# CDC/IDSA COVID-19 Clinician Call

January 8, 2022

## Welcome & Introductions

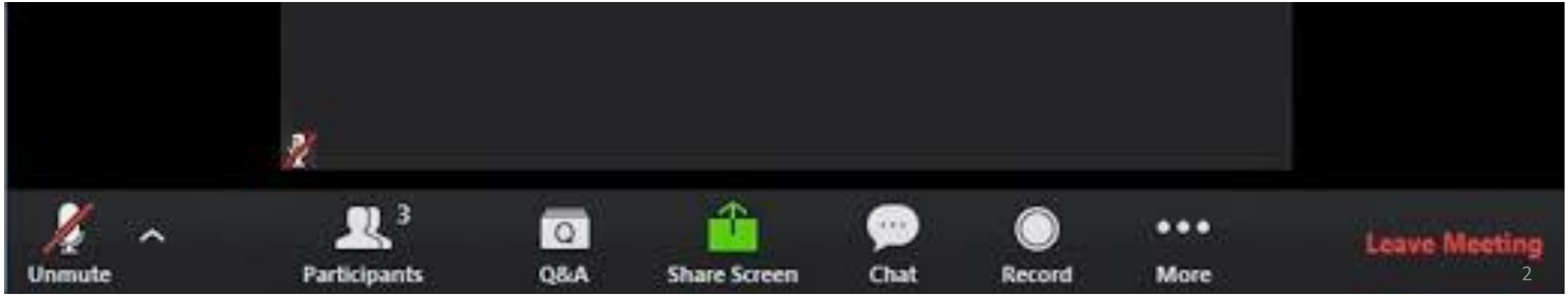
Dana Wollins, DrPH, MGC
Vice President, Clinical Affairs & Guidelines IDSA

- 82nd in a series of bi-weekly calls, initiated by CDC as a forum for information sharing among frontline clinicians caring for patients with COVID-19. This call is not intended for the media.
- 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.

COVID-19 Real-Time Learning Network
Brought to you by CDC and IDSA

Question?
Use the “Q&A” Button

Comment?
Use the “Chat” Button



# COVID-19 Treatment Updates Plus the Latest on Omicron

## *Update on the Omicron Variant*

**CAPT Lauri Hicks, DO**
Chief Medical Officer, CDC COVID-19 Response
US Centers for Disease Control and Prevention

## *Recent FDA Updates & Authorizations*

**John Farley, MD, MPH**
Director of the Office of Infectious Diseases
Office of New Drugs
U.S. Food and Drug Administration

## *Allocation & Distribution of COVID-19 Therapeutics*

**Colin W. Shepard, MD**
Medical Officer
U.S. Department Of Health and Human Services
CDC Liaison to the Office of the Assistant Secretary for Preparedness and Response
U.S. Centers for Disease Control and Prevention

## *Clinical Considerations*

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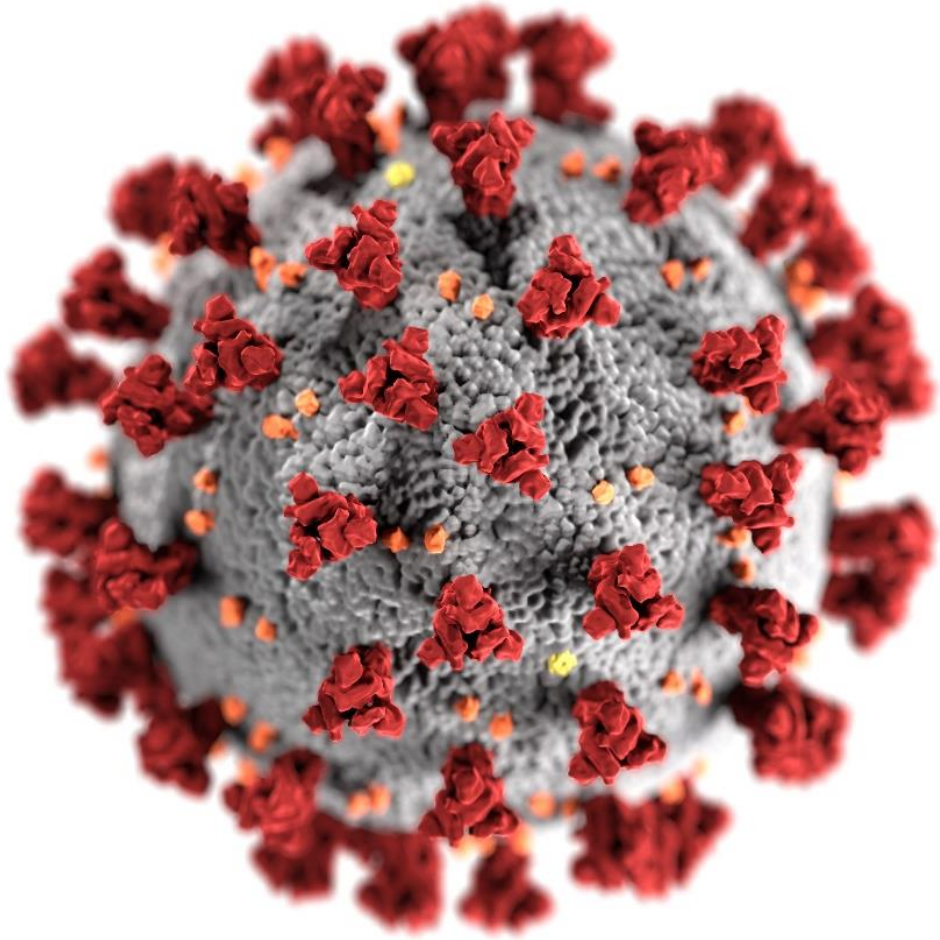
Integrated Ethics Program Officer
VA Northeast Ohio Healthcare
System

# *Update on the Omicron Variant*

**CAPT Lauri Hicks, DO**

# Update on the Omicron Variant



**CAPT Lauri Hicks, DO**
Chief Medical Officer
CDC COVID-19 Response
January 8, 2022

**cdc.gov/coronavirus**

# What are the key questions we're trying to answer?

- How **transmissible** is Omicron?
- How **severe** is Omicron compared to other variants?
- How well do vaccines and prior infection **protect** against infection, transmission, clinical disease, and death due to Omicron?

https://www.who.int/publications/m/item/enhancing-readiness-for-omicron-(b.1.1.529)-technical-brief-and-priority-actions-for-member-states

# Transmissibility

# COVID-19 cases rapidly increased since the first U.S. Omicron case was reported on December 1, 2021.

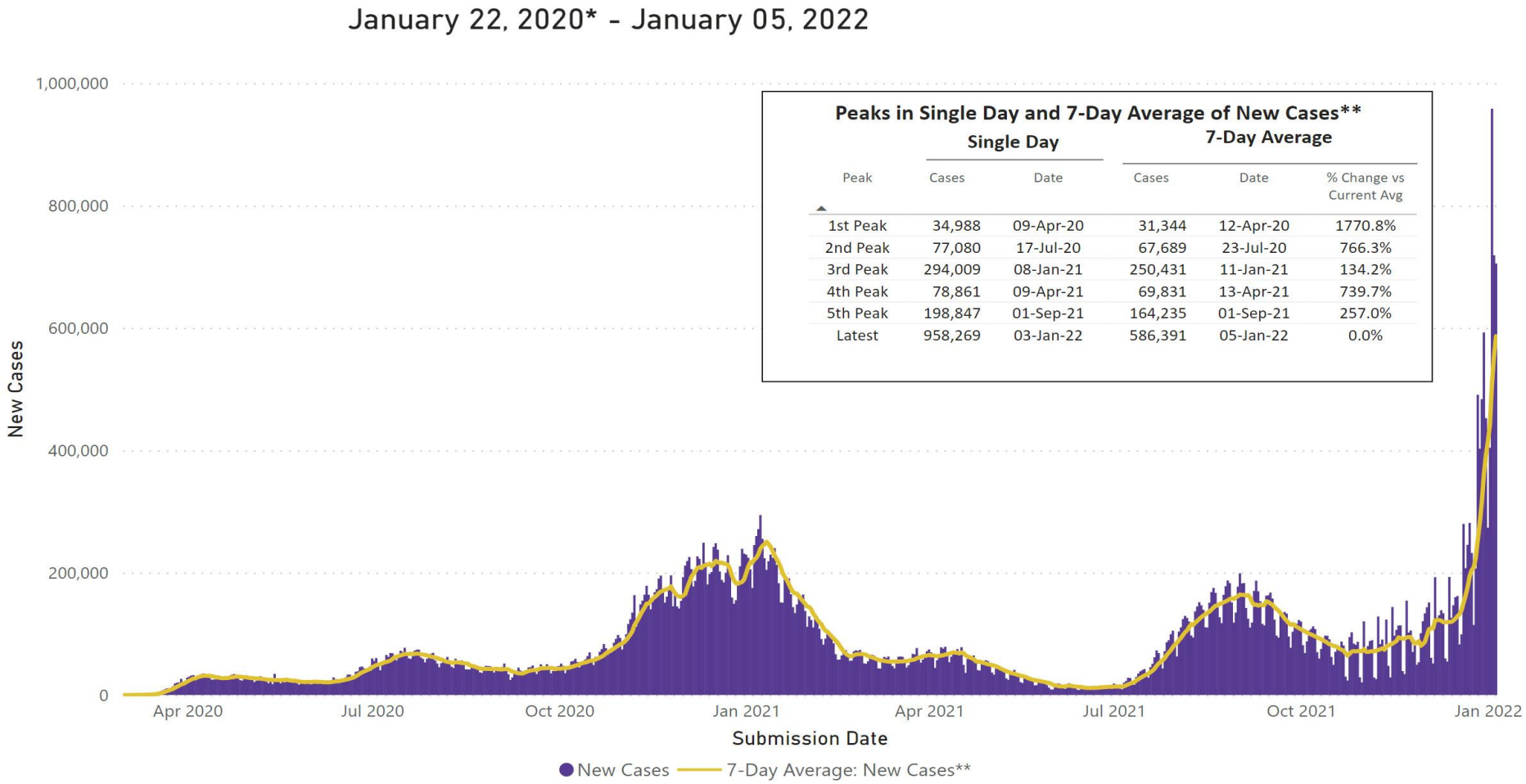
**57,898,239**
Total Cases Reported

**705,264**
New Cases Reported**

**586,391**
Current 7-Day Average**
Dec 30, 2021 - Jan 05, 2022

**315,851**
Prior 7-Day Average**
Dec 23, 2021 - Dec 29, 2021

**85.7%**
Change in 7-Day Average



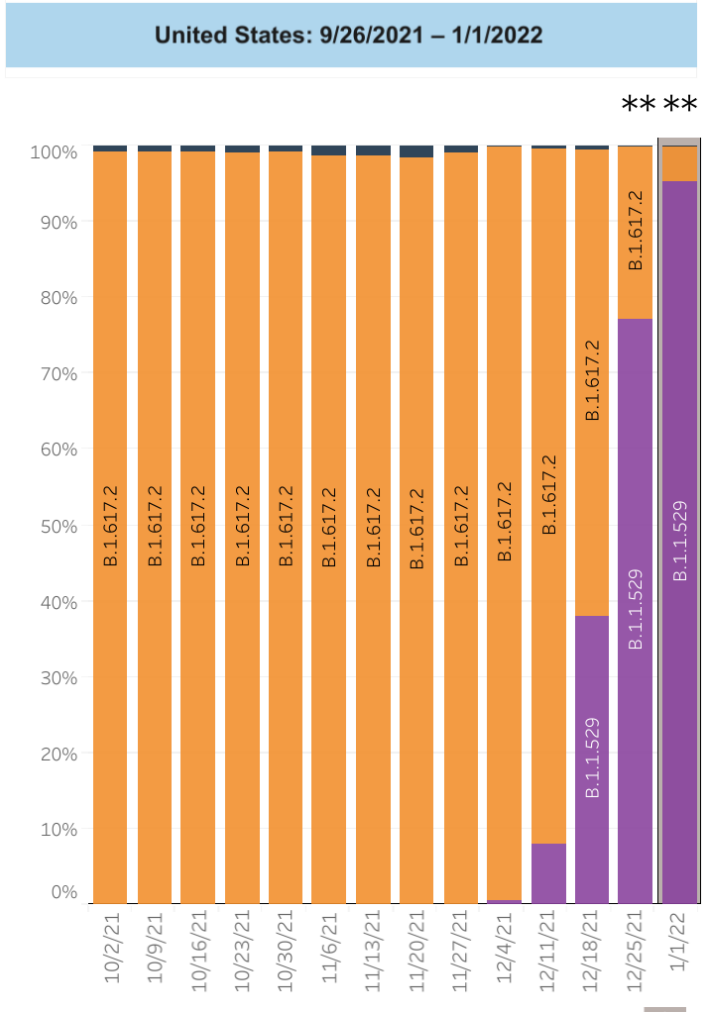

**Peaks in Single Day and 7-Day Average of New Cases****

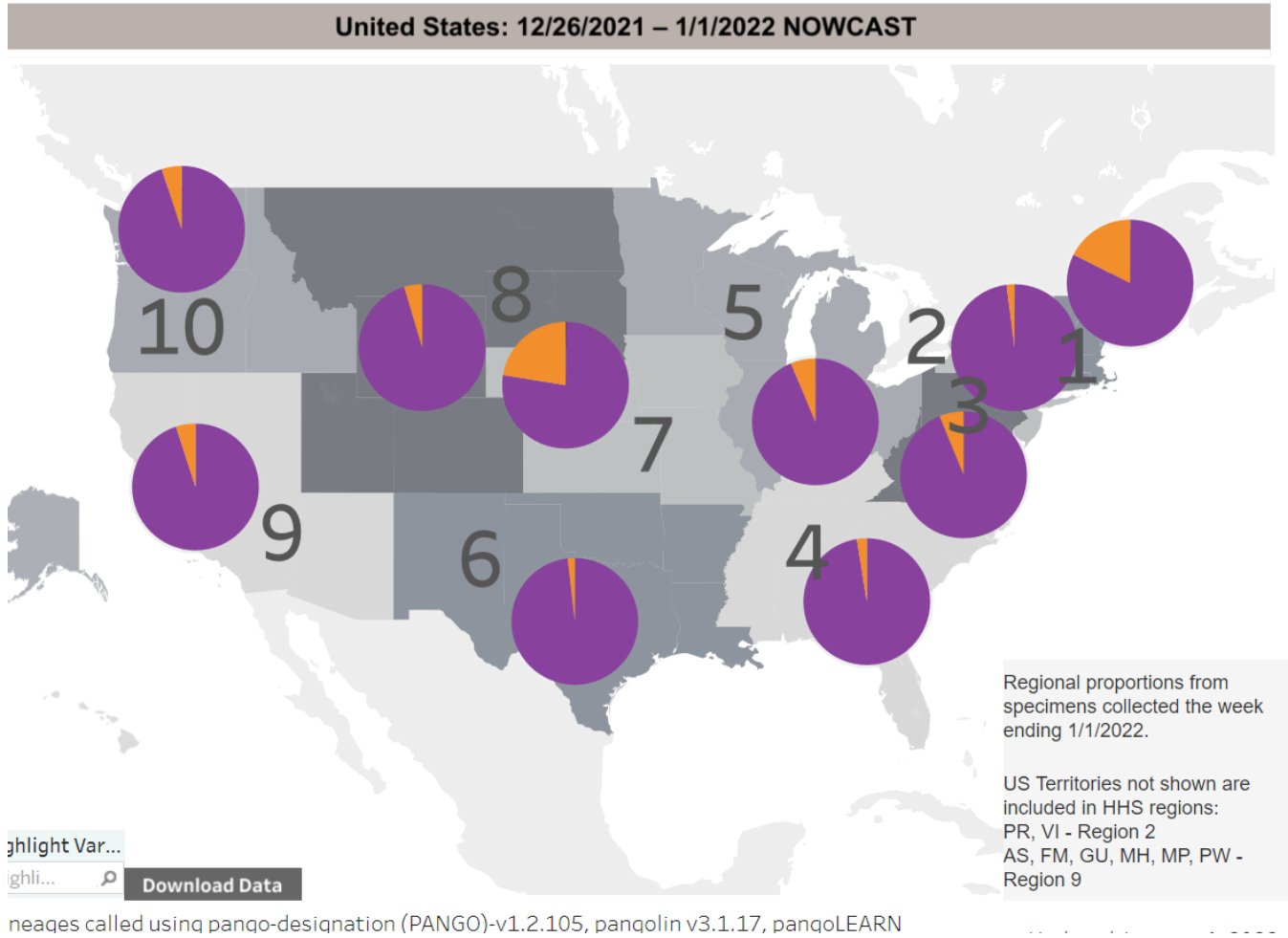
| Peak | Single Day Cases | Single Day Date | 7-Day Average Cases | 7-Day Average Date | % Change vs Current Avg |
|---|---|---|---|---|---|
| 1st Peak | 34,988 | 09-Apr-20 | 31,344 | 12-Apr-20 | 1770.8% |
| 2nd Peak | 77,080 | 17-Jul-20 | 67,689 | 23-Jul-20 | 766.3% |
| 3rd Peak | 294,009 | 08-Jan-21 | 250,431 | 11-Jan-21 | 134.2% |
| 4th Peak | 78,861 | 09-Apr-21 | 69,831 | 13-Apr-21 | 739.7% |
| 5th Peak | 198,847 | 01-Sep-21 | 164,235 | 01-Sep-21 | 257.0% |
| Latest | 958,269 | 03-Jan-22 | 586,391 | 05-Jan-22 | 0.0% |

*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 352,811 historical cases reported retroactively, none were reported on the most recent submission date; 134 in the current week; and 621 in the prior week.

# The proportion of COVID-19 cases due to Omicron is increasing.




** These data include Nowcast estimates, which are modeled projections that may differ from weighted estimates generated at later dates

# Data suggest higher household transmissibility of Omicron compared with Delta among vaccinated persons (Denmark, 2021).

| | Omicron households (N=2225) | | Delta households (N=9712) | |
|---|---|---|---|---|
| | 2° attack rate (# 2° cases) | Odds ratio for transmissibility (95% CI) | 2° attack rate (# 2° cases) | Odds ratio for transmissibility (95% CI) |
| **Unvaccinated** | 29% (340) | 1.04 (0.87-1.24) | 28% (2044) | 2.31 (2.09-2.55) |
| **Fully vaccinated** | 32% (1057) | ref | 19% (2714) | ref |
| **Booster-vaccinated** | 25% (77) | 0.54 (0.40-0.71) | 11% (165) | 0.38 (0.32-0.46) |

SARS-CoV-2 Omicron VOC Transmission in Danish Households (medrxiv.org)

# Severity

# U.S. hospitalizations with confirmed COVID-19 are surpassing peaks from last winter.

**3,773,704**
Total New Admissions
Aug 01, 2020 – Jan 04, 2022

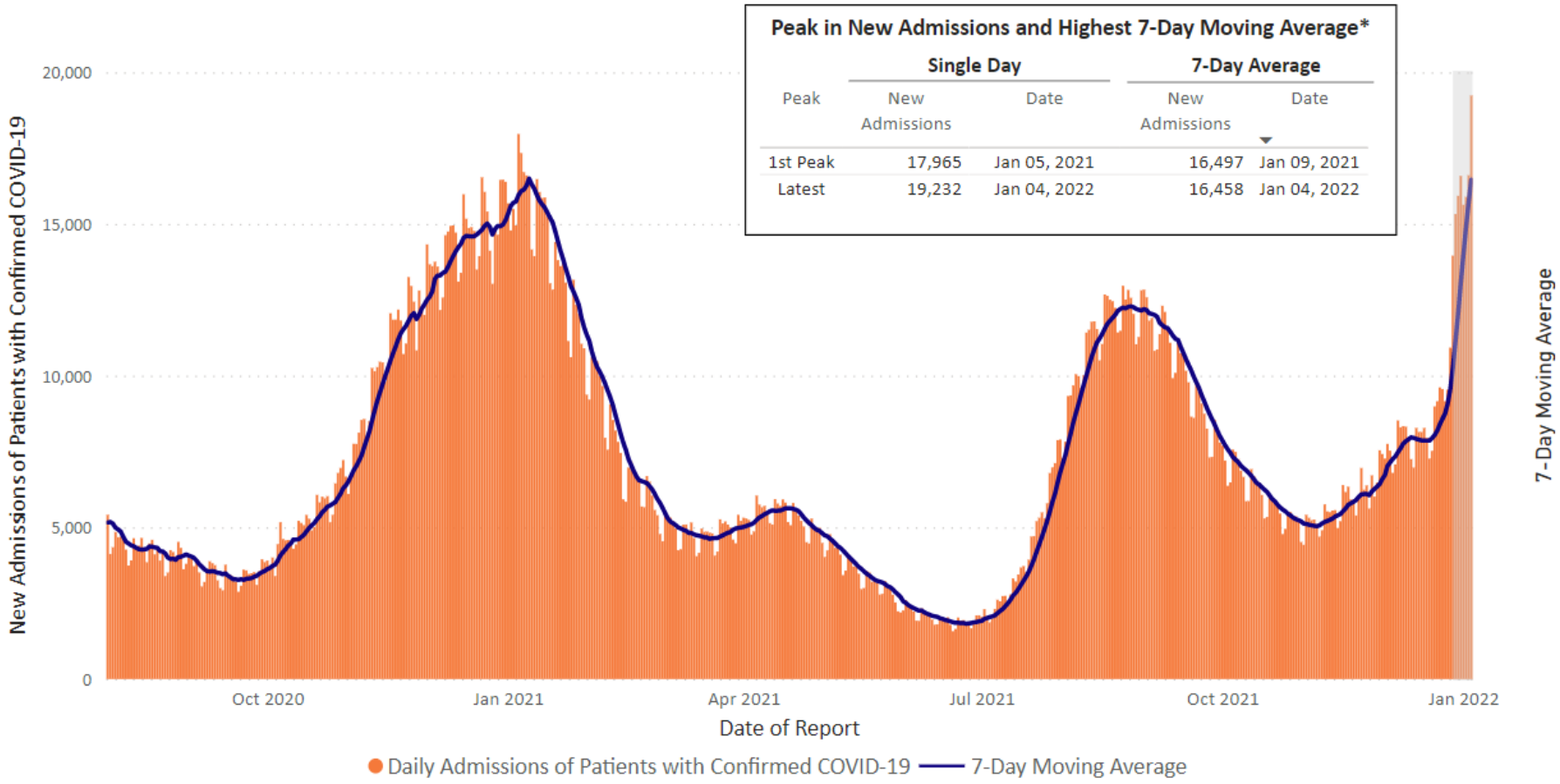
**19,232**
New Admissions
Jan 04, 2022

**16,458**
Current 7-Day Average
Dec 29, 2021 – Jan 04, 2022

**10,271**
Prior 7-Day Average
Dec 22, 2021 – Dec 28, 2021

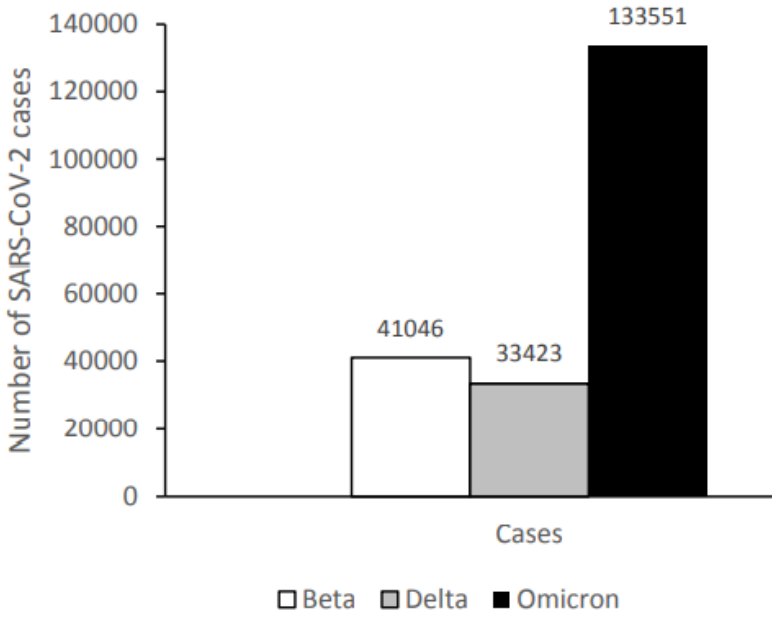
**+60.2%**
Change in 7-Day Average

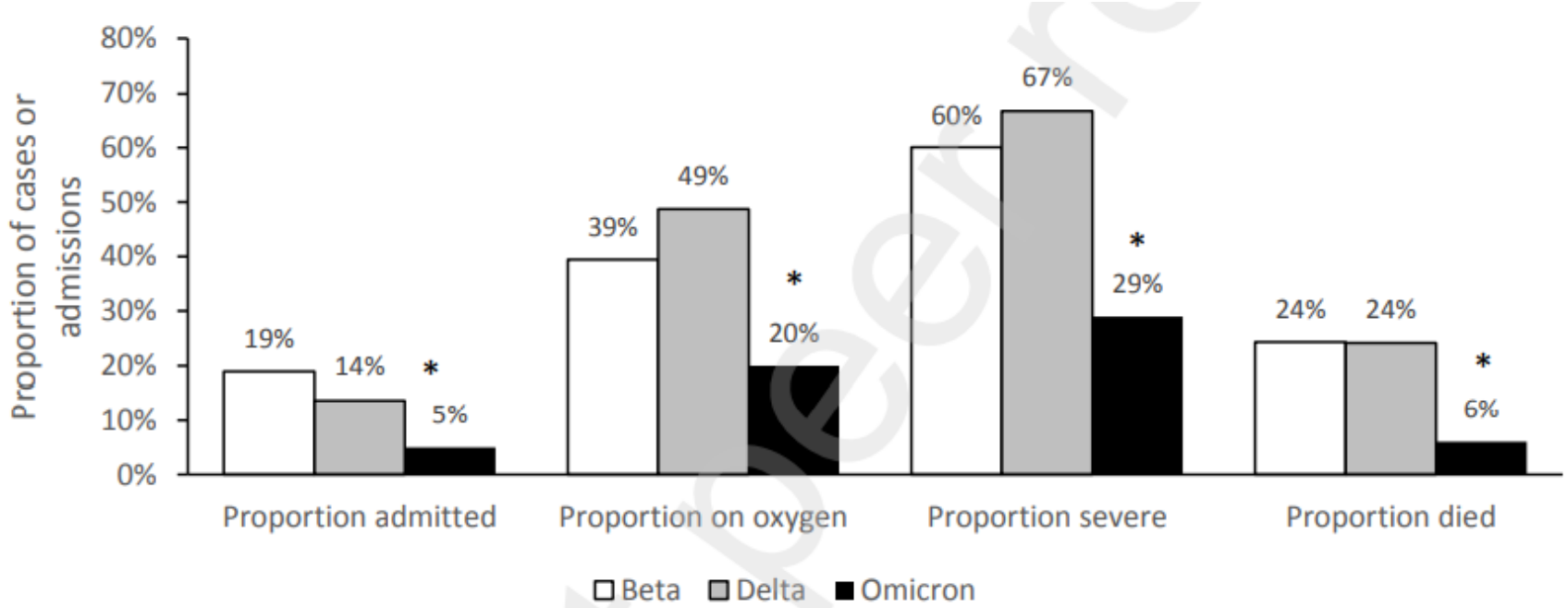
**-0.2%**
Change Since Peak 7-Day Average




https://covid.cdc.gov/covid-data-tracker/#new-hospital-admissions

# In South Africa, patients admitted during the Omicron wave were 73% less likely to have severe disease than those admitted during the Delta wave.




Clinical Severity of COVID-19 Patients Admitted to Hospitals in Gauteng, South Africa During the Omicron-Dominant Fourth Wave by Waasila Jassat, Salim Abdool Karim, Caroline Mudara, Richard Welch, Lovelyn Ozougwu, Michelle Groome, Nevashan Govender, Anne von Gottberg, Nicole Wolter, DATCOV Author Group, Lucille Blumberg, Cheryl Cohen :: SSRN

# Hospitalization rates have been relatively lower during the Omicron wave in multiple countries.

- Hospitalization rates for persons infected with Omicron: 0.4% in United Kingdom, and 0.6% in Denmark
- Risk of hospitalization due to Omicron infections estimated to be 38% (England) and 54% (Canada) lower than hospitalization for Delta infections

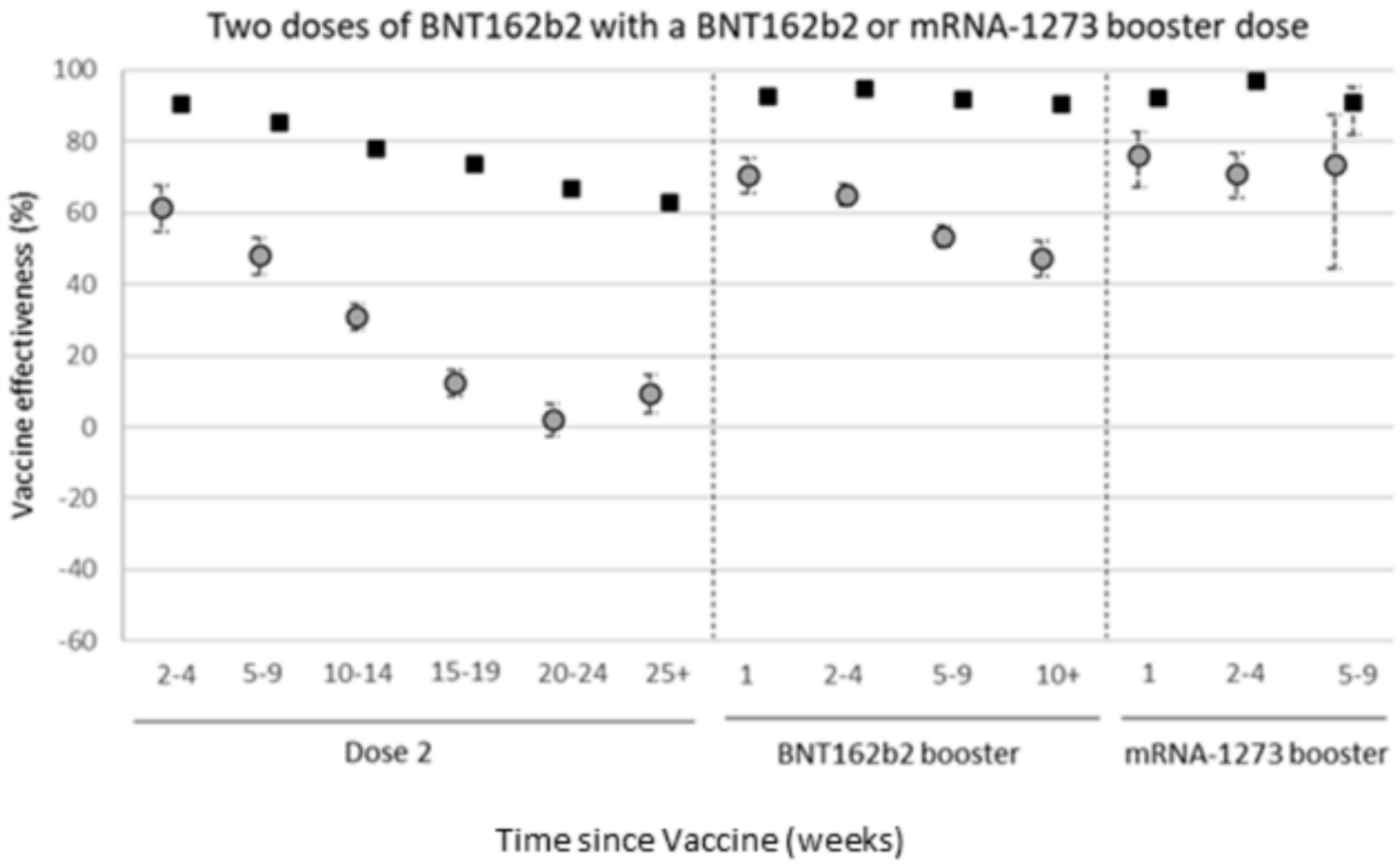
Omicron daily overview: 30 December 2021 (publishing.service.gov.uk)
rapport-omikronvarianten-29122021-ub46 (ssi.dk)
Early estimates of SARS-CoV-2 Omicron variant severity based on a matched cohort study, Ontario, Canada | medRxiv

# Vaccine Effectiveness

# Neutralization of the Omicron variant is reduced compared with ancestral and Delta strains.

| Sera from persons with different vaccination and infection scenarios | Time of collection after last vaccine dose | Neutralization of Omicron and range reduction compared with ancestral and Delta strains | References |
|---|---|---|---|
| **Infection-naïve, primary mRNA vaccine series** | 0.5–6 months | Undetectable to 11–127x lower for Omicron | Wilhelm et al https://www.medrxiv.org/content/10.1101/2021.12.07.21267432v1.full.pdfCele et al https://www.ahri.org/wp-content/uploads/2021/12/MEDRXIV-2021-267417v1-Sigal.pdf Denjnirattisai et al https://www.medrxiv.org/content/10.1101/2021.12.10.21267534v1 Aggarwal et al https://www.medrxiv.org/content/10.1101/2021.12.14.21267772v1.full.pdf Zeng et al https://www.biorxiv.org/content/10.1101/2021.12.16.472934v1 Lu et al https://pubmed.ncbi.nlm.nih.gov/34915551/ Edara et al https://www.biorxiv.org/content/10.1101/2021.12.20.473557v1.full.pdf Schmidt et al https://www.nejm.org/doi/full/10.1056/NEJMc2119641?query=RP Basile et al https://www.biorxiv.org/content/10.1101/2021.12.12.472252v1.full.pdf Planas et al https://www.biorxiv.org/content/10.1101/2021.12.14.472630v1.full.pdf Rossler et al https://www.medrxiv.org/content/10.1101/2021.12.08.21267491v1.full |
| **Infection-naïve, primary mRNA vaccine series + booster (homologous or heterologous)** | 0.5–3 months | Increased compared with primary series alone but 3–37x lower for Omicron | |
| **Previous infection and vaccination (1 or 2 doses of mRNA vaccine)** | 1–6 months | Increased compared with infection or vaccination alone but 18–44x lower for Omicron | |

# Pfizer mRNA vaccine effectiveness (VE) is lower for symptomatic infection due to Omicron compared to Delta.




Delta

Omicron

- **Post 2-dose**: increased waning immunity for Omicron (~15%) vs. Delta (~60%) at 25+ weeks post 2nd dose
- **Booster**: ~65% VE against Omicron 2 weeks; decreases to 45% at 10+ weeks

SARS-CoV-2 variants of concern and variants under investigation (publishing.service.gov.uk)

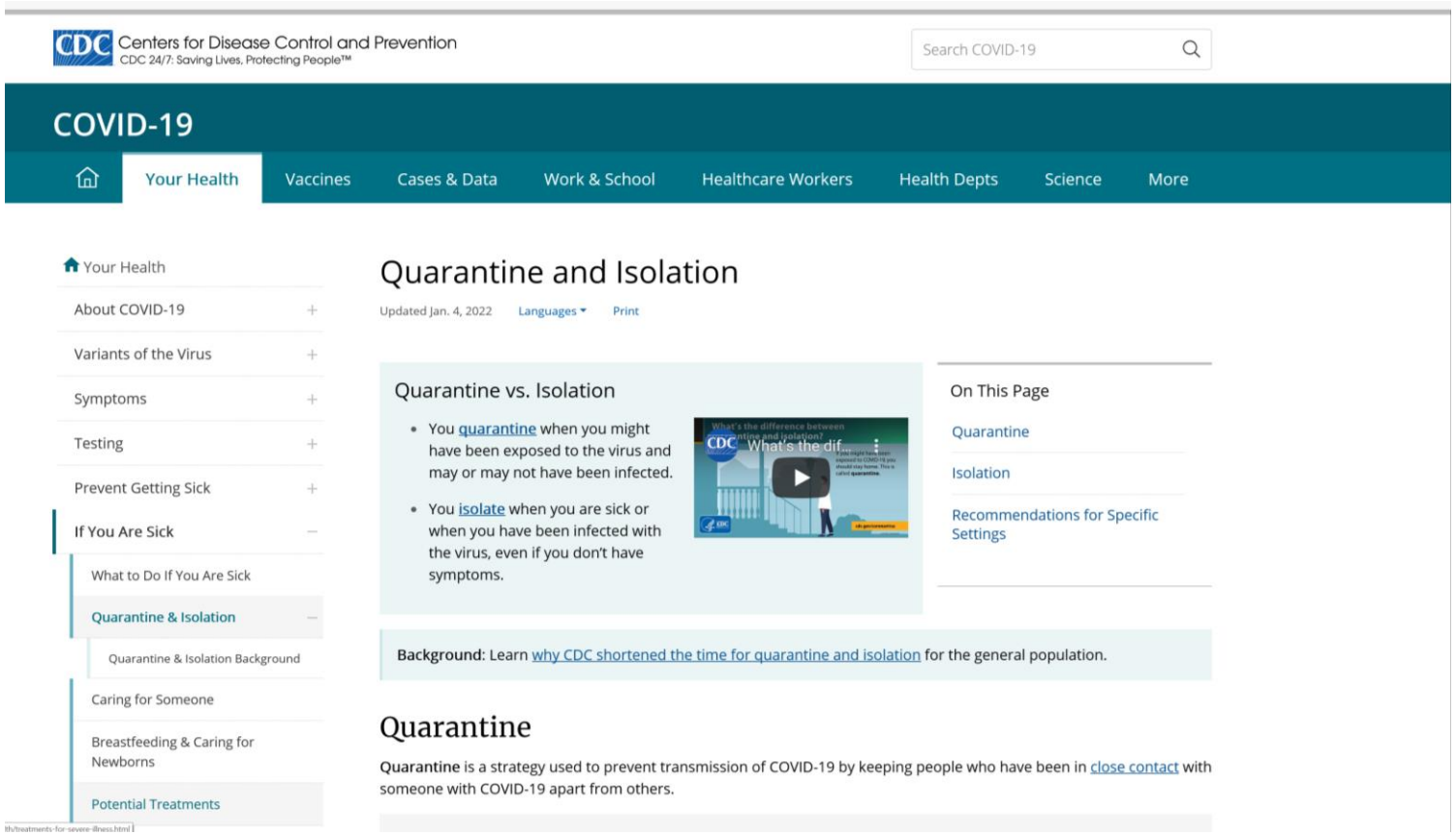
# Preparedness

# Prevention strategies are key to increasing protection against the Omicron variant.

- Vaccination
  - Recommended for everyone ages ≥5 years
  - Booster eligibility expanded to all persons ages ≥12 years
    - ≥2 months after initial Janssen vaccine
    - ≥5 months for individuals who have completed a Pfizer-BioNTech or Moderna primary series
  - Additional dose authorized for immunocompromised children ages 5-11 years
- Increased emphasis on the importance of masking
- Improved ventilation
- Wider and more frequent testing, including self-testing
- Adherence to guidance on quarantine and isolation

https://www.cdc.gov/mmwr/volumes/70/wr/mm7050e1.htm?s_cid=mm7050e1_w

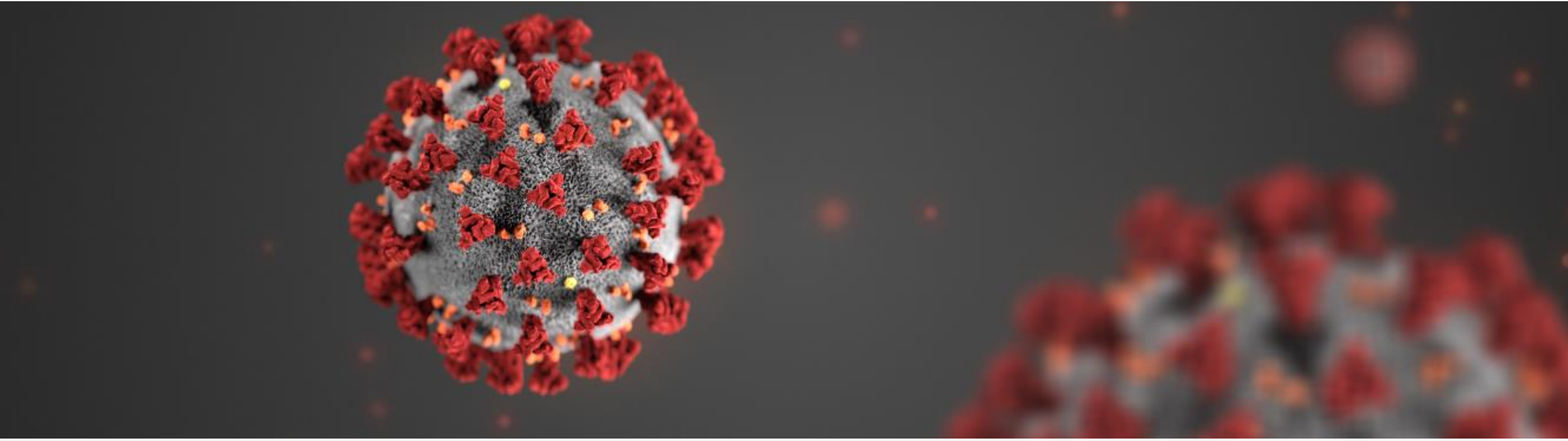
# CDC released new isolation and quarantine guidance.




https://www.cdc.gov/coronavirus/2019-ncov/your-health/quarantine-isolation.html
https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/quarantine-isolation-background.html

# Summary

- Accumulating evidence suggests that the Omicron variant is more transmissible but causes less severe disease.
- Currently authorized vaccines offer less protection against infection due to Omicron compared to ancestral strains and previous variants but still provide benefit—important to increase uptake of primary vaccination and boosters in eligible populations to optimize protection.
- CDC is closely monitoring real-world vaccine effectiveness and breakthrough infections using multiple methods, populations, and outcomes.
- Layered prevention strategies are key for minimizing the impact of the spread of the Omicron variant.



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

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

## *Recent FDA Updates & Authorizations*

**John Farley, MD, MPH**

# Recent FDA Updates and Authorizations

John Farley, MD, MPH
Director, Office of Infectious Diseases
Office of New Drugs,
Center for Drug Evaluation and Research
U.S. Food and Drug Administration

# Monoclonal Antibody Fact Sheets Updated with Virology Information for Omicron

| Casirivimab and Imdevimab Together (REGEN-COV) | | | |
|---|---|---|---|
| B.1.1.529/BA.1 Omicron | G339D+S371L+S373P+ S375F+K417N+N440K+ G446S+S477N+T478K+ E484A+Q493R+G496S+ Q498R+N501Y+Y505H | Pseudotyped Virus-Like Particle Neutralization Data | >1,013 - fold reduction in susceptibility |

| Bamlanivimab and Etesevimab Together | | | |
|---|---|---|---|
| B.1.1.529/BA.1 Omicron | G339D+S371L+S373P+ S375F+K417N+N440K+ G446S+S477N+T478K+ E484A+Q493R+G493S+ Q498R+N501Y+Y505H | Pseudotyped Virus-Like Particle Neutralization Data | >2,938 - fold reduction in susceptibility |

# Monoclonal Antibody Fact Sheets Updated with Virology Information for Omicron

| Sotrovimab | | | |
|---|---|---|---|
| B.1.1.529/BA.1 Omicron | G339D+S371L+S373P+ S375F+K417N+N440K+ G446S+S477N+T478K+ E484A+Q493R+G496S+ Q498R+N501Y+Y505H | Pseudotyped Virus-Like Particle Neutralization Data | No change (<5 - fold reduction in susceptibility) |

- Casirivimab and imdevimab together are unlikely to be active against variants from this lineage.
- Bamlanivimab and etesevimab together are unlikely to be active against variants from this lineage.
- Healthcare providers should choose an authorized therapeutic option with activity against the circulating variants in their state, territory, or US jurisdiction. Current variant frequency data are available at: https://covid.cdc.gov/covid-data-tracker/#variant-proportions

# EVUSHELD™ Authorization for PrEP

- Tixagevimab co-packaged with cilgavimab, SARS-CoV-2 spike protein-directed attachment inhibitor.

**Authorization:** for the pre-exposure prophylaxis of coronavirus disease 2019 (COVID-19) in adults and pediatric individuals (12 years of age and older weighing at least 40 kg):

- Who are not currently infected with SARS-CoV-2 and who have not had a known recent exposure to an individual infected with SARS-CoV-2 **and**
- Who have moderate to severe immune compromise due to a medical condition or receipt of immunosuppressive medications or treatments and may not mount an adequate immune response to COVID-19 vaccination **or**
- For whom vaccination with any available COVID-19 vaccine, according to the approved or authorized schedule, is not recommended due to a history of severe adverse reaction (e.g., severe allergic reaction) to a COVID-19 vaccine(s) and/or COVID19 vaccine component(s)

# EVUSHELD™ – Clinical Considerations

- Not authorized for treatment of COVID-19, nor for post-exposure prophylaxis of COVID-19 in individuals who have been exposed to someone infected with SARS-CoV-2.
- Pre-exposure prophylaxis with EVUSHELD is not a substitute for vaccination in individuals for whom COVID-19 vaccination is recommended.
- In individuals who have received a COVID-19 vaccine, EVUSHELD should be administered at least two weeks after vaccination.
- Examples of medical conditions or treatments that may result in moderate to severe immune compromise and an inadequate immune response to COVID-19 vaccination are provided in the Health Care Provider Fact Sheet.

Health Care Provider Fact Sheet: https://www.fda.gov/media/154701/download

# EVUSHELD™ Fact Sheet Updated with Virology Information for Omicron

| Tixagevimab and cilgavimab together | | | |
|---|---|---|---|
| B.1.1.529/BA.1 Omicron | G339D+S371L+S373P+ S375F+K417N+N440K+ G446S+S477N+T478K+ E484A+Q493R+G496S+ Q498R+N501Y+Y505H | Authentic Virus | 12* to 30 - fold reduction in susceptibility |

* Assay used parenteral antibodies

- Discussions ongoing regarding implications
- The terms of the authorization have not been changed at this time.

# PAXLOVID™ Authorization for Treatment

- Nirmatrelvir tablets and ritonavir tablets, co-packaged for oral use
- Nirmatrelvir is a SARS-CoV-2 main protease (Mpro: also referred to as 3CLpro or nsp5 protease) inhibitor.

**Authorization:** for the treatment of mild-to-moderate coronavirus disease 2019 (COVID-19) in adults and pediatric patients (12 years of age and older weighing at least 40 kg) with positive results of direct SARS-CoV-2 viral testing, and who are at high risk for progression to severe COVID-19, including hospitalization or death.

# PAXLOVID™ – Clinical Considerations

- Drug-drug interactions with CONTRAINDICATIONS for co-administration with some drugs highly dependent on CYP3A for clearance and some potent CYP3A inducers
- Dose reduction for moderate renal impairment (eGFR ≥30 to <60 mL/min)
- Not recommended for patients with severe renal impairment (eGFR < 30mL/min)
- Not recommended for patients with severe hepatic impairment (Child-Pugh Class C)
- Consider risk of development of HIV-1 resistance to protease inhibitors in individuals with uncontrolled or undiagnosed HIV-1 infection.

Health Care Provider Fact Sheet: https://www.fda.gov/media/155050/download

# Molnupiravir Authorization for Treatment

- Molnupiravir is a nucleoside analogue that inhibits SARS-CoV-2 replication by viral mutagenesis.

**Authorization:** for the treatment of mild-to-moderate coronavirus disease 2019 (COVID-19) in adults with positive results of direct SARS-CoV-2 viral testing, and who are at high risk for progression to severe COVID-19, including hospitalization or death, and for whom alternative COVID-19 treatment options authorized by FDA are not accessible or clinically appropriate.

# Molnupiravir – Clinical Considerations

- Not recommended for use during pregnancy (embryo-fetal toxicity)
- Advise individuals of childbearing potential to use effective contraception correctly and consistently for the duration of treatment and for 4 days after the last dose. Pregnancy Surveillance Program: https://pregnancyreporting.msd.com/
- Breastfeeding is not recommended during treatment and for 4 days after the last dose.
- Non-clinical studies to fully assess the potential to affect offspring of treated males have not been completed (if sexually active with individual of childbearing potential, contraception advised during treatment and for at least 3 months after the last dose).
- Not authorized for use in patients less than 18 years of age (may affect bone and cartilage growth)
- Counseling and documentation requirements for prescribers

Health Care Provider Fact Sheet: https://www.fda.gov/media/155054/download


FDA
U.S. FOOD & DRUG
ADMINISTRATION

## *Allocation & Distribution of COVID-19 Therapeutics*

**Colin W. Shepard, MD**

# COVID-19 Therapeutics – Update from ASPR

**Colin Shepard, MD**

Medical Officer

U.S. Department of Health and Human Services (HHS)

CDC Liaison to the Office of the Assistant Secretary for Preparedness and Response, HHS

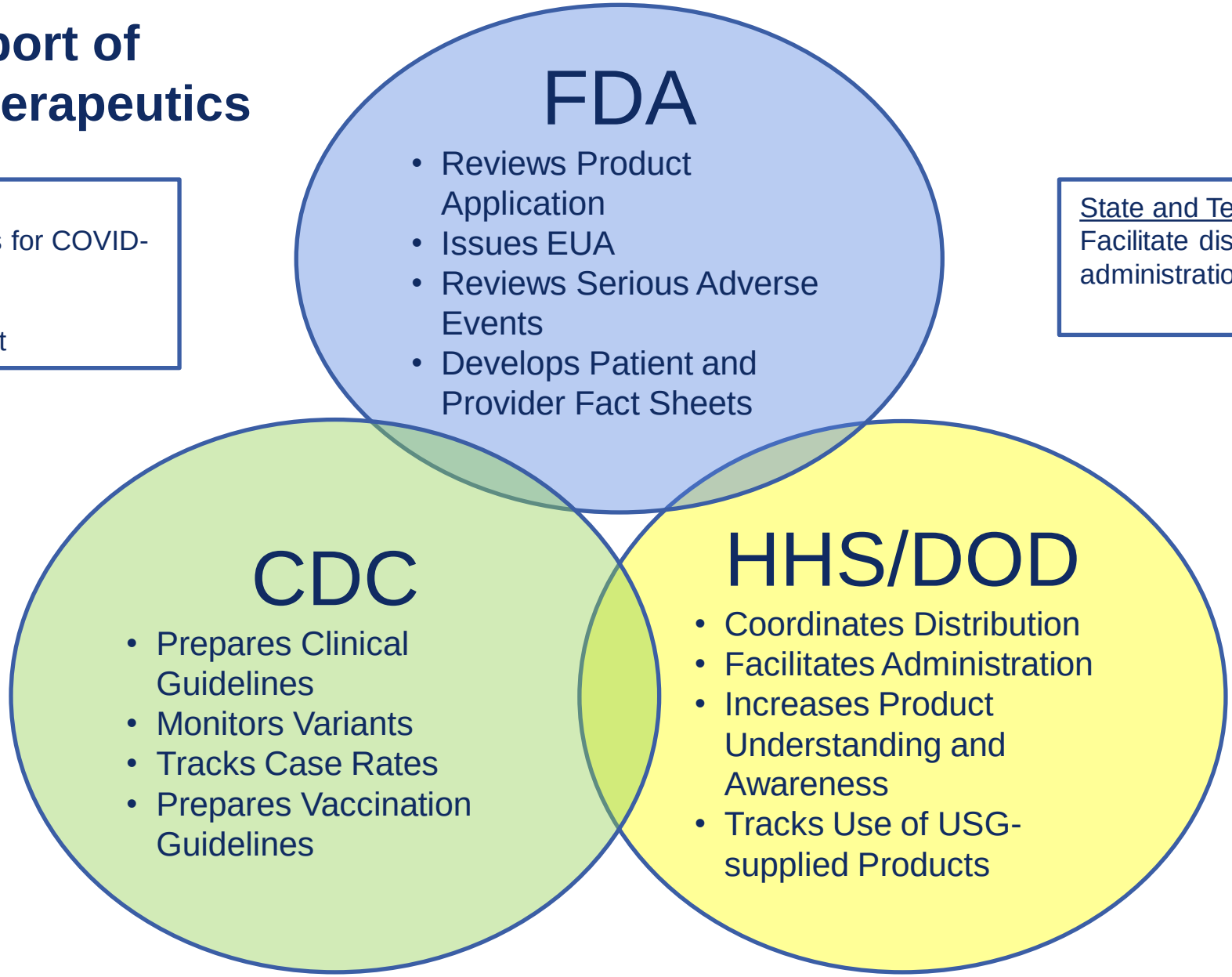
***January 8, 2022***

Unclassified/For Public Use

These medications are not a substitute for vaccination.

# Federal Support of COVID-19 Therapeutics

NIH
Issues clinical guidelines for COVID-19 treatment
CMS/HRSA
Manages reimbursement




State and Territorial Agencies
Facilitate distribution and administration

# Distribution and Utilization Summary

| | |
|---|---|
| **4.11M** | Shipped through all Tx programs[1] |
| **12,298** | Number of sites shipped to[1] |
| **2.62M** | Total reported usage[2] |
| **63.7%** | % of distributed supply used[3] |

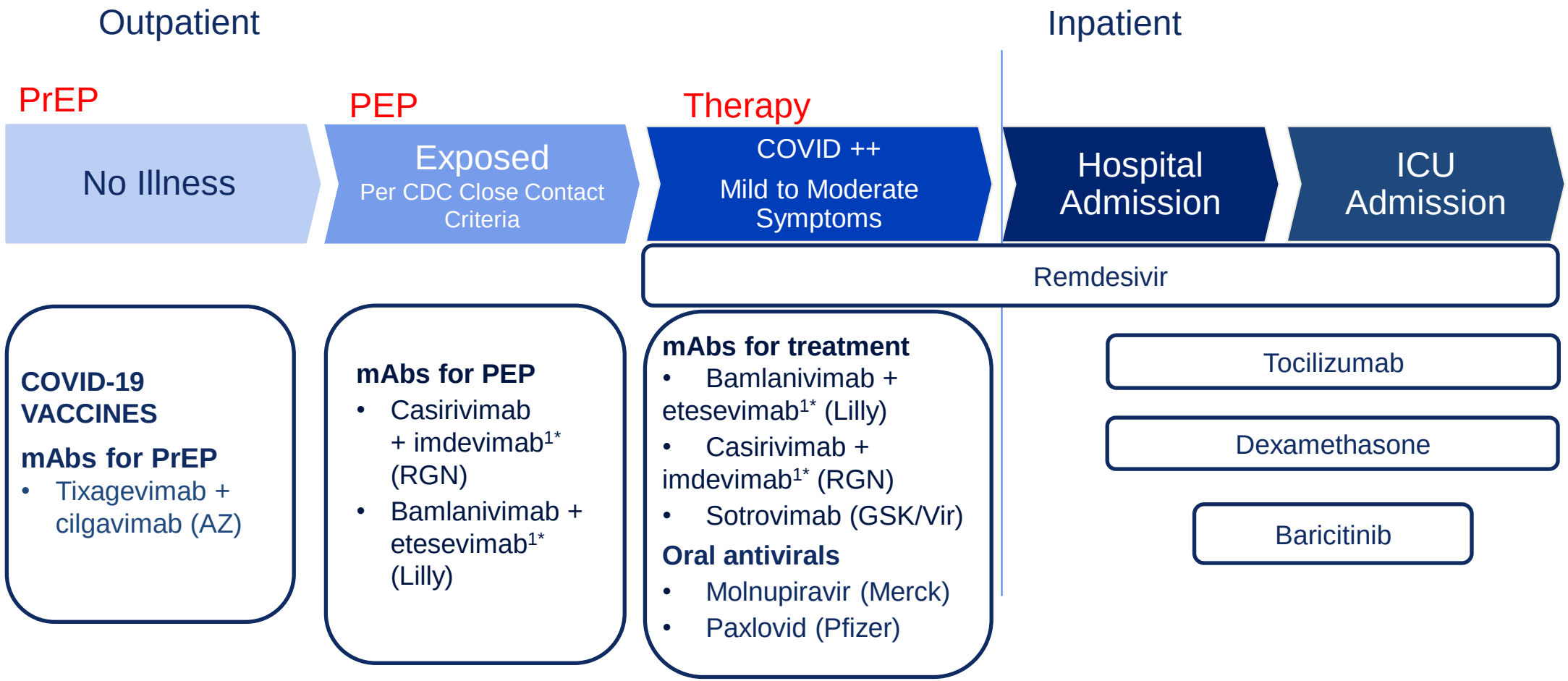
1. Total for entire period 2. Total usage as reported since 12/29 3. Reported through date 12/29
Note: Number of sites, % of total stock on hand and total reported usage is updated weekly
Source: ABC Distribution reports, TeleTracking, State Reports

# Current Distribution Process: State/Territory-Coordinated System

- State/territory-coordinated distribution system helps maintain equitable distribution, both geographically and temporally-providing states and territories with consistent, fairly-distributed supply over the coming weeks and while the USG works to procure additional supply
- Administration sites no longer order directly from the distributor
- USG determines weekly distribution amounts to states and territories
- State/Territorial Health Departments determine where product goes in their jurisdictions

**USG determines weekly distribution amounts; states/territories identify receiving sites and allocate amounts**

# Stages of COVID-19 Therapeutics




[1]Allocation of bam/ete and REGEN-COV has resumed nationally as of 12/31/2021, see PHE.gov.
*The Omicron variant is not neutralized by bam/ete or REGEN-COV.

# January Allocation Schedule

- For planning purposes only

- HHS assesses COVID-19 data on a daily basis and may adjust allocation schedule as required

- **Jan 10:**
  Evusheld, Sotrovimab, Bam/Ete, Regen-COV
  Molnupiravir, Paxlovid

- **Jan 18**
  Evusheld, Sotrovimab, Bam/Ete, Regen-COV

- **Jan 24**
  Evusheld, Sotrovimab, Bam/Ete, Regen-COV
  Molnupiravir, Paxlovid

- **Jan 31**
  Evusheld, Sotrovimab, Bam/Ete, Regen-COV

| Monday | Tuesday |
|---|---|
| **3** AZ – 50K, GSK – 50K, BAM-ETE – 45K, REGN – 55K **ABC CLOSED** | |
| **10** MERCK, PFIZER, AZ, GSK, BAM-ETE, REGN | |
| **17 – MLK HOLIDAY** | **18** AZ, GSK, BAM-ETE, REGN |
| **24** MERCK, PFIZER, AZ, GSK, BAM-ETE, REGN | |
| **31** AZ, GSK, BAM-ETE, REGN | |

# About this Week's Allocations

- Approximately 200,000 (197,386) courses of COVID-19 therapeutics have been allocated to jurisdictions for the period of Jan 3-9, 2022:
  - Sotrovimab (GSK) – 48,498 courses
  - Evusheld (AstraZeneca) – 49,896 courses
  - Bam/Ete (Lilly) – 44,520 courses
  - REGEN-COV (Regeneron) – 54,472 courses

- Monoclonal antibodies now allocated on one-week cycles (for at least the next three weeks); next allocation Monday, Jan 10.

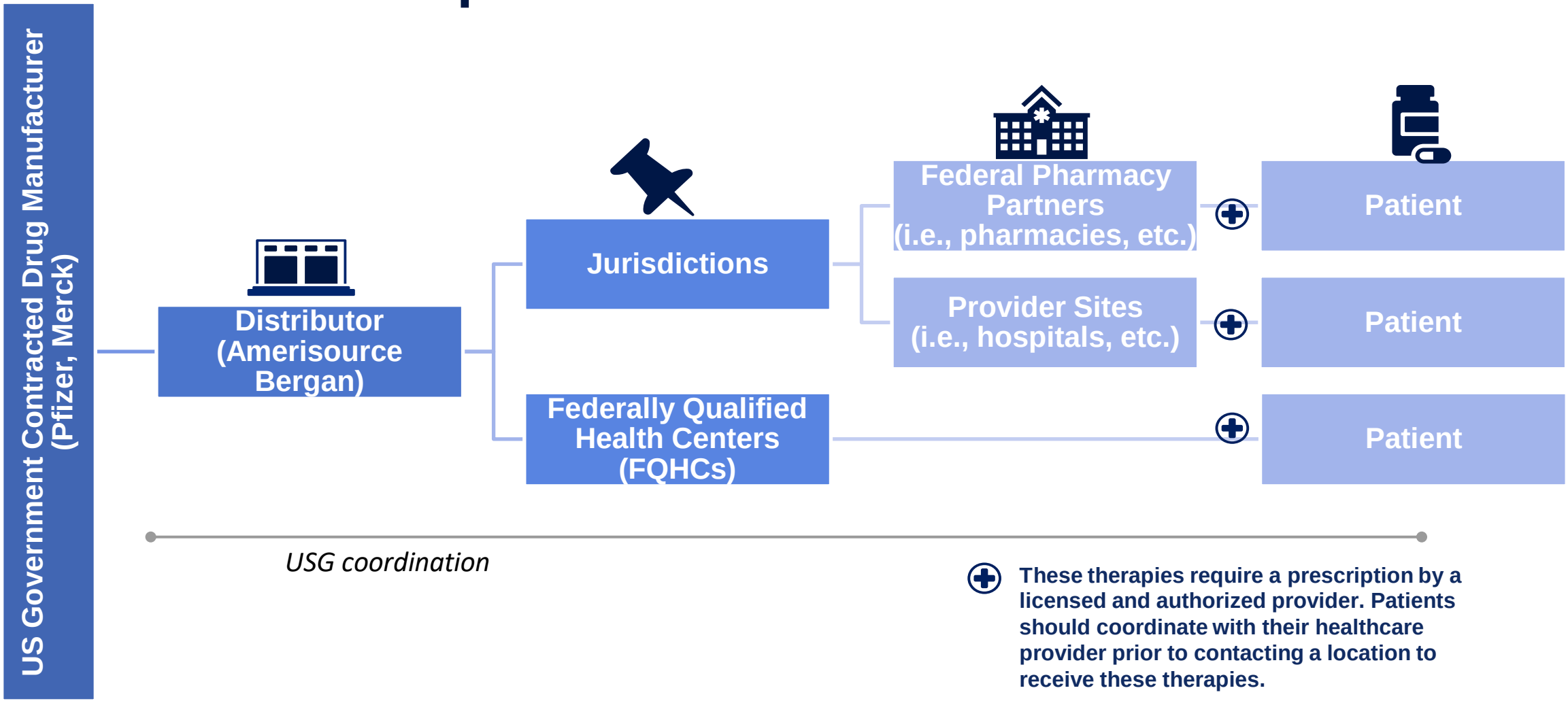
- During the one-week allocation cycles, Sotrovimab and Evusheld **WILL NOT** be swept at the end of each week – no Federal Pool for additional product requests

- Subsequent allocations will be added to product on hand to increase jurisdictional flexibility

- Oral antivirals on two-week allocation cycle; next allocation Monday, Jan 10

**One-week cycle for mAbs; Two-week Cycle for Oral Antivirals**

# Oral Antiviral Journey | Overview of how drug goes from manufacturer to patient




⊕ These therapies require a prescription by a licensed and authorized provider. Patients should coordinate with their healthcare provider prior to contacting a location to receive these therapies.

# Update: Allocation of bam/ete and REGEN-COV

- Federal guidance updated Friday, Dec 31, 2021 - all states and territories can continue to order both bam/ete and REGEN-COV based on allocated amounts for clinically appropriate use

- A number of alternative therapeutics available, including oral and IV antivirals, that are effective against the Omicron variant
  - NOTE: NIH recommended IV Remdesivir for therapy consideration in outpatients

- If Delta variant represents significant proportion of infections in a region and other options are not available or are contraindicated, eligible patients can be offered bam/ete or REGEN-COV, with the understanding that these treatments would be ineffective if patients are infected with Omicron
  - Concern can be mitigated if virus-specific diagnostic testing[1] in a given patient indicates infection with the Omicron VOC is unlikely.

- Dec 30, 2021 National Institutes of Health (NIH) clinical guidelines

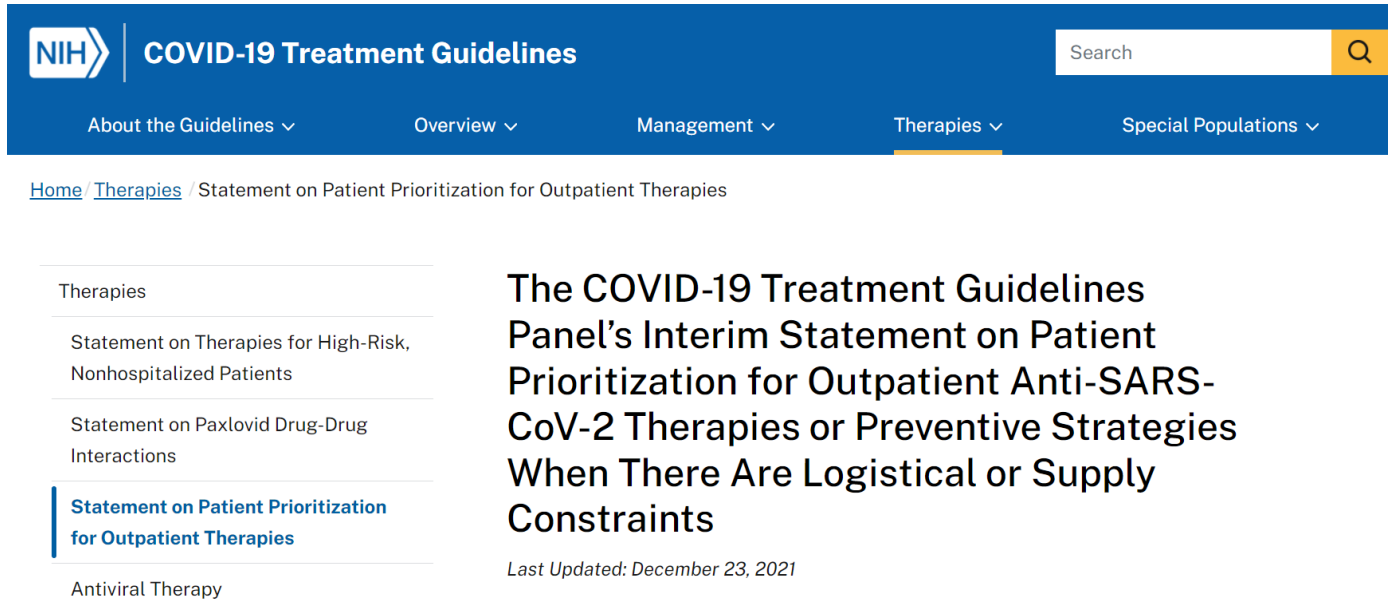
**Assess local and CDC data; review NIH guidelines**

# USG-procured mAbs are provided at no cost

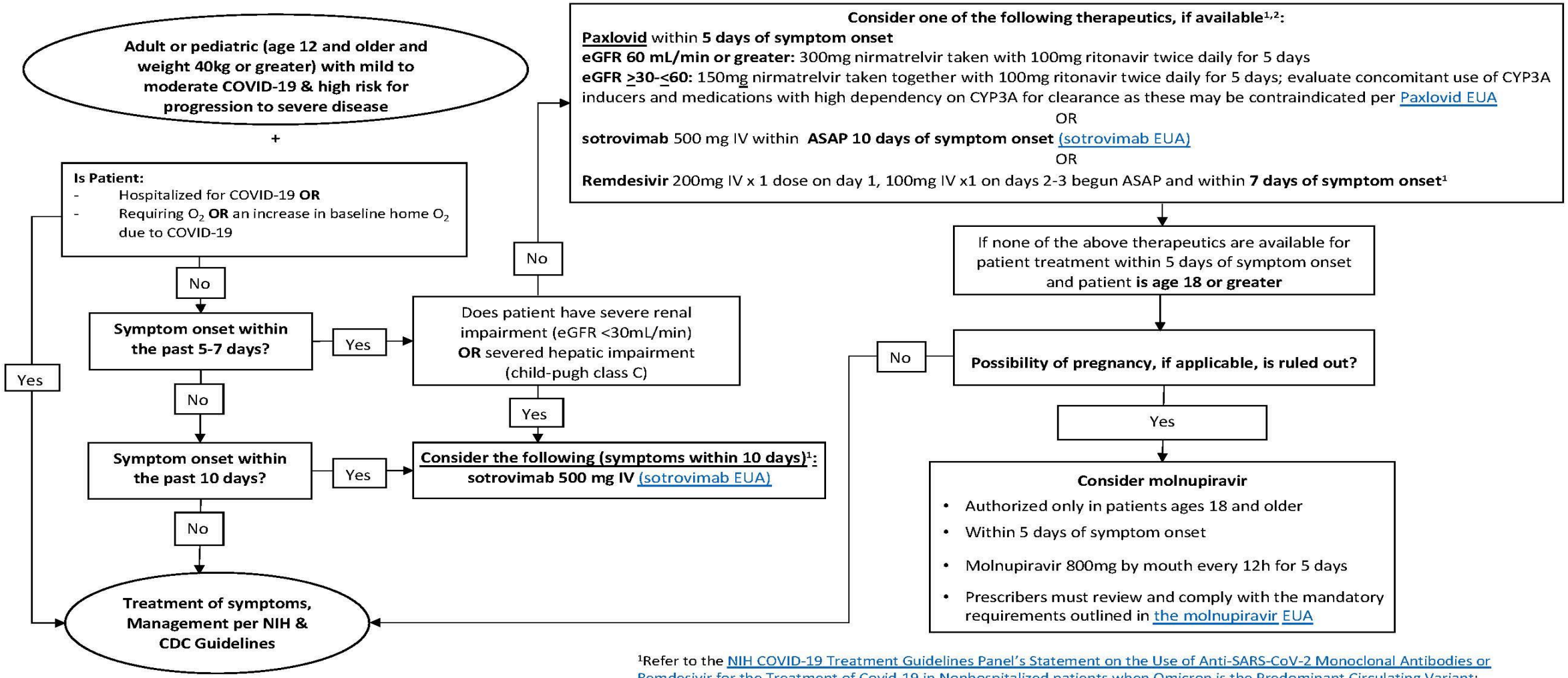
- Administration fees for mAbs may be billed by sites.
- CMS reimbursement rates increased:
  - $450 for most outpatient settings.
  - $750 when administered in patient's home.
- Additional information on reimbursement: Monoclonal Antibody COVID-19 Infusion | CMS
- Reimbursement options for uninsured individuals: HRSA

# Patient Prioritization Guidance for Treatment

[Patient Prioritization for Outpatient Anti-SARS-CoV-2 Therapies or Preventive Strategies When There Are Logistical or Supply Constraints]



# COVID-19 Outpatient Therapeutics Decision Guide




***Limited use of bamlanivimab/etesevimab and REGEN-COV as they are not expected to be active against the Omicron variant[1]***

December 30, 2021

[1]Refer to the NIH COVID-19 Treatment Guidelines Panel's Statement on the Use of Anti-SARS-CoV-2 Monoclonal Antibodies or Remdesivir for the Treatment of Covid-19 in Nonhospitalized patients when Omicron is the Predominant Circulating Variant; Remdesivir is only approved for hospitalized individuals with COVID-19. Outpatient treatment is based on information from the literature (Dec 22, 2021 Early Remdesivir to Prevent Progression to Severe Covid-19 in Outpatients; DOI: 10.1056/NEJMoa2116846)

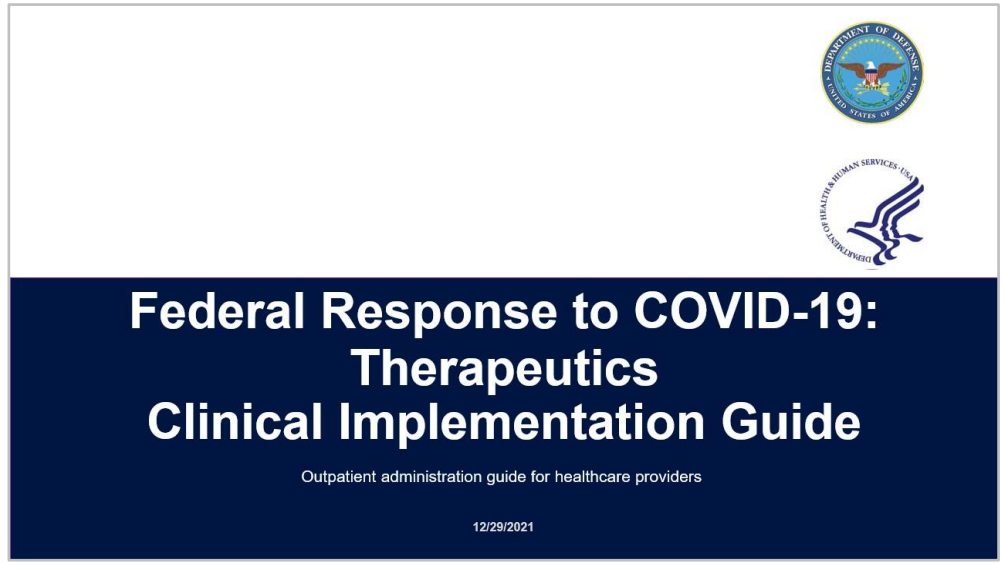
[2] COVID-19 convalescent plasma with high titers of anti-SARS-CoV-2 antibodies is authorized for the treatment of COVID-19 in patients with immunosuppressive disease in either the outpatient or inpatient setting (COVID-19 Convalescent Plasma EUA)

# Clinical Implementation Guide

**Federal Response to COVID-19: Therapeutics Clinical Implementation Guide**

- Updated periodically with EUA changes.
- **PHE.gov/COVIDTherapeutics**

Side-by-Side Overview of Outpatient Therapies Authorized for Treatment of Mild-Moderate COVID-19




Please contact **COVID19Therapeutics@hhs.gov** with any questions.

# Weekly Stakeholder Engagements

- **Office Call: Discussion with FRPTP Participants (Pharmacy Group)**
  - Tuesdays (12:00–12:30PM ET)

- **Office Call Sessions: HHS/ASPR Distribution and Administration of COVID-19 Therapeutics—open to all with equity in the process**
  - Tuesdays and Thursdays (2:00–2:30PM ET)

- **Stakeholder Call: State, Local, Tribal, and Territorial Health Officials**
  - Wednesdays (2:00–3:00PM ET)

- **Stakeholder Call: National Healthcare and Medical Orgs and Associations**
  - Wednesdays (3:15–4:15PM ET)

- **Federal COVID Response: Therapeutics 210 Webinar**
  - For new administration sites, health officials: Every other Friday (12:00–1:00PM ET)
    https://hhsasproea.zoomgov.com/j/1617536991?pwd=NjFMcnJOUENuSFhtRFFtaWltejYzZz09

**Please email COVID19Therapeutics@hhs.gov to request Zoom links for these calls.**

# COVID-19 Therapeutics for Non-Hospitalized Patients: What Treatments are Preferred – and Why?

**Rajesh Gandhi, MD, FIDSA**

**Disclosures (past 2 years):** Member, NIH & Infectious Diseases Society of America COVID-19 Treatment Guidelines Panels; Recommendations in this talk are my own and not necessarily those of the Panels

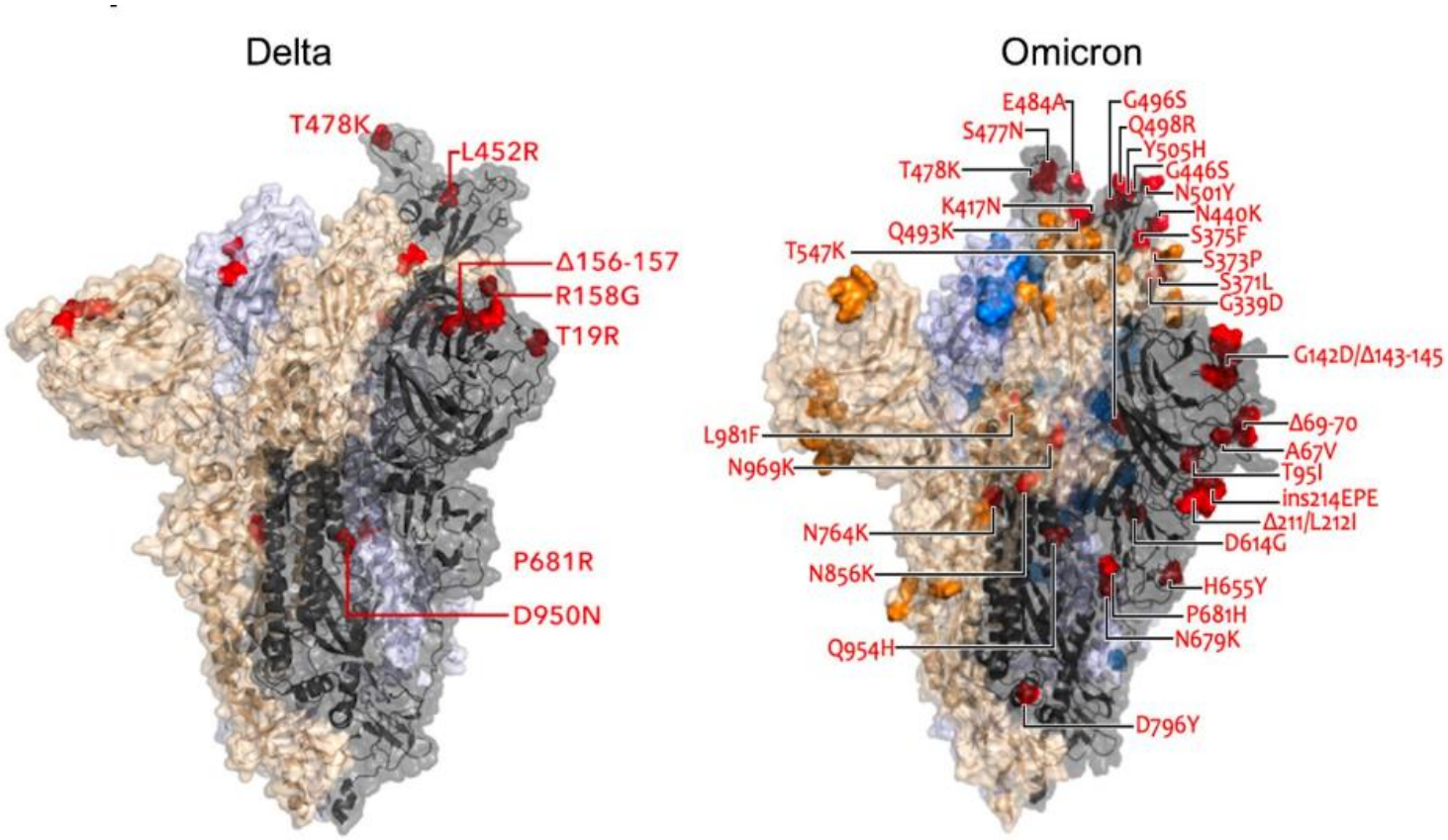
**Acknowledgments:** Arthur Kim, Jon Li, Annie Luetkemeyer, Alison Han, Safia Kuriakose, Alice Pau, Efe Airewele

# COVID-19 Treatment Guidelines Updated to Include Oral Therapies (Nirmatrelvir/ritonavir, Molnupiravir) and Remdesivir for High-Risk Non-Hospitalized Patients

## Infectious Diseases Society of America Guidelines on the Treatment and Management of Patients with COVID-19

Adarsh Bhimraj*, Rebecca L. Morgan**, Amy Hirsch Shumaker, Valery Lavergne**, Lindsey Baden, Vincent Chi-Chung Cheng, Kathryn M. Edwards, Rajesh Gandhi, Jason Gallagher, William J. Muller, John C. O'Horo, Shmuel Shoham, M. Hassan Murad**, Reem A. Mustafa**, Shahnaz Sultan**, Yngve Falck-Ytter**

# Omicron and Outpatient Therapeutics




Modified from slide from Dr. Arthur Kim

>50 amino acid changes; ~30 in spike

- Of mAbs authorized for treatment, only sotrovimab anticipated to be active

Small molecule antivirals target SARS CoV-2 replicase:

- Data from cell cultures: preserved activity of nirmatrelvir/ritonavir, molnupiravir, remdesivir against Omicron

https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-omicron-variant.html
Vangeel L et al, bioRxiv preprint doi: https://doi.org/10.1101/2021.12.27.474275

# How do the therapies stack up?

| | 1) Nirmatrelvir/r | 2) Sotrovimab | 3) Remdesivir | 4) Molnupiravir |
|---|---|---|---|---|
| **Efficacy (prevention hospitalization or death)** | •**Relative risk reduction: 88%**<br>•Absolute risk: 6.3%→0.8%<br>•NNT: 18 | •**Relative risk reduction: 85%**<br>•Absolute risk: 7%→ 1%<br>•NNT: 17 | •**Relative risk reduction: 87%**<br>•Absolute risk: 5.3%→0.7%<br>•NNT: 22 | •**Relative risk reduction: 30%**<br>•Absolute risk: 9.7%→6.5%<br>•NNT: 31 |
| Pros | •Highly efficacious<br>•Oral regimen<br>•Ritonavir studied (safe) in pregnancy | •Highly efficacious<br>•Monoclonals typically safe in pregnancy<br>•Few/no drug interactions | •Highly efficacious<br>•Studied in pregnancy<br>•Few/no drug interactions | •Oral regimen<br>•Not anticipated to have drug interactions |
| Cons | •Drug drug interactions | •Requires IV infusion followed by 1 hour observation | •Requires IV infusion on 3 consecutive days | •Low efficacy<br>•Concern: mutagenicity<br>•Not recommended in pregnancy/children |

# Bringing it All Back Home: Outpatient Treatment Options for COVID-19

| Option | Patient Population |
|---|---|
| Nirmatrelvir/ ritonavir | • Patient not on interacting medications<br>• As soon as possible and within 5 days of symptom onset |
| Sotrovimab | • Patient on interacting medication/able to come to health care facility<br>• As soon as possible and within 10 days of symptom onset |
| Remdesivir | • Patient in health care facility or through home infusion service<br>• As soon as possible and within 7 days of symptom onset |
| Molnupiravir | • Patient not able to be treated with one of the options above<br>• Not pregnant (if given during pregnancy, shared decision making)<br>• As soon as possible and within 5 days of symptom onset |

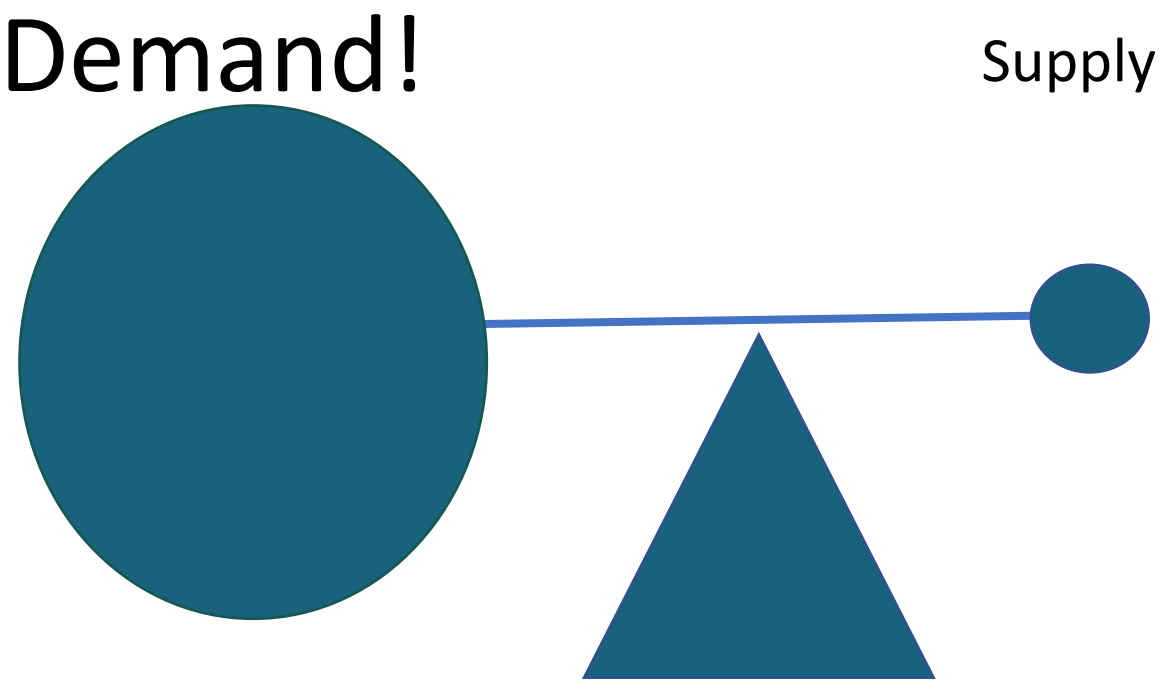
# How do we manage mismatch between supply and demand?

- Massachusetts allocation for 1st week:

  1100+ courses of nirmatrelvir/rtv

  8000+ courses of molnupiravir

- Prioritize highest risk patients until supply catches up with demand
- Monitor distribution to ensure equitable access
- When supply constraints ease, expand treatment to encompass broader range of patients




The COVID-19 Treatment Guidelines Panel's Interim Statement on Patient Prioritization for Outpatient Anti- SARS-CoV-2 Therapies or Preventive Strategies When There Are Logistical or Supply Constraints

*Last Updated: December 23, 2021*

https://www.covid19treatmentguidelines.nih.gov/

| Tier | Risk group |
|---|---|
| 1 | Immunocompromised individuals regardless of vaccine status **or** Unvaccinated individuals age ≥75 y or age ≥65 y with additional risk factors* |
| 2 | Unvaccinated individuals age ≥65 y or age <65 y with risk factors* |
| 3 | Vaccinated individuals age ≥75 y or age ≥65 y with additional risk factors* |
| 4 | Vaccinated individuals age ≥65 y or age <65 y with risk factors* |

*Risk factors for progressing to severe COVID include advanced age, cancer, cardiovascular disease, chronic kidney disease, chronic lung disease, diabetes, immunocompromised, obesity, pregnancy, sickle cell disease, other conditions*

*https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/underlyingconditions.html

# Future Directions in Outpatient COVID-19 Therapy

- What is the benefit of therapies in lower risk patients (vaccinated, infected with Omicron)?
- Will monotherapy select for viral resistance? Role of combination Rx?
  - Concern greatest for severely immunocompromised.
- Should these oral therapies, mAbs be used in hospitalized patients?

  Only if patient admitted for non-COVID reason and otherwise meets EUA criteria
- Does early treatment prevent long COVID?

# Desiderata: “Things Wanted or Needed”

| Need | Perfect Drug |
|---|---|
| Efficacy | ✓✓✓ |
| Ease of delivery | ✓✓✓ |
| Drug Interactions | ✓✓✓ |
| Safety during pregnancy | ✓✓✓ |
| Authorized in children (>12) | ✓✓✓ |
| Supply/Access | ✓✓✓ |

*Remdesivir approved for children >age 12 years and >40 kg; authorized for children under age of 12 years (3.5 to 40 kg)

# Desiderata: "Things Wanted or Needed"

| Need | Nirmatrelvir | Sotrovimab | Remdesivir | Molnupiravir |
|---|---|---|---|---|
| Efficacy | ✓✓✓ | ✓✓✓ | ✓✓✓ | ✓ |
| Ease of delivery | ✓✓✓ | X | XXX | ✓✓✓ |
| Drug Interactions | XXX | ✓✓ | ✓✓ | ✓✓ |
| Safety during pregnancy | ✓ | ✓ | ✓✓ | XXX |
| Authorized in children (>12) | ✓✓ | ✓✓ | ✓✓✓* | XX |
| Supply/Access | XXX | XXX | ✓ | XX |

*Remdesivir approved for children >age 12 years and >40 kg; authorized for children under age of 12 years (3.5 to 40 kg)

**Conclusion: We Don't Yet Have the Perfect Drug**

# Updates to IDSA Guidance: Early Treatment and Prophylaxis (PReP)

**Lindsey R. Baden, MD**

**Disclosures**: Member IDSA Guideline Committee, Chair FDA Antimicrobial Drug Advisory Committee, NIH funded to conduct SARS-CoV-2 Countermeasure Research (vaccines, treatments)

# Tixagevimab/cilgavimab (Evusheld™)

- **Recommendation (NEW): In moderately or severely immunocompromised individuals* at increased risk for inadequate immune response to COVID-19 vaccine or for whom COVID-19 vaccine is not recommended due to a documented serious adverse reaction to the vaccine, the IDSA guideline panel suggests pre-exposure prophylaxis with tixagevimab/cilgavimab rather than no tixagevimab/cilgavimab.**
  - (Conditional recommendation, Low certainty of evidence)

- **Remarks:**
  - Dosing for tixagevimab/cilgavimab is 150 mg of tixagevimab & 150 mg of cilgavimab administered as two separate consecutive intramuscular injections once.
  - Local SARS-CoV-2 variant susceptibility should be considered.



IDSA Updated 24Dec2021

# Sotrovimab (Xevudy™)

- **Recommendation 17: Among ambulatory patients with mild to moderate COVID-19 at high risk for progression to severe disease, the IDSA guideline panel suggests ~~bamlanivimab/etesevimab~~, ~~casirivimab/imdevimab~~, or sotrovimab rather than no neutralizing antibody treatment.**
  - **(Conditional recommendation, Moderate certainty of evidence)**

- **Remarks**:
  - Dosing for sotrovimab is 500 IV once.
  - Patients with mild to moderate COVID-19 who are at high risk of progression to severe disease admitted to the hospital for reasons other than COVID-19 may also receive ~~bamlanivimab/etesevimab~~, ~~casirivimab/imdevimab~~, or sotrovimab.
  - Local variant susceptibility should be considered in the choice of the most appropriate neutralizing antibody therapy. Local availability of different monoclonal antibody combinations may be affected by predominance of local variants.



IDSA Updated 19Sep2021

# Remdesivir (Veklury™)

- **Recommendation (NEW): Among ambulatory patients with mild to moderate COVID-19 at high risk for progression to severe disease, the IDSA guideline panel suggests remdesivir initiated within seven days of symptom onset rather than no remdesivir.**
  - **(Conditional recommendation, Low certainty of evidence)**

- **Remarks:**
  - Dosing for remdesivir is 200 mg on day one followed by 100 mg on days two and three.
  - Patients with mild to moderate COVID-19 who are at high risk of progression to severe disease admitted to the hospital for reasons other than COVID-19 may also receive remdesivir.



IDSA Updated 24Dec2021

# Nirmatrelvir/ritonavir (Paxlovid™)

- **Recommendation (NEW): In ambulatory patients with mild to moderate COVID-19 at high risk for progression to severe disease, the IDSA guideline panel suggests nirmatrelvir/ritonavir initiated within five days of symptom onset rather than no nirmatrelvir/ritonavir.**
  - **(Conditional recommendation, Low certainty of evidence)**

- **Remarks:**
  - Patients' medications need to be screened for serious drug interactions (i.e., medication reconciliation). Patients on ritonavir- or cobicistat-containing HIV or HCV regimens should continue their treatment as indicated.
  - Dosing based on renal function:
    - Estimated glomerular filtration rate (eGFR) > 60 ml/min: 300 mg nirmatrelvir/100 ritonavir every 12 hours for five days
      o eGFR ≤60 and ≥30 mL/min: 150 mg nirmatrelvir/100 mg ritonavir every 12 hours for five days
      o eGFR <30 mL/min: not recommended
  - Patients with mild to moderate COVID-19 who are at high risk of progression to severe disease admitted to the hospital for reasons other than COVID-19 may also receive nirmatrelvir/ritonavir.



IDSA Updated 24Dec2021

# Molnupiravir (Lagevrio™)

- **Recommendation (NEW): In ambulatory patients (>/= 18 years) with mild to moderate COVID-19 at high risk for progression to** severe **disease who have no other treatment options*, the IDSA guideline panel suggests molnupiravir initiated within 5 days of symptom onset rather than no molnupiravir.**
  - **(Conditional recommendation, Low certainty of evidence)**

- **Remarks:**
  - Patients who put a higher value on the putative mutagenesis, adverse events or reproductive concerns, and a lower value on the uncertain benefits, would reasonably decline molnupiravir.
  - Molnupiravir 800 mg for 5 days.
  - Patients with mild to moderate COVID-19 who are at high risk of progression to severe disease admitted to the hospital for reasons other than COVID-19 may also receive molnupiravir.
  - Molnupiravir is not authorized under the FDA EUA for use in patients < 18 years, because it may affect bone and cartilage growth.
  - Molnupiravir is not authorized under the FDA EUA for pre-exposure or post- exposure prevention of COVID-19 or for initiation of treatment in patients hospitalized due to COVID-19, because benefit of treatment has not been observed in individuals when treatment is started after hospitalization due to COVID-19.



IDSA Updated 30Dec2021

# COVID-19 Therapies for Children

Kathryn M. Edwards, MD

**Disclosures:**

Dr. Edwards has disclosed the following financial relationships. Any real or apparent conflicts of interest related to the content of this presentation have been resolved.

| Affiliation / Financial Interest | Organization |
|---|---|
| Grant Recipient | CDC (Vaccine Safety with COVID vaccines) |
| Grant Recipient | NIH (Mentoring young investigators in vaccine sciences) |
| Consultant | BioNet (pertussis vaccines) |
| Consultant | IBM (vaccine safety networks) |
| Consultant | Data Safety and Monitoring Boards: Sanofi, X-4 Pharma, Seqirus, Moderna, Pfizer, Merck, GSK, Roche |

## Summary of available SARS-CoV-2 monoclonal antibody preparations based on indication and age/weight inclusion criteria in children and adolescents at high risk for progressing to severe COVID-19

| | Minimum Age & Weight | |
|---|---|---|
| **Treatment Mild to Moderate COVID-19** | **>1 kg and <40 kg**<br>• Bamlanivimab/Etesevimab | **>40 kg**<br>• Bamlanivimab/Etesevimab<br><br>**<u>≥12 years and ≥40kg</u>**<br>• Casirivimab/Imdevimab<br>• Sotrovimab |
| **POST- Exposure Prophylaxis** | **>1 kg and <40 kg**<br>• Bamlanivimab/Etesevimab | **>40 kg**<br>• Bamlanivimab/Etesevimab<br><br>**<u>≥12 years and ≥40kg</u>**<br>• Casirivimab/Imdevimab |
| **PRE- Exposure Prophylaxis** | **<12 years and <40 kg**<br>• No mAb option | **≥12 years and ≥40kg**<br>Tixagevimab and Cilgavimab |

# Which children and adolescents are considered “high risk” and may qualify for outpatient  treatment with SARS-CoV-2 monoclonal antibodies?

- **Body mass index (BMI) ≥85$^{th}$ percentile** for age and gender
- **Immunosuppressive disease or receipt of immunosuppressive therapies**
- Neurodevelopmental disorders (eg, cerebral palsy, trisomy 21)
- A medical-related technological dependence that is not related to COVID-19 (eg, **tracheostomy,** gastrostomy)
- Sickle cell disease
- Congenital or acquired heart disease
- Chronic lung disease; asthma or other chronic respiratory disease that requires daily medication for control
- Diabetes
- Chronic kidney disease
- Chronic liver disease (eg, cirrhosis, autoimmune hepatitis)
- Age <1 year
    - More recent data evaluating **risk factors for severe COVID-19** in young infants, identified **prematurity** (gestational age <37 weeks) as a risk factor for severe COVID-19.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

# Early Remdesivir to Prevent Progression to Severe Covid-19 in Outpatients

R.L. Gottlieb, C.E. Vaca, R. Paredes, J. Mera, B.J. Webb, G. Perez, G. Oguchi, P. Ryan, B.U. Nielsen, M. Brown, A. Hidalgo, Y. Sachdeva, S. Mittal, O. Osiyemi, J. Skarbinski, K. Juneja, R.H. Hyland, A. Osinusi, S. Chen, G. Camus, M. Abdelghany, S. Davies, N. Behenna-Renton, F. Duff, F.M. Marty,* M.J. Katz, A.A. Ginde, S.M. Brown, J.T. Schiffer, and J.A. Hill, for the GS-US-540-9012 (PINETREE) Investigators†

Table 1. Demographic and Clinical Characteristics of the Patients at Baseline.*

| Characteristic | Remdesivir (N=279) | Placebo (N=283) | Total (N=562) |
|---|---|---|---|
| Age — yr | 50±15 | 51±15 | 50±15 |
| Age category — no. (%) | | | |
| ≥60 yr | 83 (29.7) | 87 (30.7) | 170 (30.2) |
| <18 yr | 3 (1.1) | 5 (1.8) | 8 (1.4) |

## *Remdesivir Dosing*

Children > 40 kg:

200 mg for first day and then 100 mg for days 2 and 3

Children 3.5 kg to 39 kg:

5 mg/kg for first day and then 2.5 mg/kg for days 2 and 3

# FACT SHEET FOR HEALTHCARE PROVIDERS: EMERGENCY USE AUTHORIZATION FOR PAXLOVID™

## 8.1 Pregnancy

Risk Summary

There are no available human data on the use of nirmatrelvir during pregnancy to evaluate for a drug-associated risk of major birth defects, miscarriage, or adverse maternal or fetal outcomes. Published observational studies on ritonavir use in pregnant women have not identified an increase in the risk of major birth defects. Published studies with ritonavir are insufficient to identify a drug-associated risk of miscarriage *(see Data).* There are maternal and fetal risks associated with untreated COVID-19 in pregnancy *(see Clinical Considerations).*

PAXLOVID is not authorized for use in pediatric patients younger than 12 years of age or weighing less than 40 kg. The safety and effectiveness of PAXLOVID have not been established in pediatric patients. The authorized adult dosing regimen is expected to result in comparable serum exposures of nirmatrelvir and ritonavir in patients 12 years of age and older and weighing at least 40 kg as observed in adults, and adults with similar body weight were included in the trial EPIC-HR *[see Adverse Reactions (6.1), Clinical Pharmacology (12.3), and Clinical Studies (14)].*

# U.S. Food and Drug Administration Center for Drug Evaluation and Research
# FDA Briefing Document Antimicrobial Drugs Advisory Committee Meeting
# November 30, 2021
# Molnupiravir (MOV)

- Pregnancy

  Molnupiravir may cause fetal harm when administered to pregnant individuals. Therefore, **molnupiravir is not recommended for use during pregnancy.** Prior to initiating treatment with molnupiravir, health care providers should assess whether an individual of childbearing potential is pregnant or not, if clinically indicated. Molnupiravir is authorized to be prescribed to a pregnant individual only after the health care provider has determined that the benefits would

**Pediatrics (Less Than 18 Years of Age**) As previously described, animal studies suggest that MOV may affect bone and cartilage growth. Further, COVID-19 is typically associated with a mild disease course in most pediatric patients. All of the mAbs authorized for the treatment of mild-to-moderate COVID-19 include adolescents (patients 12 years of age and older weighing at least 40 kg) in the authorization. A juvenile toxicity study in rats is planned to further inform the safety of MOV in pediatric patients. If MOV is authorized, the Agency and Sponsor are in agreement that MOV not be authorized for use in patients less than 18 years old.

# *Pharmacologic Considerations*

**Amy Hirsch Shumaker, PharmD, BCPS, AAHIVP**

# Renal Dosing Paxlovid™ (nirmatrelvir/ritonavir)

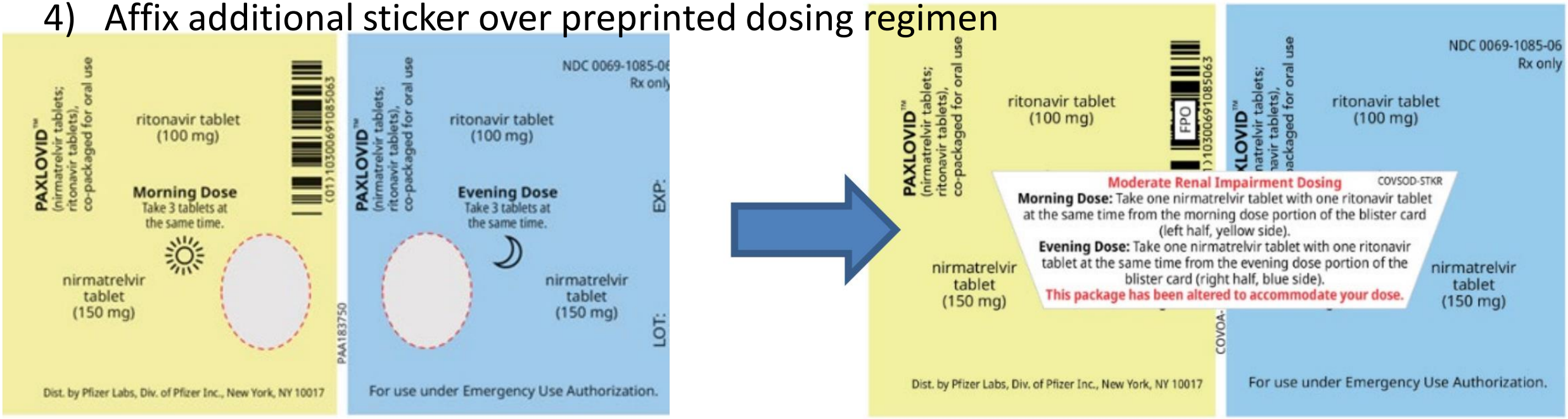
| eGFR Range | Nirmatrelvir* Dose | Ritonavir Dose |
|---|---|---|
| eGFR ≥ 60 mL/min (mild) | 300 mg twice daily x 5 days | 100 mg twice daily x 5 days |
| eGFR > 30 to < 60 mL/min (moderate) | 150 mg twice daily x 5 days | 100 mg twice daily x 5 days |
| eGFR < 30 mL/min (severe) | Paxlovid (nirmatrelvir/ritonavir) not recommended until more information available | |
| * Nirmatrelvir is renally eliminated; Cmax and AUC were 48% and 204% higher in those with severe renal impairment | | |

Prescriptions should specify the numeric dosage of each active ingredient within Paxlovid™

# Pharmacist Dispensing Instructions for Paxlovid™ with Moderate Renal Impairment

Pharmacist steps:

1) Remove one nirmatrelvir 150 mg dose from morning and evening dose (doses in middle of card)
2) Affix sticker to cover empty blister cavities
3) Repeat steps 1 and 2 for every blister card in carton (5 per carton for 5-day supply)
4) Affix additional sticker over preprinted dosing regimen




https://www.fda.gov/media/155072/download Accessed: 1/6/2022

# Drug-Drug Interactions (DDI's) with Paxlovid™

- Ritonavir-FDA approved as an HIV protease inhibitor
  - Potent inhibitor of CYP3A4, p-glycoprotein
    - Also inhibits CYP2D6, CYP2C19, CYP2C8 and CYP2C9
  - Inducer of CYP1A2, CYP2B6, CYP269, CYP2C19
- Nirmatrelvir is a substrate of CYP3A4

Major potential for drug-drug interactions

| Drug Interaction Mitigation Strategies | HIV Setting | COVID-19 Setting |
|---|---|---|
| **Pharmacy expert involved** | **++++** | **++** |
| **Medication reconciliation available** | **++++** | **++** |
| **Access to electronic medical record** | **+++** | **+** |
| **Ability to directly consult with prescribers** | **+++** | **+** |

Heskin J, Pallett S, Mughal N, et al. Lancet. 2022 1-7 January; 399(10319): 21–22.

# Paxlovid™
# Medication Contraindications and Resources

**Drugs highly dependent on CYP3A for clearance and subject to increased concentrations**

- Alpha1-adrenoreceptor antagonist: alfuzosin
- Analgesics: pethidine, piroxicam, propoxyphene
- Antianginal: ranolazine
- Antiarrhythmic: amiodarone, dronedarone, flecainide, propafenone, quinidine
- Anti-gout: colchicine
- Antipsychotics: lurasidone, pimozide, clozapine
- Ergot derivatives: dihydroergotamine, ergotamine, methylergonovine
- HMG-CoA reductase inhibitors: lovastatin, simvastatin
- PDE5 inhibitor: sildenafil (Revatio®) when used for pulmonary arterial hypertension (PAH)
- Sedative/hypnotics: triazolam, oral midazolam

**Drugs that can speed up the metabolism of nirmatelvir**

- Anticancer drugs: apalutamide
- Anticonvulsant: carbamazepine, phenobarbital, phenytoin
- Antimycobacterials: rifampin
- Herbal products: St. John's Wort (hypericum perforatum)

## Resources:

- https://www.covid19-druginteractions.org/
- https://www.hiv-druginteractions.org/
- HIV/Hep C literature

# Paxlovid™ DDI's in Transplant Patients

## Transplant Medications

Tacrolimus levels
(monitor when feasible)

Cyclosporine levels
(monitor when feasible)

Sirolimus levels
(avoid concomitant use)

## American Society of Transplantation Statement[1]

1) **Drug monitoring is challenging in outpatient settings**
2) **Molnupiravir not evaluated and low efficacy**
3) **Early monoclonal antibody treatment or IV remdesivir may be preferable**

1.https://www.myast.org/sites/default/files/AST%20Statement%20on%20Oral%20Antiviral%20Therapy%20for%20COVID%20Jan%204%20%282%29.pdf- Accessed 1/5/2022

# Paxlovid™ DDI's in Cardiology

- Statins
  - Lovastatin-not recommended
  - Simvastatin-not recommended

  Hold all statins x 5 days?
- Antiarrhythmics-not recommended d/t risk of arrhythmias
  - Amiodarone
  - Dronedarone
  - Flecainide
  - Propafenone
  - Quinidine
- Clopidogrel-not mentioned in FDA EUA however known interaction in HIV literature
  - Risk of thrombosis s/p stenting; high risk 6 weeks post stent
- Antihypertensives
  - Increased levels of calcium channel blockers
- Increased digoxin levels

# Additional* Paxlovid™ DDI's (*not an exhaustive list)

- Oncology agents
  - Various concerns if drug ends in:
    - -ib
    - -clax
    - -tine
- Systemic corticosteroids
  - Cushing's syndrome
  - ? Inhaled steroids
  - ? Injectable steroids
- Women's Health
  - Decreased effectiveness on ethinyl estradiol
  - Counsel on backup non-hormonal method of contraception
- Men's Health
  - PDE5-no warning for use in ED; warnings on max doses in HIV literature

# Q&A/Discussion

# Today's Links

CAPT Lauri Hicks, MD

- Slide 6 - https://www.who.int/publications/m/item/enhancing-readiness-for-omicron-(b.1.1.529)-technical-brief-and-priority-actions-for-member-states
- Slide 9 - https://covid.cdc.gov/covid-data-tracker/#variant-proportions
- Slide 10 – SARS-CoV-2 Omicron VOC Transmission in Danish Households (medrxiv.org)
- Slide 12 – https://covid.cdc.gov/covid-data-tracker/#new-hospital-admissions
- Slide 13 – Clinical Severity of COVID-19 Patients Admitted to Hospitals in Gauteng, South Africa During the Omicron-Dominant Fourth Wave by Waasila Jassat, Salim Abdool Karim, Caroline Mudara, Richard Welch, Lovelyn Ozougwu, Michelle Groome, Nevashan Govender, Anne von Gottberg, Nicole Wolter, DATCOV Author Group, Lucille Blumberg, Cheryl Cohen :: SSRN
- Slide 14 - Omicron daily overview: 30 December 2021 (publishing.service.gov.uk)
  rapport-omikronvarianten-29122021-ub46 (ssi.dk)
  Early estimates of SARS-CoV-2 Omicron variant severity based on a matched cohort study, Ontario, Canada | medRxiv
- Slide 16 - https://www.medrxiv.org/content/10.1101/2021.12.07.21267432v1.full.pdf
  https://www.ahri.org/wp-content/uploads/2021/12/MEDRXIV-2021-267417v1-Sigal.pdf
  https://www.medrxiv.org/content/10.1101/2021.12.10.21267534v1
  https://www.medrxiv.org/content/10.1101/2021.12.14.21267772v1.full.pdf
  https://www.biorxiv.org/content/10.1101/2021.12.16.472934v1
  https://pubmed.ncbi.nlm.nih.gov/34915551/
  https://www.biorxiv.org/content/10.1101/2021.12.20.473557v1.full.pdf
  https://www.nejm.org/doi/full/10.1056/NEJMc2119641?query=RP
  https://www.biorxiv.org/content/10.1101/2021.12.12.472252v1.full.pdf
  https://www.biorxiv.org/content/10.1101/2021.12.14.472630v1.full.pdf
  https://www.medrxiv.org/content/10.1101/2021.12.08.21267491v1.full
- Slide 17- SARS-CoV-2 variants of concern and variants under investigation (publishing.service.gov.uk)
- Slide 19 - https://www.cdc.gov/mmwr/volumes/70/wr/mm7050e1.htm?s_cid=mm7050e1_w
- Slide 20 - https://www.cdc.gov/coronavirus/2019-ncov/your-health/quarantine-isolation.html
  https://www.cdc.gov/coronavirus/2019-ncov/if-you-are-sick/quarantine-isolation-background.html

# Today's Links

John Farley, MD, MPH

- Slide 25 - https://covid.cdc.gov/covid-data-tracker/#variant-proportions
- Slide 27 - EVUSHELD™ Health Care Provider Fact Sheet: https://www.fda.gov/media/154701/download
- Slide 30 – PAXLOVID Health Care Provider Fact Sheet: https://www.fda.gov/media/155050/download
- Slide 27 and 32 –Molnupiravir Health Care Provider Fact Sheet: https://www.fda.gov/media/155054/download
- Slide 32 – Pregnancy Surveillance Program: https://pregnancyreporting.msd.com/

Colin Shepard, MD

- Slide 39 – PHE.gov.
- Slide 43 – National Institutes of Health (NIH) clinical guidelines
- Slide 44 – Additional information on reimbursement: Monoclonal Antibody COVID-19 Infusion | CMS
  Reimbursement options for uninsured individuals: HRSA
- Slide 45 - https://www.covid19treatmentguidelines.nih.gov/therapies/statement-on-patient-prioritization-for-outpatient-therapies/
- Slide 47 – https://www.phe.gov/emergency/events/COVID19/therapeutics/Pages/default.aspx
  https://www.phe.gov/emergency/events/COVID19/therapeutics/Pages/Side-by-Side-Overview-of-mAbs-Treatment.aspx
- Slide 48 - COVID19Therapeutics@hhs.gov

Rajesh Gandhi, MD, FIDSA

- Slide 51 - https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/scientific-brief-omicron-variant.html
  Vangeel L et al, bioRxiv preprint doi: https://doi.org/10.1101/2021.12.27.474275

- Slide 55 - https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-care/underlyingconditions.html
  https://www.covid19treatmentguidelines.nih.gov/

# Today's Links

Amy Hirsch Shumaker, PharmD, BCPS, AAHIVP

- Slide 73 - https://www.fda.gov/media/155072/download
- Slide 74 - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8718360/
- Slide 75 - https://www.covid19-druginteractions.org/
  https://www.hiv-druginteractions.org/
- Slide 76 - https://www.myast.org/sites/default/files/AST%20Statement%20on%20Oral%20Antiviral%20Therapy%20for%20COVID%20Jan%204%20%282%29.pdf

Program Links:

- This webinar is being recorded and can be found with the slides online at https://www.idsociety.org/cliniciancalls
- RTLN Survey - https://www.surveymonkey.com/r/BFBJ5CK
- COVID-19 Real-Time Learning Network: https://www.idsociety.org/covid-19-real-time-learning-network/
- Vaccine FAQ: https://www.idsociety.org/covid-19-real-time-learning-network/vaccines/vaccines-information--faq/

Continue the conversation on Twitter

@RealTimeCOVID19
#RealTimeCOVID19

We want to hear from you!

Please complete the post-call survey.

Next Call

**Saturday, Jan. 22nd**

A recording of this call will be posted at
**www.idsociety.org/cliniciancalls**

*-- library of all past calls now available --*

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