages circulating above 1% nationally in at least one week period. "Other" represents the aggregation of lineages which are circulating <1% nationally during all weeks displayed.
** These data include Nowcast estimates, which are modeled projections that may differ from weighted estimates generated at later dates
# AY.1-AY.133 and their sublineages are aggregated with B.1.617.2. BA.1, BA.3 and their sublineages (except BA.1.1 and its sublineages) are aggregated with B.1.1.529. Except BA.2.12.1, BA.2.75 and their sublineages, BA.2 sublineages are aggregated with BA.2. Except BA.4.6, sublineages of BA.4 are aggregated to BA.4. Except BF.7, sublineages of BA.5 are aggregated to BA.5. Sublineages of BA.1.1 and BA.2.75 are aggregated to the parental BA.1.1 and BA.2.75 respectively.

Efficacy of COVID-19 Therapeutics against Variants

Evusheld (PrEP)

Lineage	Country 1st Identified	WHO Nomenclature	Key Substitutions Tested	Fold Reduction (Pseudotyped VLPs)	Fold Reduction (Authentic Virus)
BA.1	Botswana	Omicron (BA.1)	G339D+S371L+S373P+ S375F+K417N+N440K+ G446S+S477N+T478K+ E484A+Q493R+G496S+ Q489R+N501Y+Y505H	132- to 183-fold#	12- to 30-fold
BA.1.1	Multiple country origin	Omicron (BA.1.1) [+R346K]	G339D+R346K+S371L+ S373P+S375F+K417N+ N440K+G446S+S477N+ T478K +E484A+Q493R +G496S+Q489R+N501Y+ Y505H	424-fold	176-fold
BA.2	Multiple country origin	Omicron (BA.2)	G339D+S371F+S373P+ S375F+T376A+D405N+ R408S+K417N+N440K+ S477N+T478K+E484A+ Q493R+Q498R+N501Y+ Y505H	No Change§	5.4-fold
BA.2.12.1	United States	Omicron (BA.2.12.1)	G339D+ S371F+S373P+S375F+ T376A+D405N+R408S+ K417N+N440K+L452Q+ S477N+T478K+E484A+ Q493R+Q498R+N501Y+ Y505H	5-fold	ND
BA.3	Multiple country origin	Omicron (BA.3)	G339D+S371F+ S373P+S375F+D405N+ K417N+N440K+G446S+ S477N+T478K+E484A+ Q493R+Q498R+N501Y+ Y505H	16-fold	ND
BA.4/5	Multiple country origin	Omicron (BA.4/5)	+G339D+S371F+S373P+ S375F+T376A+D405N+ R408S+K417N+N440K+ L452R+S477N+T478K+ E484A+F486V+Q498R+ N501Y+Y505H	33- to 65-fold	ND

https://www.fda.gov/media/154701/download

Bebtelovimab (treatment)

Lineage with Spike Protein Substitution	Country First Identified	WHO Nomenclature	Key Substitutions Tested[a]	Fold Reduction in Susceptibility
BA.1.1	South Africa	Omicron [+R346K]	BA.1 + R346K	No change[b]
BA.2	South Africa	Omicron [BA.2]	G339D + S371F + S373P + S375F + T376A + D405N + R408S + K417N + N440K + S477N + T478K + E484A + Q493R + Q498R + N501Y + Y505H	No change[b]
BA.2.12.1	USA	Omicron [BA.2+L452Q]	BA.2 + L452Q	No change[b]
BA.2.75	India	Omicron [BA.2+D339H, G446S, N460K, R493Q (reversion)]	BA.2 + D339H, G446S, N460K, R493Q (reversion)	No change[b]
BA.4/BA.5	South Africa	Omicron [BA.4/BA.5]	G339D + S371F + S373P + S375F + T376A + D405N + R408S + K417N + N440K + L452R + S477N + T478K + E484A + F486V + Q498R + N501Y + Y505H	No change[b]
BA.4.6	USA	Omicron [BA.4+R346T]	BA.4 + R346T	No change[b]

https://www.fda.gov/media/156152/download

- Preliminary reports showing retained activity against BA.4/5 for **Veklury**[1,2] & oral antivirals (**Paxlovid, Lagevrio**)[2]
- Evusheld activity against BA.4.6 is likely diminished

1. https://www.gilead.com/news-and-press/company-statements/veklury-remdesivir-demonstrates-continued-in-vitro-antiviral-activity-against-omicron-subvariants
2. https://www.nejm.org/doi/full/10.1056/NEJMc2207519

Efficacy of COVID-19 Therapeutics against Variants

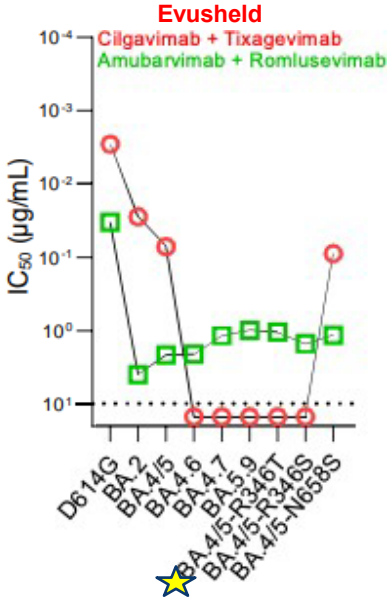
Table 1. Efficacy of Monoclonal Antibodies and Antiviral Drugs against Omicron Subvariants in Vitro.*

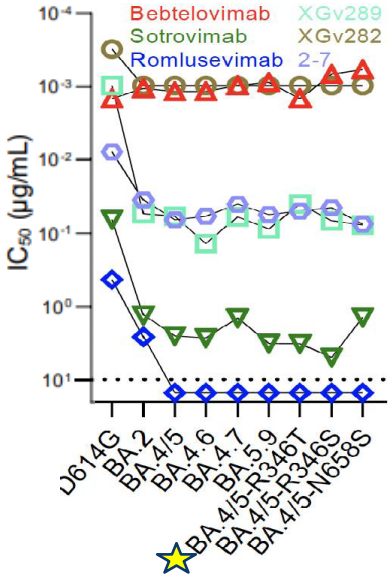
Subvariant	Mean Neutralization Activity of Monoclonal Antibody†								Susceptibility to Antiviral Drug‡		
	Imdevimab	Casirivimab	Tixagevimab	Cilgavimab	Sotrovimab Precursor	Bebtelovimab	Imdevimab+ Casirivimab (Regen-cov)	Tixagevimab+ Cilgavimab (Evusheld)	Remdesivir (Veklury)	Molnupiravir (Lagevrio)	Nirmatrelvir (+rito,Paxlovid)
	ng per milliliter								*μmol*		
Reference§	7.4	6.1	6.1	7.0	95.1	2.5	3.4	6.3	1.7	2.8	2.7
BA.1	>50,000	>50,000	1552.7	2916.9	40727.1	5.8	>10,000	351.1	1.9	7.5	4.8
BA.1.1	>50,000	>50,000	603.5	>50,000	3769.2	3.9	>10,000	1296.8	2.0	6.0	3.9
BA.2	329.0	>50,000	2756.6	16.9	>50,000	3.3	835.1	34.6	5.9	8.7	6.9
BA.2.12.1	238.1	>50,000	335.2	21.0	>50,000	4.0	452.7	38.1	0.5	3.2	1.8
BA.4	132.6	>50,000	>50,000	53.6	>50,000	2.9	459.1	37.8	1.2	3.3	2.9
BA.5	583.4	>50,000	>50,000	56.8	>50,000	3.3	1093.1	192.5	2.0	4.1	4.4

* The antibodies that were used in this analysis are listed by their commercial names for readability although they were produced in the authors' laboratories in their generic formulations. Omicron subvariants of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) are listed according to the World Health Organization labels for the Pango lineage.
† Individual monoclonal antibodies were tested at a starting concentration of 50,000 ng per milliliter on 50% focus reduction neutralization testing. The monoclonal antibody combinations were tested at a starting concentration of 10,000 ng per milliliter for each antibody.
‡ The susceptibility to antiviral drugs was measured as the 50% inhibitory concentration of the mean micromole value of triplicate reactions. GS-441524 is the main metabolite of remdesivir and EIDD-1931 is the active form of molnupiravir, both of which are RNA-dependent RNA polymerase inhibitors. Nirmatrelvir (PF-07321332) is a protease inhibitor.
§ The reference strain was SARS-CoV-2/UT-NC002–1T/Human/2020/Tokyo.

- Live virus data; https://www.nejm.org/doi/full/10.1056/NEJMc2207519
- Data against more recent variants (BA.4.6, BA.2.75.2) pending

Preliminary data: Evusheld Loses Neutralization Potency against BA.4.6
Bebtelovimab Maintains Potency





IC50 (ng/ml)	B.1	BA.5	BA.4.6	BA.2.10.4	BA.2.75.2
S309 (sotrovimab)	119	559	925	560	442
Cilgavimab	12	71	>1000	168	>1000
Tixagevimab	4	>1000	>1000	>1000	>1000
Evusheld	6	120	>1000	816	>1000
LY-CoV1404 (bebtelovimab)	4	1	2	3	2
REGN10933 (casivirimab)	14	>1000	>1000	>1000	>1000
REGN10987 (imdevimab)	10	>1000	>1000	>1000	>1000
LY-CoV016 (etesevimab)	29	>1000	>1000	>1000	>1000
LY-CoV555 (bamlanivimab)	9	>1000	>1000	>1000	>1000
ADG-20	56	>1000	>1000	>1000	>1000
S2E12	4	>1000	>1000	>1000	>1000
S2K146	18	118	78	207	62
A23-58.1	6	>1000	>1000	>1000	>1000

Pseudovirus Data:

Preprints: Wang (above);
R346[T/S/I] mutations impact Evusheld activity; ★BF.7

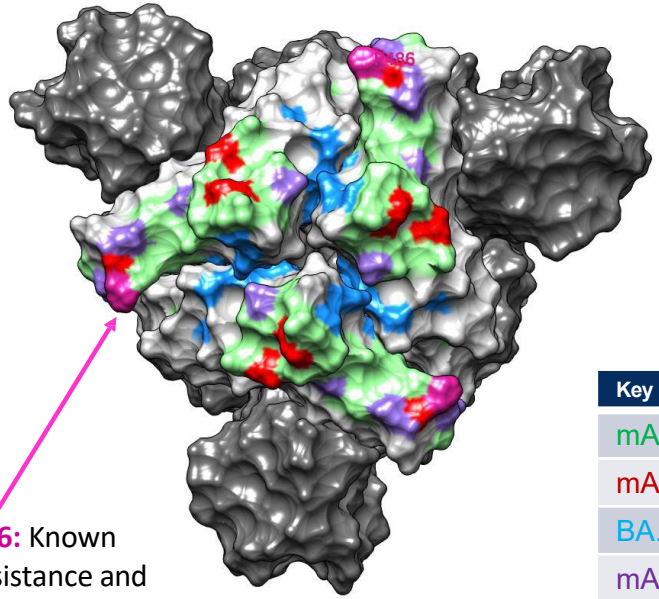
Preprint: Sheward

BA.4 vs BA.4.6: Example of Impact of R346T to Evusheld

BA.4

6 BA.4 mutations within binding footprint: 440,452,477,478,486,484

***Evusheld neutralizes BA.4

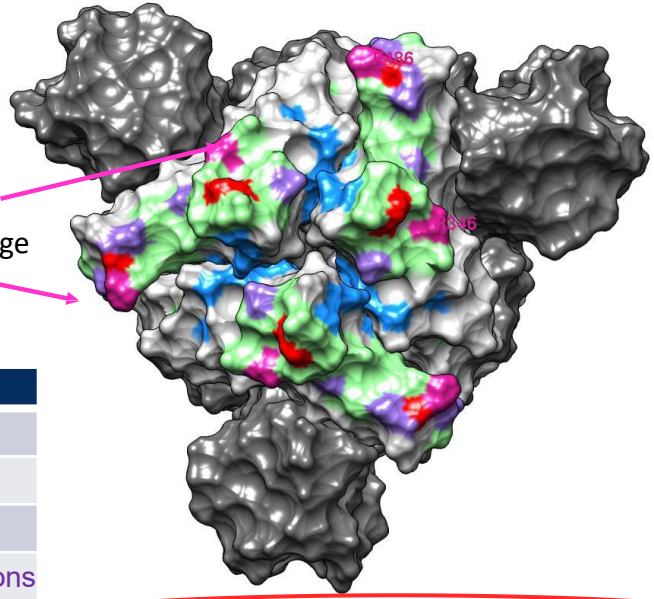


486: Known resistance and lineage mutation

BA.4.6

7 BA.4.6 mutations within binding footprint: R346T,440,452,477,478,484,486

***Evusheld potency likely significantly reduced



346, 486: Known resistance and lineage mutation

Key
mAb binding site
mAb Resistance Residues
BA.4/BA.4.6 RBD Mutations
mAb Binding/RBD Lineage Mutations

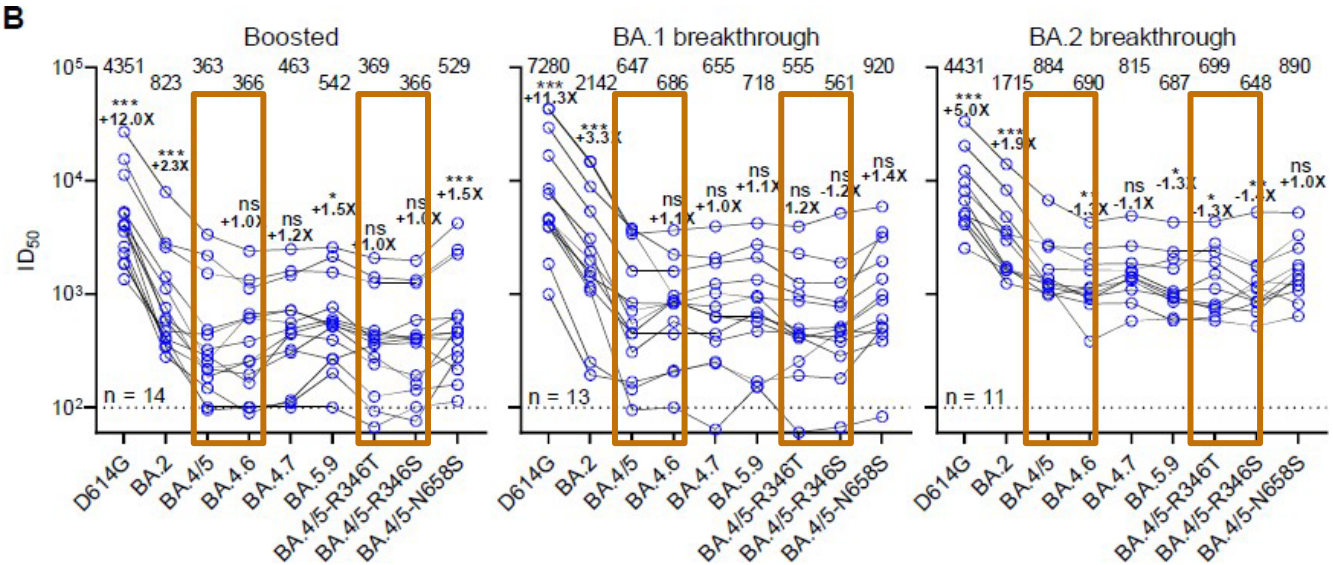
Other Lineages with R346T: BF.7, BA.2.75.2

Note: BA.2.75 w/o R346T is likely susceptible to Evusheld

Pseudovirus neutralization of Omicron variants by Vaccine Sera

- Immune evasion: D614G < BA.2 ~ BA.2.75 < BA.4/5 ~ BA.4.6 ~ BA.4.7 ~ BA.5.9

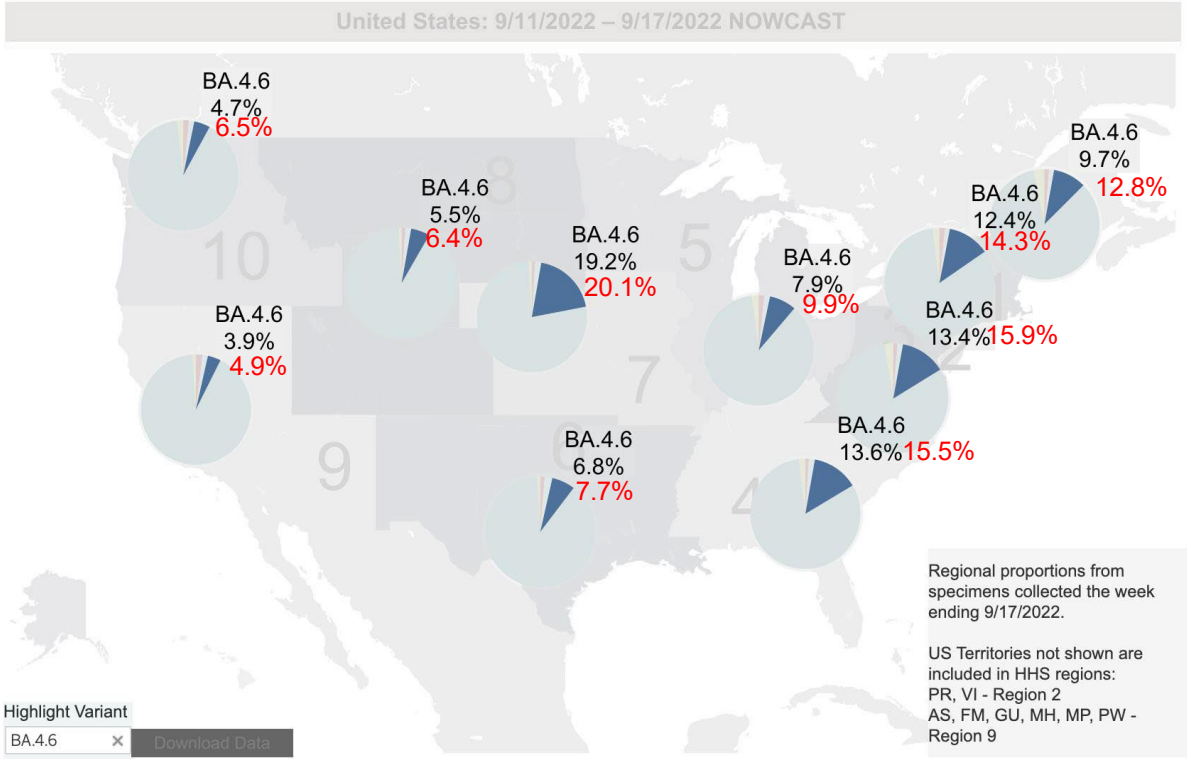
- R346T, R346S, and N658S in the background of BA.4/5 had minimal impact on vaccine sera neutralization



Wang *et al*, bioRxiv 2022.09.05.506628;
https://doi.org/10.1101/2022.09.05.506628

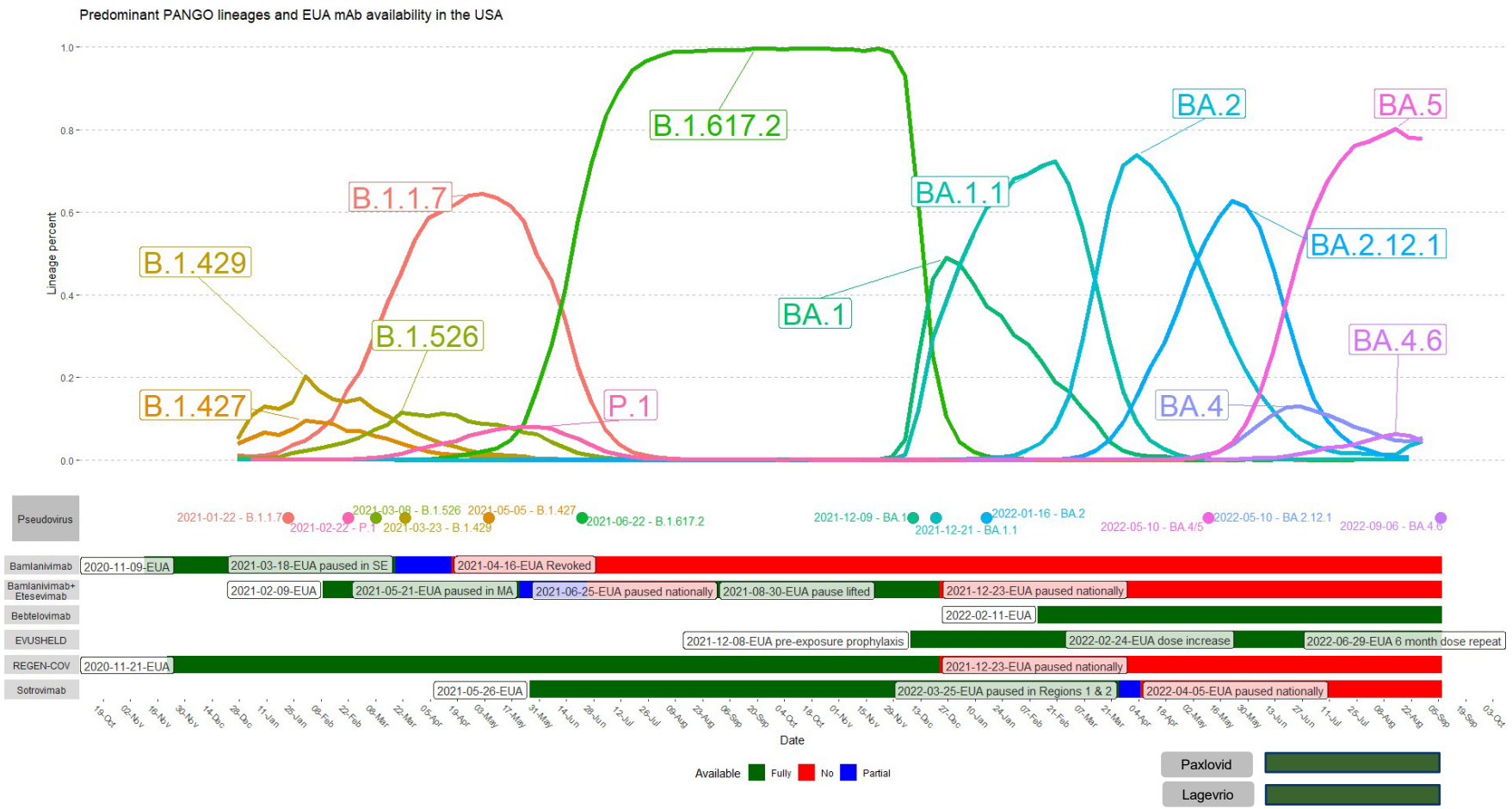
BA.4.6 US Regional Epidemiology Data

BA.4.6
BA.4.6+BF.7

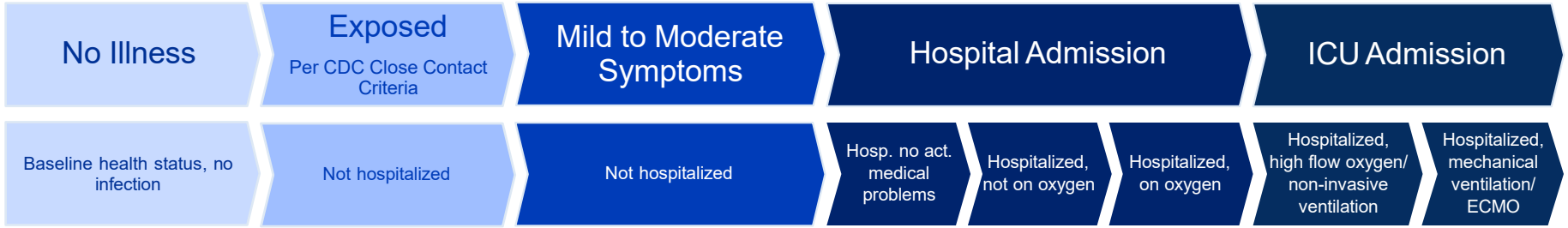


Lineages called using pangolin v4.1.2, pangolin-data v1.14 and usher v.0.5.4.

Updated September 16, 2022


Predominant PANGO lineages and EUA mAb availability in the USA
Lineage percent
1.0
0.8
0.6
0.4
0.2
0.0
B.1.429
B.1.1.7
B.1.526
B.1.427
B.1.617.2
P.1
BA.1
BA.1.1
BA.2
BA.2.12.1
BA.4
BA.4.6
BA.5
Pseudovirus
2021-01-22 - B.1.1.7
2021-02-22 - P.1
2021-03-08 - B.1.526
2021-03-23 - B.1.429
2021-05-05 - B.1.427
2021-06-22 - B.1.617.2
2021-12-09 - BA.1
2021-12-21 - BA.1.1
2022-01-16 - BA.2
2022-05-10 - BA.4/5
2022-05-10 - BA.2.12.1
2022-09-06 - BA.4.6
Bamlanivimab
2020-11-09-EUA
2021-03-18-EUA paused in SE
2021-04-16-EUA Revoked
Bamlanivimab+ Etesevimab
2021-02-09-EUA
2021-05-21-EUA paused in MA
2021-06-25-EUA paused nationally
2021-08-30-EUA pause lifted
2021-12-23-EUA paused nationally
Bebtelovimab
2022-02-11-EUA
EVUSHELD
2021-12-08-EUA pre-exposure prophylaxis
2022-02-24-EUA dose increase
2022-06-29-EUA 6 month dose repeat
REGEN-COV
2020-11-21-EUA
2021-12-23-EUA paused nationally
Sotrovimab
2021-05-26-EUA
2022-03-25-EUA paused in Regions 1 & 2
2022-04-05-EUA paused nationally
19-Oct 02-Nov 16-Nov 30-Nov 14-Dec 28-Dec 11-Jan 25-Jan 08-Feb 22-Feb 08-Mar 22-Mar 05-Apr 19-Apr 03-May 17-May 31-May 14-Jun 28-Jun 12-Jul 26-Jul 09-Aug 23-Aug 06-Sep 20-Sep 04-Oct 18-Oct 01-Nov 15-Nov 29-Nov 13-Dec 27-Dec 10-Jan 24-Jan 07-Feb 21-Feb 07-Mar 21-Mar 04-Apr 18-Apr 02-May 16-May 30-May 13-Jun 27-Jun 11-Jul 25-Jul 08-Aug 22-Aug 05-Sep 19-Sep 03-Oct
Date
Available
Fully
No
Partial
Paxlovid
Lagevrio

Summary of COVID-19 Preventative Agents & Treatments



COVID-19 Vaccines

Monoclonal Antibodies for PrEP

- Evusheld (tixagevimab + cilgavimab, AZ)

None currently authorized for use in any US state or territory.

Oral Antivirals

- **Paxlovid (nirmatrelvir + ritonavir, Pfizer)**
- Lagevrio (molnupiravir, Merck) – **Alternative**

Monoclonal Antibodies

- Bebtelovimab (Lilly) – **Alternative**

Veklury® (remdesivir, Gilead)

Please see NIH Current Inpatient Therapies (https://www.covid19treatmentguidelines.nih.gov/therapies/)

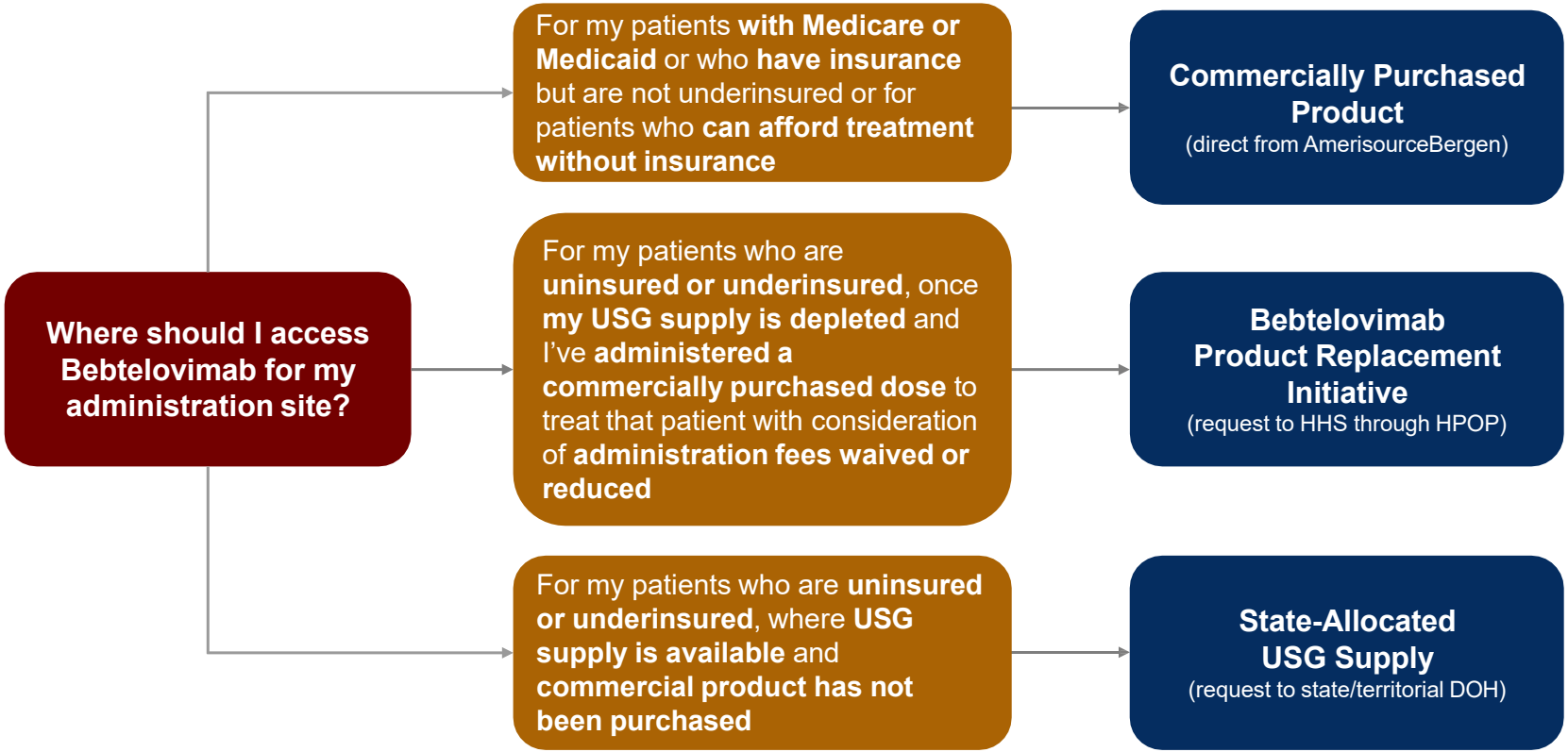
- There is currently **ample supply** of all therapeutics – every eligible patient should have access to these medications

Therapeutic Management of Nonhospitalized Adults With COVID-19
Therapeutic Management of Hospitalized Adults With COVID-19

Bebtelovimab Transition to Commercial Market: bebtelovimab product replacement initiative now available

- How it works: A provider who has commercial supply and treats an under or uninsured patient with a purchased dose can request a replacement dose, at no charge, from USG
- Provider site should:
  - Have **used all their USG supply** acquired through the HHS distribution program
  - Have **purchased commercial bebtelovimab** and **attest** to using a purchased dose for an under or uninsured patient
  - **Charge a reasonable administration fee** for bebtelovimab for that patient
    - Consideration to waive or reduce fee to be reasonable for the patient being treated
- Process: Requests made in the Health Partner Ordering Portal (HPOP)
  - Provider attests to verifying the patient who received treatment was uninsured (has no insurance coverage/can't afford treatment) or underinsured (can use guidelines for other federal or local programs)
- How to access: Providers already registered in HPOP have immediate access; others should contact their state or territorial health department to access HPOP
  - Replacement dose must replace a commercially purchased dose
  - Replacement dose shipped to provider is commercially labelled supply and can be used for any patient; payment is allowable for the replacement dose received

Bebtelovimab Supply Options



Related Resources

Helpful Information and Resources

- HHS Therapeutics Homepage
- Product Expiration Date Extensions
- Test to Treat Initiative webpage and Fact Sheet
- Test to Treat Site Locator and Digital Tool Kit
- General Therapeutics Locator
- HHS Clinical Implementation Guide
- Outpatient Therapeutics Decision Aid
- Side-by-Side Overview of Outpatient Therapeutics
- ASPR Regional Emergency Coordinators
- CMS reimbursement information for mAbs
- CMS reimbursement information for oral antivirals

Latest COVID-19 Therapeutics Updates Found at aspr.hhs.gov

MONKEYPOX

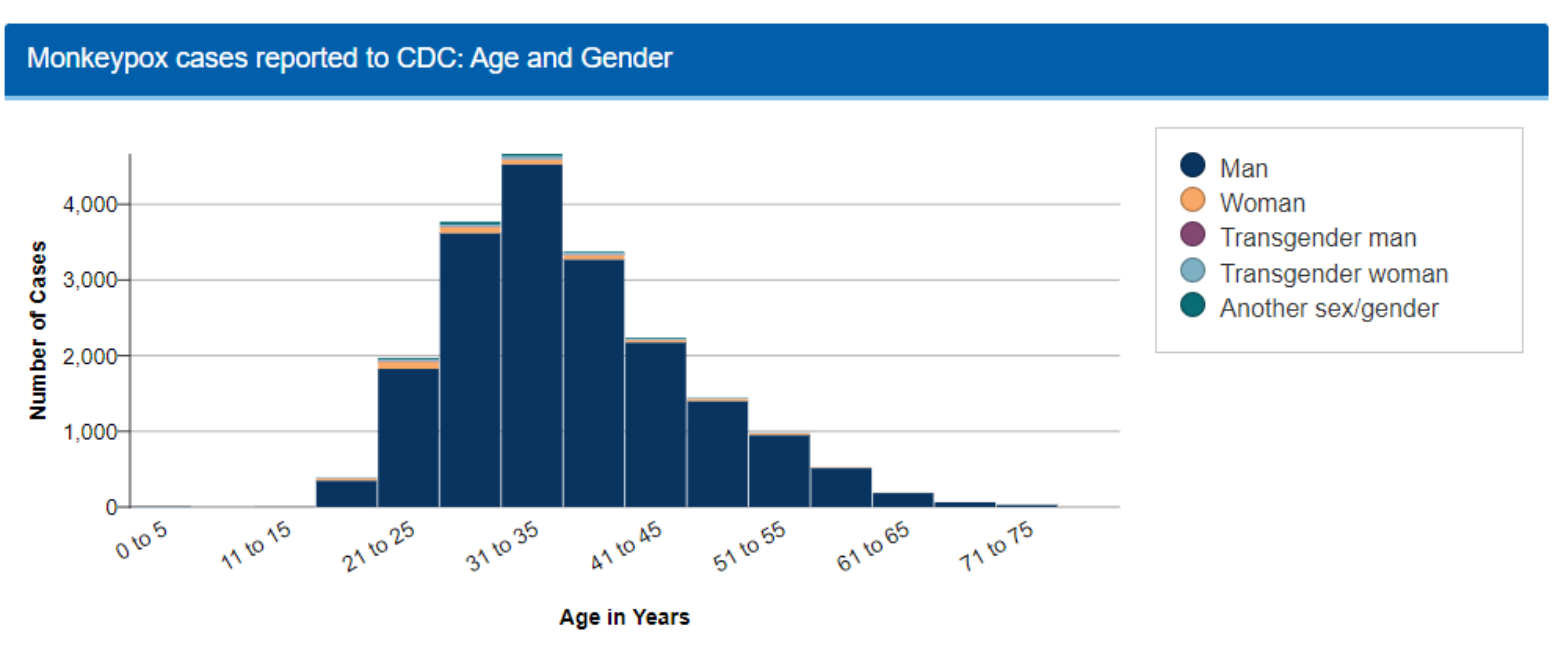
Update: Severe manifestations of monkeypox—United States

CDC/IDSA Clinician Call
Saturday, Sept 24th, 2022

Agam Rao, MD
CAPT, U.S. Public Health Service
Monkeypox Subject Matter Expert, CDC

Age and Gender (9/21/22)

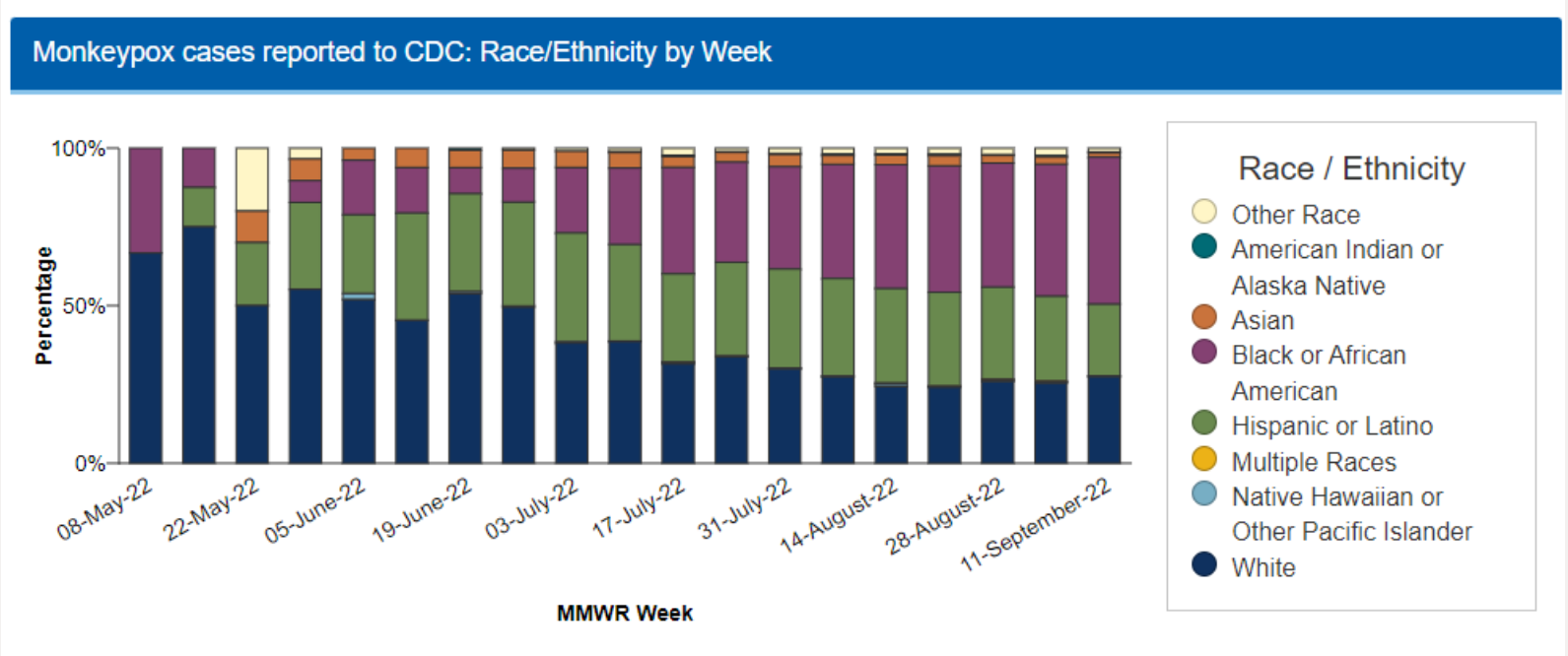
https://www.cdc.gov/poxvirus/monkeypox/response/2022/demographics.html



Up to 94% of patients report recent male-to-male sexual contact in the last 3 weeks*

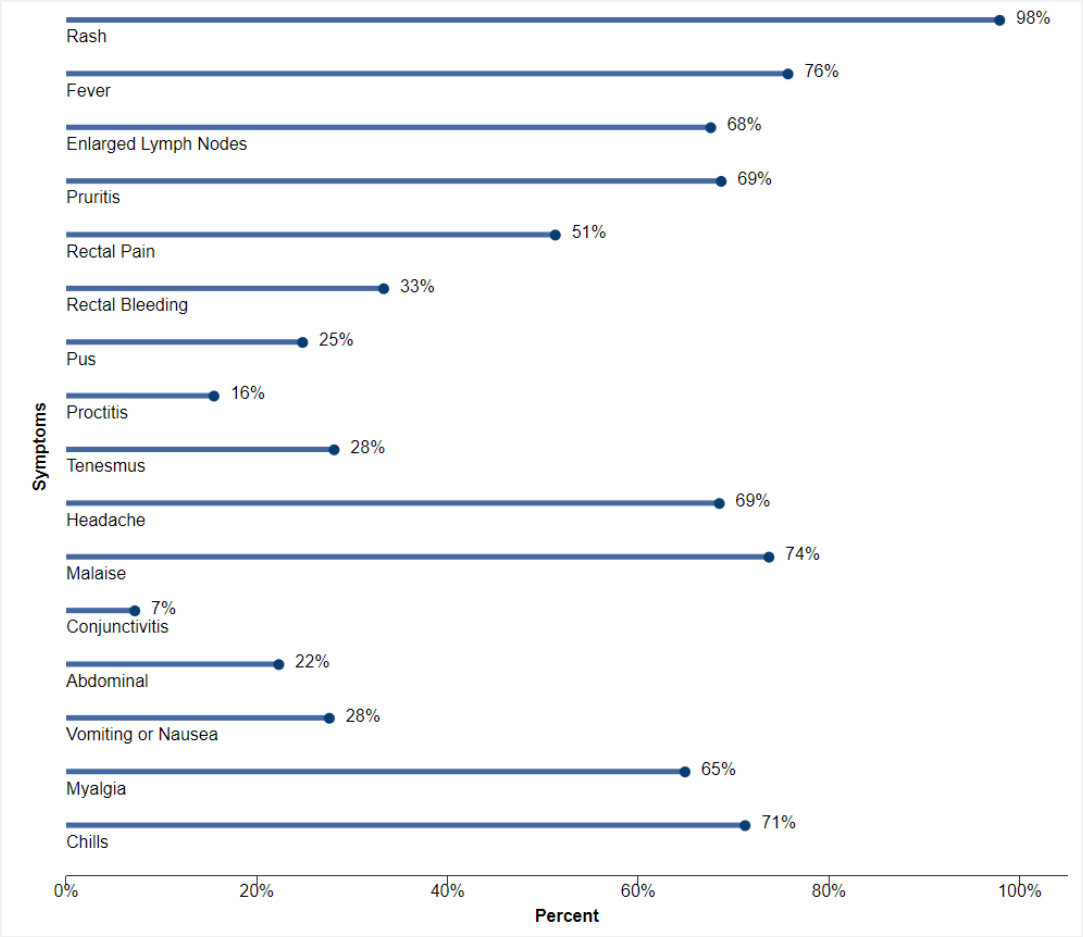
(*Epidemiologic and Clinical Characteristics of Monkeypox Cases — United States, May 17–July 22, 2022 | MMWR (cdc.gov))

Race/Ethnicity (9/21/22)



https://www.cdc.gov/poxvirus/monkeypox/response/2022/demographics.html

Signs and symptoms (9/21/22)



Most common:

- Rash (98%)
- Fever (76%)
- Malaise (74%)
- Chills (71%)
- Enlarged lymph nodes (68%)
- Myalgia (65%)

Other:

- Rectal Pain (51%)
- Tenesmus (28%)
- Proctitis (15%)

https://www.cdc.gov/poxvirus/monkeypox/response/2022/demographics.html

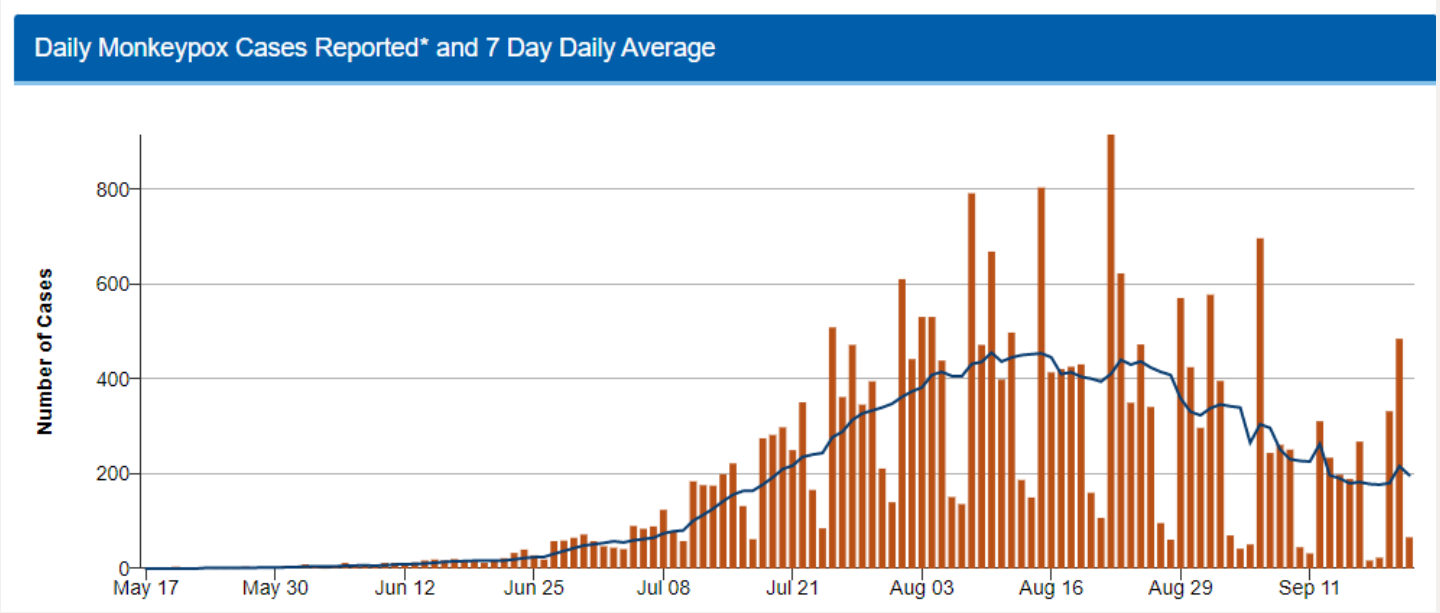
Management of most patients

- Most immunocompetent patients recover with pain management* and other supportive care
- Tecoviromat should be considered for some conditions†
  - Severe disease: hemorrhagic disease, large number of lesions, sepsis, encephalitis, ocular or periorbital infections, other conditions requiring hospitalization
  - Lesions involving anatomic areas that could cause severe infection (e.g., pharynx, penile foreskin, vulva, vagina, urethra, anus)
  - Lesions in persons who are at high risk for severe disease
    - Immunocompromise
    - Pediatric populations
    - Pregnant or breastfeeding
    - Condition affecting skin integrity

*https://www.cdc.gov/poxvirus/monkeypox/clinicians/pain-management.html

†https://www.cdc.gov/poxvirus/monkeypox/clinicians/treatment.html

Cases decreasing—United States, September 21, 2022



Severe infections

- Demographics of affected patients
  - 100% male
  - Ages 21–58 years (median= 32 years)
  - Majority Hispanic or non-Hispanic Black
  - Most immunocompromised due to advanced HIV
  - 2 patients receiving chemotherapy for cancer

- Progressive illness
  - >100 lesions; new lesions despite treatment
  - Coalesced lesions and necrosis
  - Significant lymphadenopathy
  - Hemodynamic instability
  - Sepsis and secondary infections

CDC Clinical Consultations

- Available 24/7 through health departments
- Can facilitate
  - Treatment with stockpiled VIGIV and in the future, brincidofovir
  - Determination of antibody response (i.e., serology)
  - Evaluation of certain biopsy and autopsy specimens for orthopoxviruses
  - Genome sequencing, including to evaluate for tecoviromat resistance
  - Case specific advice based on accumulated clinical knowledge

- Learn together about clinical manifestations so that national guidance about use of stockpiled therapeutics and other countermeasures can be made accordingly

- >175 case specific consultations

Spectrum of questions

- Interpretation of unexpected OPX+ test result
- Use of tecoviromat in patients with renal insufficiency
- Suspicion for recurrent monkeypox
- Myocarditis
- Ocular infections
- Encephalitis
- Severe illness in severely immunocompromised persons

Next steps, CDC

- Continue to answer clinical inquiries and provide clinical consultations, therapeutics, and laboratory testing
- Gather information about patient outcomes, including severely ill patients with monkeypox
- Develop interim guidance about use of stockpiled therapeutics (informed by input from clinical experts)
- Promote assistance provided by CDC for management of severe cases
- Increase clinician awareness of severe cases

Acknowledgments

- Clinicians caring for patients with monkeypox
- Health departments investigating cases
- CDC Multinational Monkeypox Outbreak Response
  - Clinical Consultations Team
  - Clinical Guidance Team
  - Vaccine Implementation Team
  - Worker Safety Team
  - Infection Prevention and Control Team
  - Special Case Investigations Team

For more information, contact CDC

1-800-CDC-INFO (232-4636)
TTY: 1-888-232-6348 www.cdc.gov

Or visit the 2022 U.S. Monkeypox Outbreak Response website:

https://www.cdc.gov/poxvirus/monkeypox/response/2022/index.html

Severe Monkeypox in a Patient with Newly Diagnosed HIV

Robert L. Atmar, M.D.

Andrew DiNardo, M.D.

Baylor College of Medicine

Clinical Case - History

- **26 yo man (MSM) presented to outside hospital 12 days PTA with rash on flank and back pain**
  - **Smoked hookah with female friend diagnosed with monkeypox**
  - **Flank lesions swabbed**
  - **Prescribed Medrol dose-pack for back pain**
  - **Notified a few days later of orthopox PCR (+) test →isolate at home**
- **Day of admission (evening) complained of progressive symptoms**
  - **Rash involved all of body with black central eschar in some ulcerated lesion**
  - **Increased dyspnea on exertion, dry cough, post-tussive emesis**
  - **Continued back pain; painful neck swelling**
  - **Last sexual partner – 3 months earlier**

Clinical Case – Physical Examination

- **VS: T 102.8 F, P 128, BP 134/78, RR 20**
- **Diffuse rash involving face, trunk, extremities; central ulceration/eschar; some necrotic/gangrenous (dry)**
- **HEENT – facial lesion; oral ulcerations, no eye involvement**
- **Neck – large tender mass with overlying induration in left neck**
- **Lungs – Clear**
- **Cor – Tachycardic**
- **Abd – no HSmegaly**
- **Ext – no edema, clubbing**
- **Neuro – Alert, fully oriented, no focal sensory/motor findings**

Clinical Case – Laboratory (initial)

- **Na: 126 mM**
- **BUN/creat: 30.9/1.4 mg/dL**
- **AST/ALT: 40/19 U/L**
- **Tot. bili: 1.2 mg/dL**
- **H/H: 12.7/36.2 (MCV 78)**
- **WBC: 30.1 (92% PMNs)**
- **Platelets: 140K**
- **PT/INR: 16.3/1.3**

- **U/A: 1+ protein, 1+ ketones, 1+ bilirubin; 0 WBCs, 2 RBC/HPF**
- **HIV Ag/Ab combo – POSITIVE**
  - **Viral load – 878K**
  - **CD4: 79**
  - **CD4%: 3%**
- **Syphilis screen: negative**
- **Ferritin: 5417 ng/mL**
- **Troponin I: <0.03**
- **Blood cultures: 1/4 bottles corynebacteria**

Clinical Case – Initial Radiology

- **Admit CXR – no acute abnormality**

- **CT neck – 6.9 x 7.7 x 9.8 cm dense heterogeneous mass in left neck; multiple deep cervical nodes**

Clinical Case – Hospital Course

- **HD#2, next morning – consented to TPOXX**
- **Flexible nasolaryngoscopy – thrush**
- **HD#2, afternoon – increasing somnolence; evaluation by MICU; fully oriented and protecting airway**
  - **Non-contrast CT head: no mass lesion**
- **HD#2, evening/night: progressive confusion/stupor – transfer to MICU with elective intubation for airway protection**
- **HD#3, early morning: 1st dose IV TPOXX administered**
- **HD#3, morning: septic shock requiring pressor support, increasing creatinine (1.7); good ventilation/oxygenation**
- **HD#3, morning: generalized tonic-clonic seizure**

Clinical Case – Hospital Course

- **Problems: Septic shock with organ failure; encephalopathy/encephalitis?**
- **Diff dx: monkeypox vs. AIDS-associated OI vs. both**
- **Empiric treatment for bacterial and OIs; diagnostic studies unrevealing for OI**
- **Consult CDC for consideration of VIGIV**
- **Progressive hypotension increasing pressor requirement**
- **HD#4 – received VIGIV**
- **HD#5 – dilated, unresponsive pupils, no gag**
- **HD#6 – Brain scan without cerebral perfusion**

Case Summary

- **Rapidly progressive illness when presented in patient with previously undiagnosed HIV infection/AIDS**
- **Autopsy pending**
- **Opportunities during management**
  - **Check for evidence of HIV infection in risk groups**
  - **Avoid high dose steroids in treatment of symptoms**
  - **Counsel patient to seek care with progressive symptoms**

MPOX associated encephalomyelitis

Matthew J. Copeland, DO

Assistant Professor of Medicine, Georgetown University Medical Center

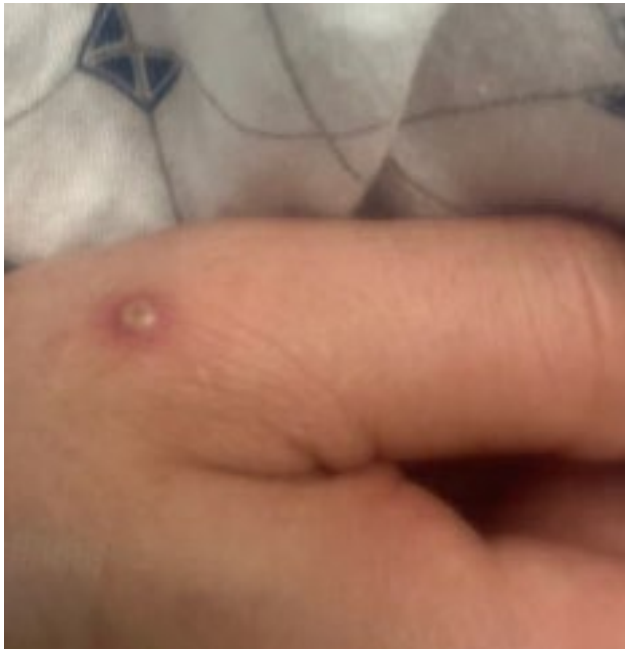
Attending Physician, Division of Infectious Diseases, Medstar Georgetown University Hospital

History of Illness

34-year-old generally healthy man

Day of Illness (DoI) 2: Seen at local emergency room with 2 days of diffuse pustular rash (hands, arms, legs, torso), low grade fever, and myalgias. Discharged home to quarantine while awaiting Orthopox PCR testing. PCR swab for Orthopox returns positive (later confirmed MPOX).

- ~DoI 4: Starts to notice LE weakness, balance trouble, and difficulty with urination
- DoI 5: Presents to local ER, found to have LE flaccid paralysis, decreased rectal tone, and urinary hesitancy
- DoI 6: Develops obtundation requiring intubation and is transferred to our hospital



Denies: Respiratory symptoms, dysuria, rectal pain, ocular complaints, hearing changes, diarrhea, vomiting, dysphagia/odynophagia, facial weakness

Medical History

Past Medical History:

1) Early latent syphilis ~6 months prior to illness (treated with single dose IM Penicillin 2.4mil units)
2) Chlamydial proctitis ~6 months prior to illness (treated with doxycycline x 7 days)

Surgical history: tooth extraction in his 20's; No prior spinal surgery or injections

Social history:

- Identifies as a gay man, in monogamous relationship with male partner
- Travel to NYC ~1 week prior to onset of rash and Texas ~2 weeks prior to onset of rash; no known MPOX contacts
- No recent vaccinations; previously vaccinated against polio and COVID-19 (3 doses mRNA)
- No prior smallpox vaccination
- No GI illness prior to onset
- No significant animal contact, including bites/scratches

Family history: No known history of neurologic disease or familial disorders

Laboratory studies (serum)

CMP: Cr 0.94, AST 29, ALT 58, Tbili 0.7, protein 8.1, globulin 3.4
CBC: WBC 11.3 (ANC 8K, ALC 2.5K, Mono 700), H/H 14.7/44.2, PLT 327 K
CRP 6 (normal 0-3)
ESR 26
CPK: 238
HIV 4th generation screen and RNA PCR: negative
RPR negative
GC/CT NAAT from urine, pharynx, rectum negative
WNV IgM negative
Lyme IgG negative
ANA negative
C-ANCA 1:20
Anti SM 1:80 and Anti Actin IgG 34
MOG IgG <1:10
AQP 4 Receptor Ab <1.5
ACE level: 24 (normal)
Vitamin B12: 950 (high)

Laboratory studies (CSF)

RBC: 4
WBC: 30 (89% Lymph, 11 % Mono)
Glucose 65
Protein 60
Meningoencephalitis panel negative
HSV/VZV PCR negative
Bacterial culture negative
Fungal/AFB stains negative
VDRL negative
Cryptococcal antigen negative
WNV IgM negative
Lyme IgG negative
Enterovirus PCR negative
Orthopox PCR negative (University of Washington)

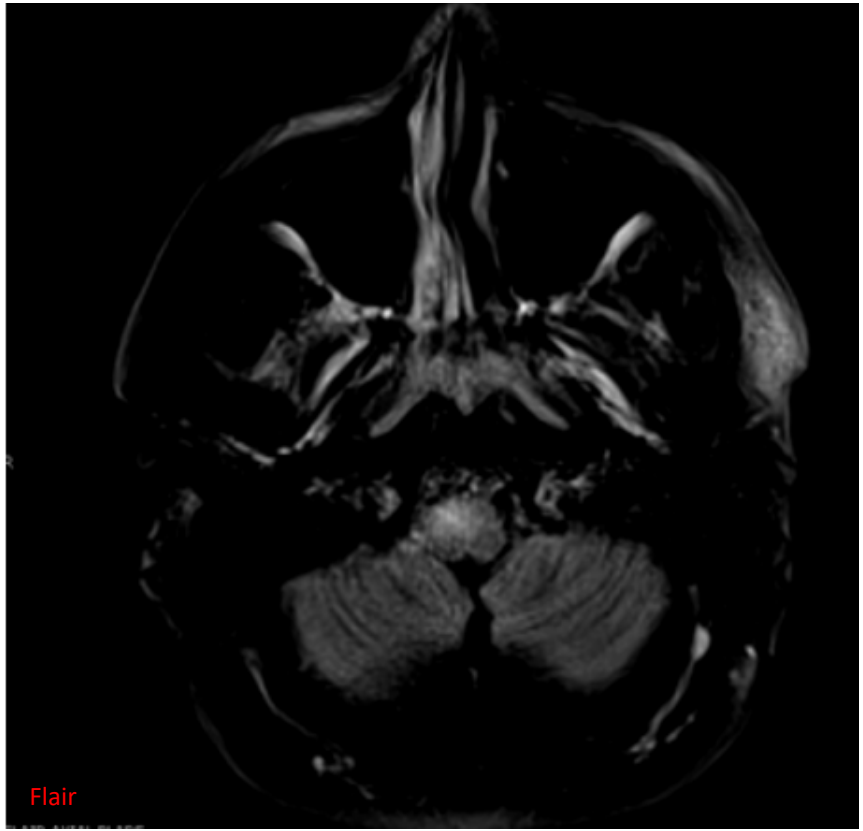
Oligoclonal Bands: 3 (abnormal)
ACE level: normal
Aqp 4 Rec Ab negative
MOG Ab negative
NMDA IgG negative
Autoimmune/paraneoplastic panel negative

Imaging

CT Abd/Pelvis: Rectal wall thickening c/w proctitis, enlarged pelvic lymph nodes

CT Chest: segmental and subsegmental PE in R lung vasculature

Imaging



Hospital Course

DoI 7: Noted some loss of tone in UE, Starts PO Tecovirimat 600mg BID through OG tube, Starts IV methylprednisolone 1000mg

DoI 9: Switched to IV Tecovirimat d/t concerns regarding absorption with tube feeds

DoI 12: Modest improvement in cognition, MRI after 5 days IVMP with unchanged spinal/brainstem disease, IVIG started

DoI 15: High, spiking fevers, IVIG stopped, treated for MSSA VAP

DoI 19: MRI Brain wit progression of diffusion restriction through cerebellum and brainstem

DoI 20: Starts plasma exchange

DoI 22: Extubated

DoI 24: Completes 14-day course of Tecovirimat, lesions crusted

(DoI 25): Normal strength UE and improvement in LE weakness; completes 5-day course PLEX

(DoI 26): Receives rituximab maintenance therapy

(DoI 31): Able to sit-stand twice from bed

(DoI 38): Able to transfer to bedside commode

(DoI 44): Ambulates 15 feet with assistance; lesions healed

(DoI 46): Discharged to acute rehab

(DoI 55): Able to complete most ADLs, ambulates with assistance

Final Presumed Diagnosis

MPOX associated encephalomyelitis

Autoimmune vs. CNS viral invasion

Questions this case presented:

- CNS penetration of Tecovirimat? PO vs. IV?
- Best test to evaluate for CNS involvement of MPOX? (PCR vs. IgM)
- Approach to auto-immune associated encephalomyelitis in the setting of active viral infection?
- Vaccination after immune mediated encephalomyelitis?

THANK YOU!

My ID, Neurology, Radiology, and PCCM colleagues at MGUH

Georgetown University Medical Center

The CDC MPOX Response Task Force

Public Health Perspective: TPOXX Program in Maricopa County, Arizona

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Assistant Medical Director, Office of Epidemiology & Data Services
Saturday, 9/24/2022, CDC/IDSA Clinical Call

TPOXX Consultations 7/7/22 – 8/22/22

- 221 total MPXV cases
- Provided 62 clinical consultations
- 41/221 cases treated = 18.6%
  - 18 (44%) HIV+
  - 2 (5%) peri-orbital, 1 (2%) orbital
- 9/221 cases hospitalized = 4.1%
  - (6 treated, 3 not treated)

Key Points:

- Process put in place for providers to obtain TPOXX
  - Providers could call to reach Med Epi to go over cases
- At the same time, staged TPOXX across Maricopa County at hospitals and clinics
- Early eye evaluation is important

THE UNIVERSITY OF ARIZONA
College of Medicine
Phoenix

29 year old male with HIV/AIDS on cART with recently diagnosed MPX and visual loss

Nelson Nicolasora, MD
Clinical Assistant Professor
Division of Infectious Disease
Banner University Medical Center – Phoenix
University of Arizona

Outpatient Timeline

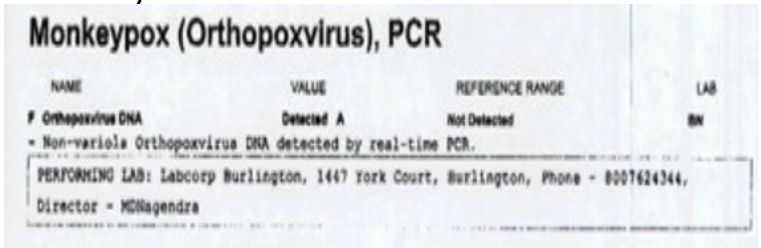
Reported encounter with a partner diagnosed with MPXV.
PCP eval.
Rash in face, trunk, extremities.
MPX PCR negative.

Increasing conjunctival redness and constitutional SSx's.

Rashes - some are scabbed, some fresh.

Doxy, Pred eye gtts to left eye, Ophtho referral

MPXV PCR of arm lesion (result:D 15)



Monkeypox (Orthopoxvirus), PCR

NAME	VALUE	REFERENCE RANGE	LAB
F Orthopoxvirus DNA	Detected A	Not Detected	BN

- Non-variola Orthopoxvirus DNA detected by real-time PCR.

PERFORMING LAB: Labcorp Burlington, 1447 York Court, Burlington, Phone - 8007624344,
Director - MDNagendra

Initiated Rx's : Tecovirimat

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Trifluridine

Increasing left eye pain, irritation, photosensitivity, and blurriness of vision.

Admitted.
Started on Trifluridine, Tecovirimat IV.

Day 0 | Day 10 | Day 17-19 | Day 21

Diagnostics

WBC 5.8 Hgb 13.2 Hct 39.2 platelet 254

Diff. Count.
PMN 74.6%
L 10.7%
M 11.3%

ALC 0.62

CMP normal

Meds:

Azithromycin, 500 mg, Oral, Daily

Biktarvy oral tablet, 1 tab, Oral, Daily

Megestrol 40 mg oral tablet, 200 mg= 5 tab, Oral, Daily

Promethazine 25 mg oral tablet, 25 mg= 1 tab, Oral, PRN

Docusate sodium-S 50 mg-8.6 mg oral tablet, 1 tab, Oral, BID

PMH:

5/2021 : Diagnosed and treated for :

HIV/AIDS - CD4 15 VL 132K, Rx Biktarvy

PJP – Rx Bactrim, changed to Atovaquone for fever, did not comply with Pentamidine

Giardiasis – Rx Metronidazole

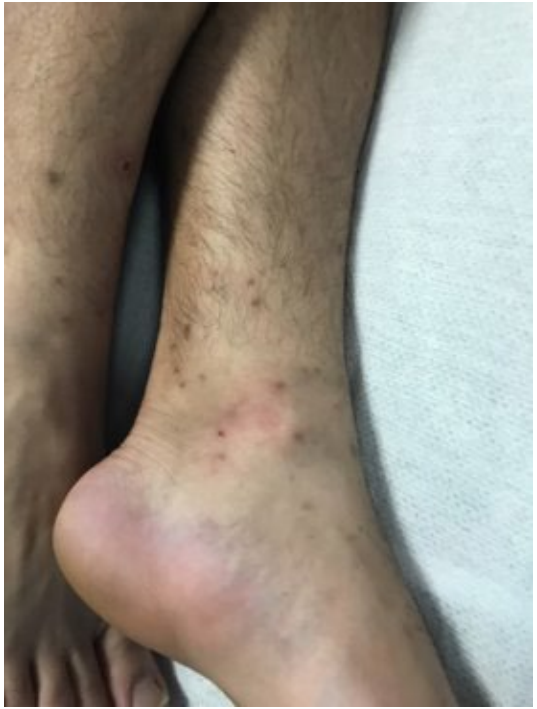
1/27/2022 CD4 19 VL 4270

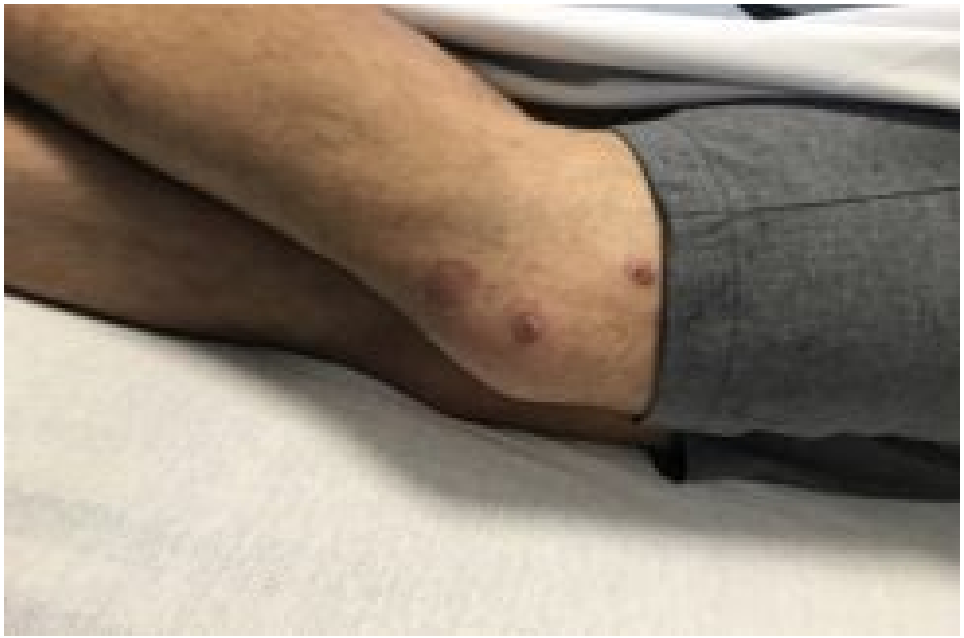
History of OA, degenerative disc disease, anxiety disorder, depression, and ADHD

- Felt cold
- No chills or fever
- No nausea or vomiting
- Moderate global headache
- No neck stiffness
- No chest pain or dyspnea
- No GI/GU symptoms

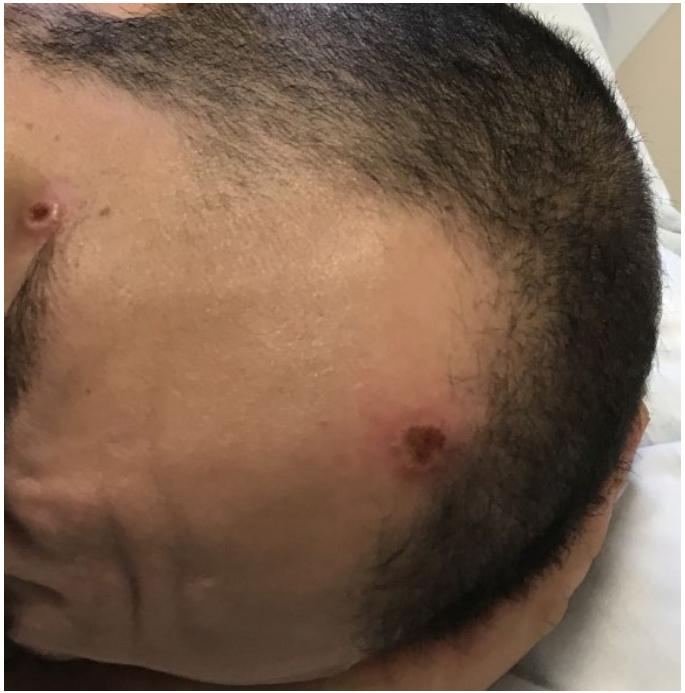
- Excessive tearing
- Visual loss, left eye
- Significant eye pain
- Significant photophobia, limits evaluation
- Bed-ridden
- Mild pre-auricular LAD

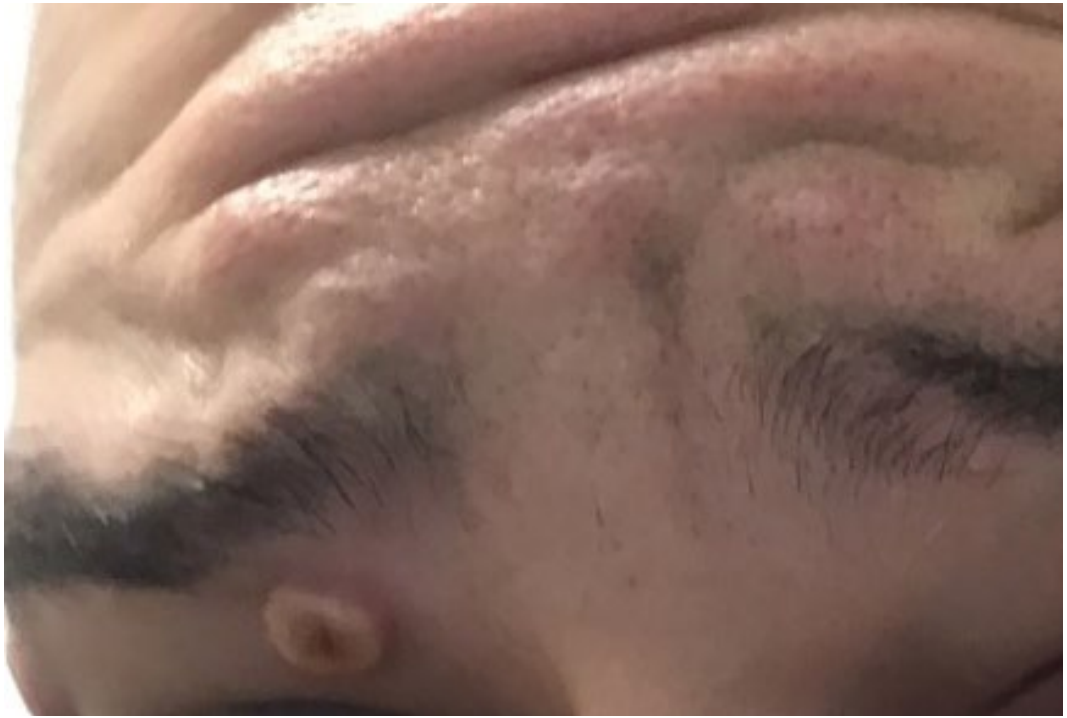
DAY 21 – DATE OF ADMISSION

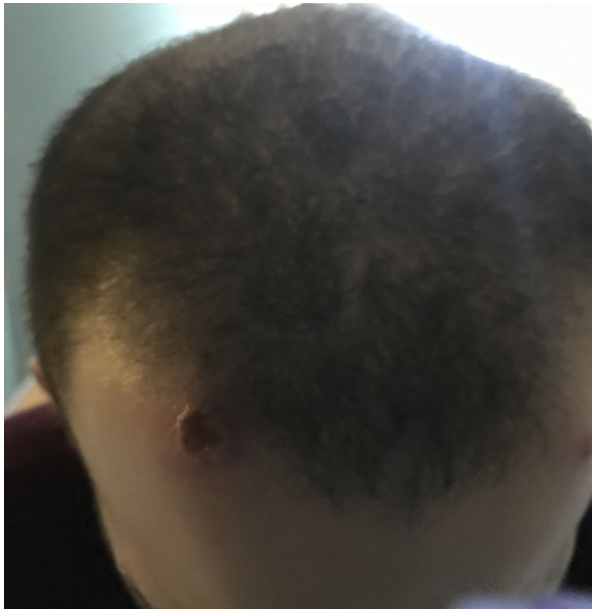




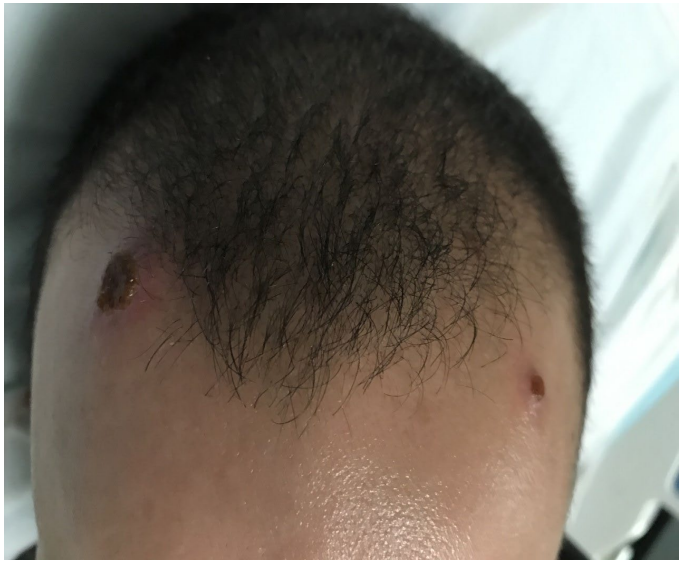
Facial and periorbital lesions of MPXV







Day 21 – D1 in Hospital



Day 23– D3 in Hospital

Ophthalmological Examination:

	OD	OS
Visual Acuity:		
sc:	**20/20**	**20/40**
cc:		
Pupils:	Eq & Reactive	Eq & Reactive
EOM's:	Full	Full
Adnexae:	Normal	2 vesicles on forehead
Eyelids:	Normal	Normal
Conjunctiva:	Normal	3+ injected, mostly inferiorly
Cornea:	Normal	superficial 4 mm X 2 mm corneal ulcer 6 o'clock limbus with surrounding conj injection
Ant Chamber:	Deep & Clear	Deep & Clear
Lens:	Clear	Clear
Iris:	Normal	Normal
Fundus:	Normal	Not clearly visible
Vitreous:	Normal	Not clearly visible
Optic Nerves:	Normal	Not clearly visible
IOP:	NTP	NTP

Ophthalmology Management

Ofloxacin (Ocuflox) ophth drops Q-4-h

Trifluridine ophth drops q-2-h Left Eye.
Discussed with Katalina in pharmacy; non-formulary, not available in hospital. I discussed that these drops are generally available in outpatient pharmacies; she will urgently research and get the drops in house to start OS q-2-h

Erythromycin ophth q-6-h
Need to avoid topical steroids

Inpatient Timeline

Increased left eye irritation and pain, photosensitivity, and blurriness of vision.
Right eye 20/20
Left eye 20/40

Admitted.
Started on Trifluridine gtts:
Left eye q 2 H
Right eye q 8 H

Tecovirimat IV

Started on Gancyclovir IV

Ulcer at 6 o'clock limbus has shrunken - down to ~ 1 mm X 2 mm and superficial.
Visual acuity unchanged.

No involvement of right eye.
Remainder of ophthalmological exam unremarkable.

Decrease Trifluridine to q4H L eye, continue R eye TID x 1 week after discharge.

CMV IgG negative – GCV Dc'd

Skin lesions starting to involute.

Improved eye pain and photophobia

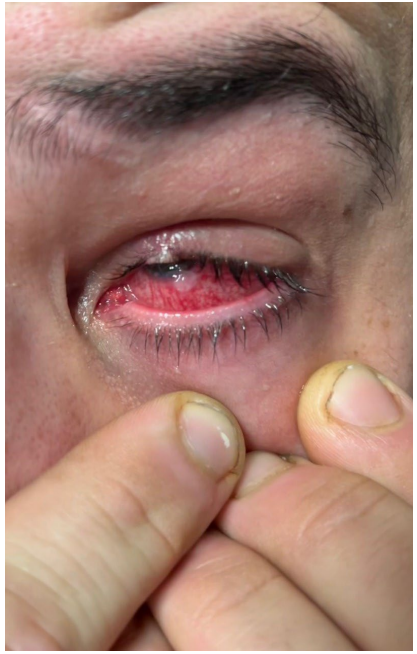
Improving constitutional symptoms.

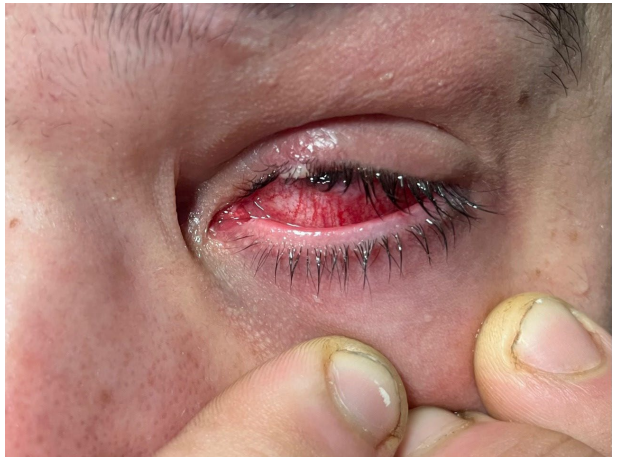
Discharged on:
Trifluridine eye gtts;
Erythromycin ointment;
Tecovirimat po x 14 days.

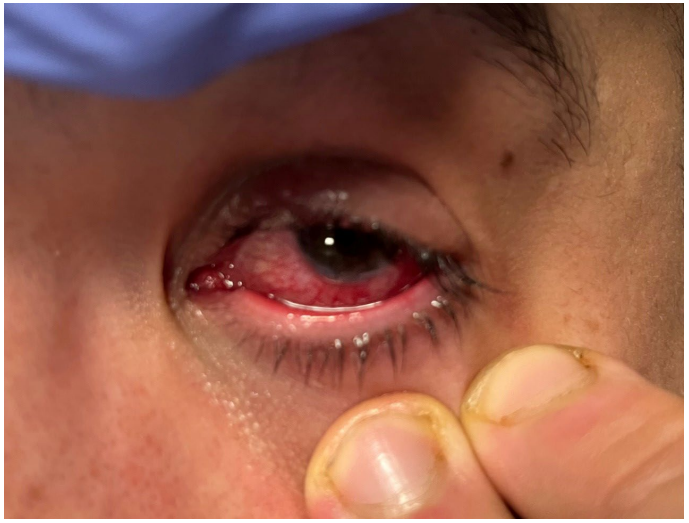
Biktarvy
Atovaquone PCP PPx;
FF-up.

Day 21 | Day 22 | Day 23 | Day 25-26

Severe conjunctivitis with corneal ulceration (4-6'oclock limbus), Hospital Day 2







Diagnostics

HIV VL 8190 copies per mL CD4 25 (2.7%), outpatient resistance testing sent
CRAG – negative
Syphilis screen - negative
Toxo IgG – negative
Coccidioides screen - negative
CMV PCR undetectable/ CMV IgG negative
Urine GC/chlamydia - negative
Hep B surface Ab - >1000, immune
Hep B surface Ag -NR
Hep C Ab - NR

Lessons Learned

Thornhill, et. Al. (NEJM 2022)

528 cases, 41% with HIV & 95% with HIV VL < 50 copies per mL.

3/217 nasal and eye (1% of all mucosal **lesions**)

20% incidence of conjunctivitis (Jezek JID 1987; Ogoina CID 2020; Farahat Ann Clin Micro 2022; Hughes IJID 2014).

3.6-7.5% keratitis (Ogoina CID 2020; Jezek WHO Bulletin 1988)

"Conjunctivitis" - tend to have more constitutional SSx (Hughes IJID 2014)

Mazzota et. al. (Journal of Infection 8/2022) - PCR + from conjunctival swab with replication-competent virus (grew in culture)

Lessons Learned

- False negative test, delay in results.
- Should one empirically treat while waiting for the test? Consider the host and the severity of illness? Consider the delay in getting the medication.
- A complete eye exam is necessary. Severe photophobia, eye pain and excessive tearing can potentially give a lower read on VA exam.
- Early ophthalmological evaluation is important.
- Maintain DDx.
- Hand hygiene to prevent autoinoculation.
- Care coordination and is key.

Q&A/
Discussion

Selected Resources

Update on COVID-19 Epidemiology: Pragna Patel

Ou, J., Lan, W., Wu, X. *et al.* Tracking SARS-CoV-2 Omicron diverse spike gene mutations identifies multiple inter-variant recombination events. *Sig Transduct Target Ther* **7**, 138 (2022). https://doi.org/10.1038/s41392-022-00992-2

Pre-Delta period, March 1, 2020–June 26, 2021; Delta period, June 27–December 18, 2021; Omicron period December 19, 2021–February 28, 2022. ** p-value <0.05. Singson et al. MMWR 2022 71 (27) https://www.cdc.gov/mmwr/volumes/71/wr/pdfs/mm7127a3-H.pdf

https://covid.cdc.gov/covid-data-tracker/#demographicsovertime

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

COVID-19 Therapeutics Update: Meghan Pennini

https://www.gilead.com/news-and-press/company-statements/veklury-remdesivir- demonstrates-continued-in-vitro-antiviral-activity-against-omicron-subvariants

https://www.nejm.org/doi/full/10.1056/NEJMc2207519

Live virus data; https://www.nejm.org/doi/full/10.1056/NEJMc2207519

https://www.biorxiv.org/content/10.1101/2022.09.16.508299v1.full.pdf

Wang *et al*, bioRxiv 2022.09.05.506628; https://doi.org/10.1101/2022.09.05.506628

https://www.covid19treatmentguidelines.nih.gov/management/clinical-management/nonhospitalized-adults--therapeutic-management/

https://www.covid19treatmentguidelines.nih.gov/management/clinical-management/hospitalized-adults--therapeutic-management/

Update: Severe Manifestations of Monkeypox: Agam Rao

https://www.cdc.gov/mmwr/volumes/71/wr/mm7132e3.htm?s_cid=mm7132e3_w

https://www.cdc.gov/poxvirus/monkeypox/response/2022/demographics.html

https://www.cdc.gov/poxvirus/monkeypox/response/2022/demographics.html

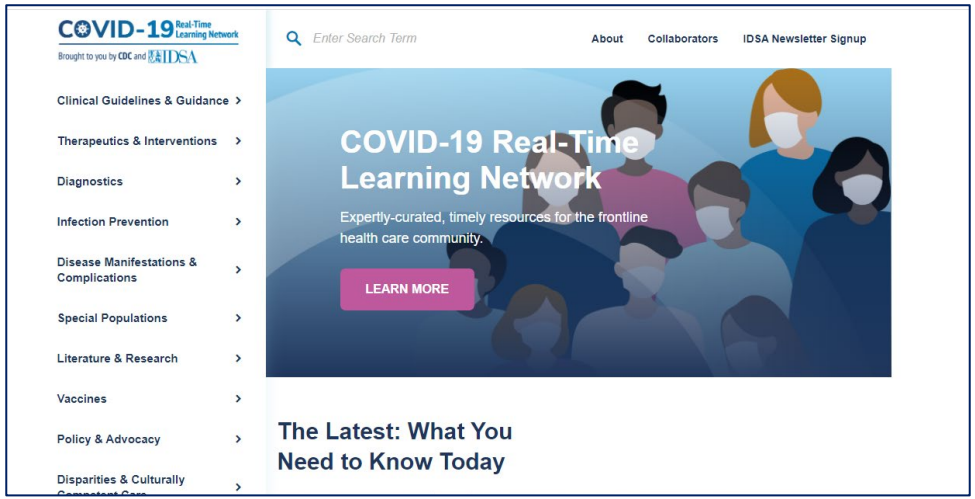
https://www.cdc.gov/poxvirus/monkeypox/clinicians/pain-management.html

https://www.cdc.gov/poxvirus/monkeypox/clinicians/treatment.html

COVID-19 Real-Time Learning Network

Brought to you by CDC and IDSA

An online community bringing together information and opportunities for discussion on latest research, guidelines, tools and resources from a variety of medical subspecialties around the world.



Specialty Society Collaborators

American Academy of Family Physicians
American Academy of Pediatrics
American College of Emergency Physicians
American College of Obstetricians & Gynecologists
American College of Physicians
American Geriatrics Society
American Thoracic Society
Pediatric Infectious Diseases Society
Society for Critical Care Medicine
Society for Healthcare Epidemiology of America
Society of Hospital Medicine
Society of Infectious Diseases Pharmacists

www.COVID19LearningNetwork.org
@RealTimeCOVID19
#RealTimeCOVID19

CDC-IDSA Partnership: Clinical Management Call Support

FOR WHOM?

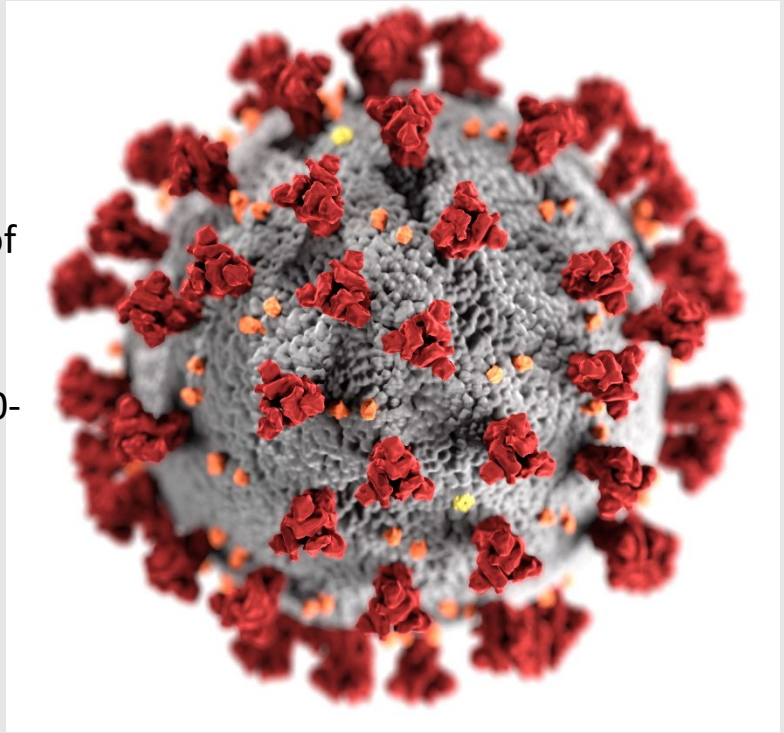
- Clinicians who have questions about the clinical management of COVID-19

WHAT?

- Calls from clinicians will be triaged by CDC to a group of IDSA volunteer clinicians for peer-to-peer support

HOW?

- Clinicians may call the main CDC information line at 800-CDC-INFO (800-232-4636)
- To submit your question in writing, go to www.cdc.gov/cdc-info and click on Contact Form



IDSA
Infectious Diseases Society of America

cdc.gov/coronavirus

THANK YOU

We want to hear from you!

Please complete the post-call survey.

A recording of this call, slides and the answered Q&A will be posted at
www.idsociety.org/cliniciancalls

-- library of all past calls available --

Contact Us:

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