CMEO Snack

Regional SARS-CoV-2 Variants and their Impact on Inpatient Treatment

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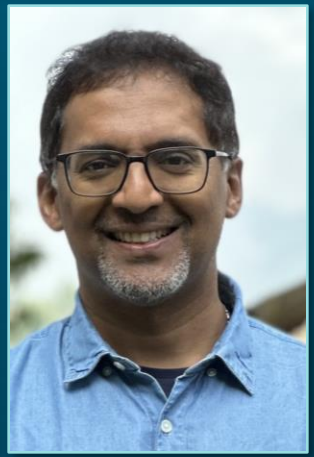

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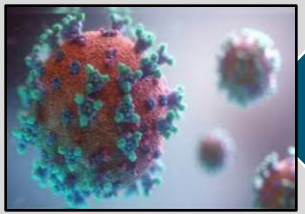
LEARNING OBJECTIVE 1

Analyze regional differences in SARS-CoV-2 variants and their influence on the effectiveness of inpatient COVID-19 treatment strategies

SARS-CoV-2 Misconceptions between Patients and Clinicians

Natural immunity provides superior and efficient protection without vaccination

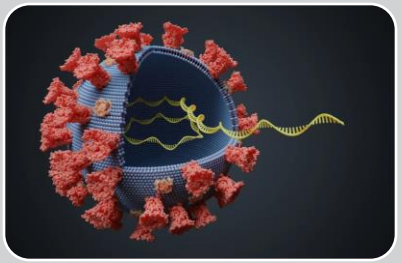


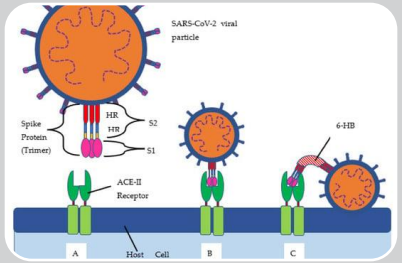
Emerging variants are more severe and current vaccines are ineffective

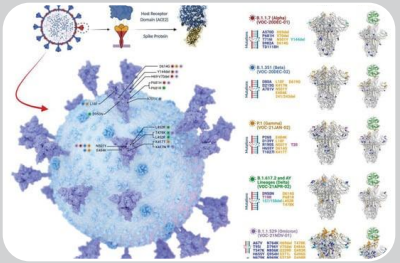
Long COVID is not a real or serious medical condition

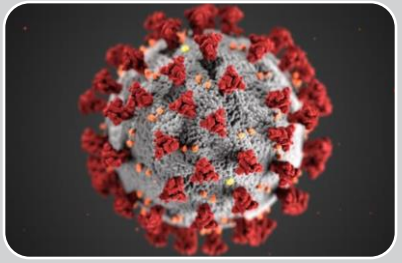
Kisa K, et al. *J Med Internet Res*.2024;26:e56931; Link-Gelles R, et al. *MMWR Morb Mortal Wkly Rep*. 2025;74(6):73-82; Pooley N, et al. *Infect Dis Ther*. 2023;12(2):367-387; Hou Y, et al. *medRxiv*. 2025;01.01.24319384.

Evolutionary Trajectory: Wuhan to Stratus/Nimbus









Wuhan (2019)

Delta (2021)

Omicron (2022)

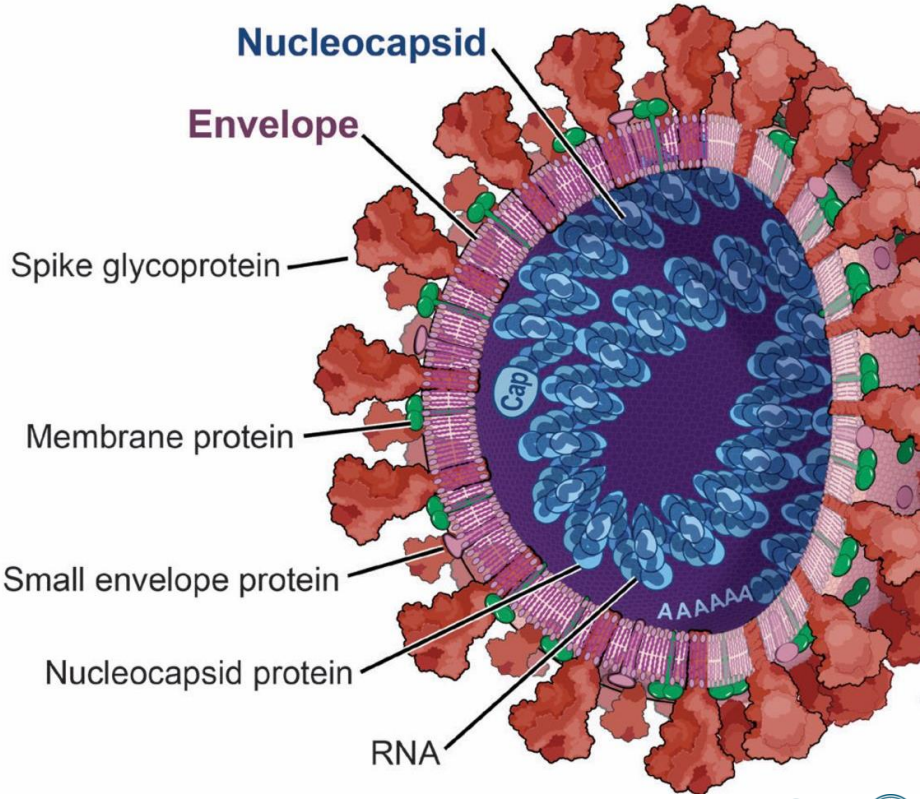
Stratus/ Nimbus (2025)

Thomas L. News Medical Life Sciences Website. 2021. https://www.news-medical.net/news/20210507/The-ancestor-of-SARS-CoV-2e28099s-Wuhan-strain-was-circulating-in-late-October-2019.aspx; Shiehzadegan S, et al. *Clin Pract*. 2021; 11(4): 778-784; Chavda VP, et al. *Vaccines (Basel)*. 2022;10(11):1926; Center for Disease Control and Prevention (CDC). 2024. https://www.cdc.gov/ncird/whats-new/sars-cov-2-variant-xec-increases-as-kp-3-1-1-slows.html.

Biological Mechanism of SARS-CoV-2

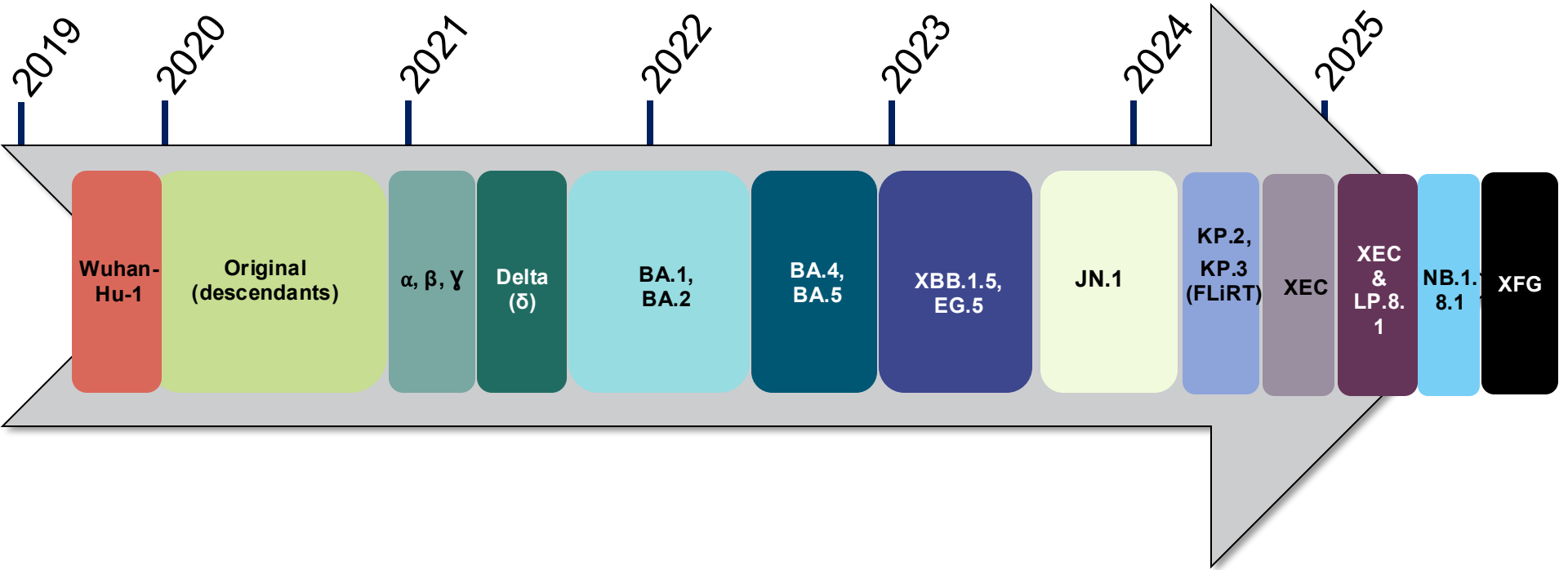
- Enveloped +ssRNA virus
- Uses **ACE2** as the obligate entry receptor
- ACE2 expressed in:
  - Nasal epithelium
  - Bronchial epithelium
  - Type II alveolar cells
  - Small intestine
  - Heart and kidney

Structural Protein	Function
Nucleocapsid (N)	Encapsulates the RNA genome into a helical ribonucleocapsid complex
Spike (S)	Viral attachment and entry into host cells
Envelope (E)	Virion assembly, budding, and release
Membrane (M)	Virus assembly and morphogenesis



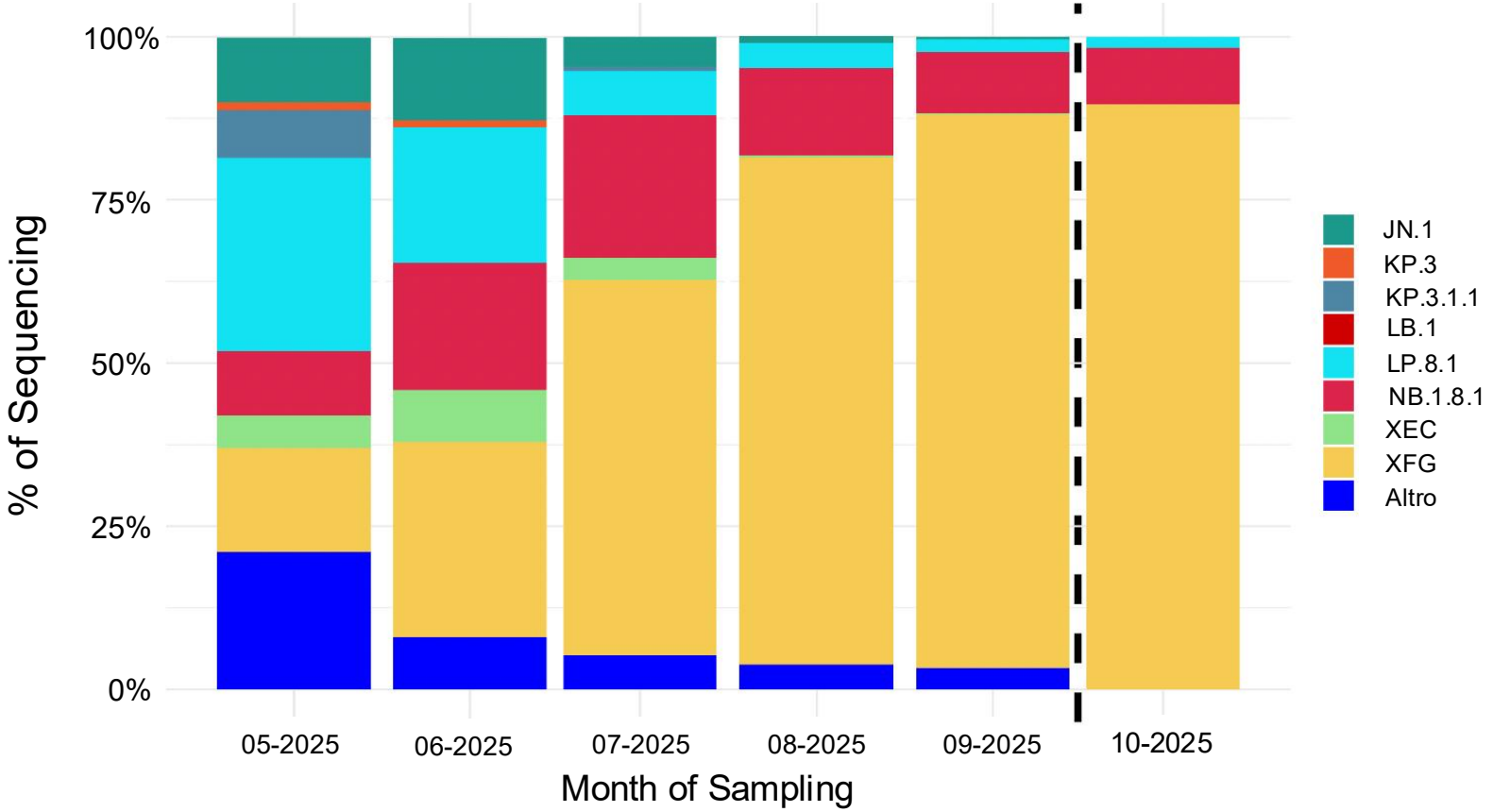
ACE2 = angiotensin-converting enzyme 2; +ssRNA = positive single-stranded ribonucleic acid

SARS-CoV-2 Variant Timeline Progression



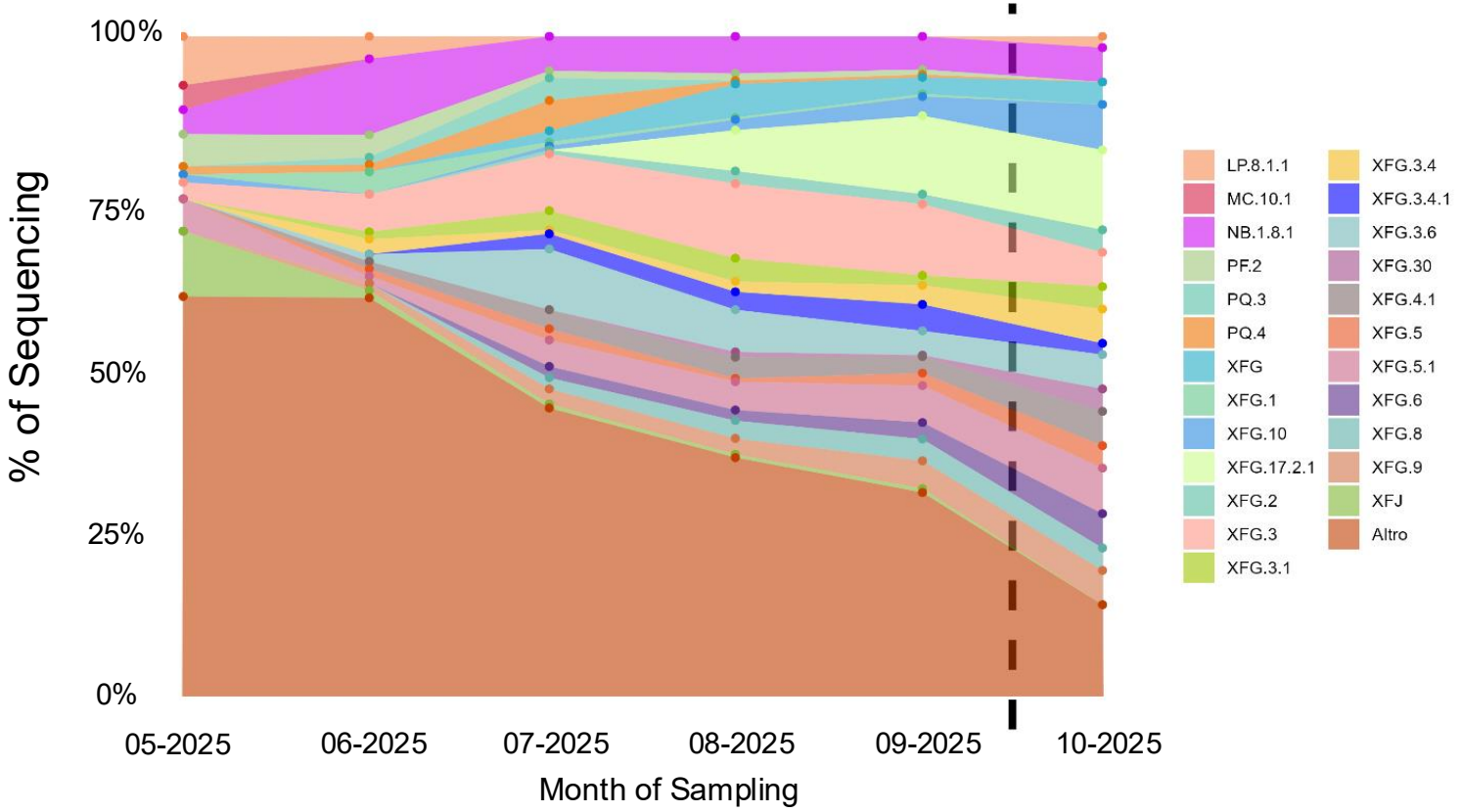
Kavanagh K. Nature Website. 2025. https://www.nature.com/articles/d41586-025-03412-x;
World Health Organization (WHO). 2022. https://www.who.int/activities/tracking-SARS-CoV-2-variants.

Percentage (%) of Major SARS-CoV-2 Lineages by Sampling Month



Ministero della Salute. *Monitoraggio Fase 3 Report Settimanale.* 2025.
https://www.salute.gov.it/new/sites/default/files/2025-10/Monitoraggio%20SARS-CoV-2%20Fase%203_Settimana%20129%20FINALE.pdf.

Percentage (%) of Major SARS-CoV-2 Sub-lineages by Sampling Month



Ministero della Salute. *Monitoraggio Fase 3 Report Settimanale*. 2025.
https://www.salute.gov.it/new/sites/default/files/2025-10/Monitoraggio%20SARS-CoV-2%20Fase%203_Settimana%20129%20FINALE.pdf.

Regional SARS-CoV-2 Variant Circulation Overview (October 5 – November 5, 2025)

Variants of interest	Variants under monitoring	Variants of concern
• JN.1	• XFG • NB.1.8.1 • LP.8.1 • KP.3.1.1 • XEC	• None

Dominant Circulating Variants
XFG – Europe and Americas
NB.1.8.1 – Western Pacific

World Health Organization (WHO). 2025. https://data.who.int/dashboards/covid19/summary.

Patient Case: PW

- PW is a 29-yr old female with rheumatoid arthritis (RA) on maintenance therapy of prednisone (10mg/day)

Initial Presentation (Day 0)

- Reports 2 days of fever, cough, and chills

Vitals in ED

- Temp: 38.8°C *(101.8°F)*
- HR: 104 bpm
- BP: 104/55 mmHg
- RR: 18 breaths/min
- SpO2 97% on RA

Diagnostics

- CBC with diff – WBC 11,000/µL; neutrophils 70%, lymphocytes 12% (absolute 0.9K), eosinophils 0%
- CMP normal
- CRP mild elevation
- CXR - unremarkable

Management

- Admitted for monitoring due to immunosuppression

BP = blood pressure; CBC = complete blood count; CMP = comprehensive metabolic panel; CRP = c-reactive protein; CXR = chest x-ray; HR = heart rate; RR = respiratory rate; SpO2 = peripheral oxygen saturation; WBC = white blood cell

Patient Case: PW

Hospital Course

Day 2 (am)

Increasing dyspnea
SpO2 92% RA
CXR reveals bilateral infiltrates

Started on O2 2-3L via nasal cannula; IV dexamethasone (6mg/day)

Day 2 (pm)

- SpO2 drops to 85%
- CRP rises to 160 mg/L - tocilizumab initiated (single IV dose)
- NIV attempted (low tidal volume, high PEEP, proning cycles initiated)

Days 5-7

- Lung mechanics improve; FiO2 requirements fall

Days 7-9

- Successfully extubated to nasal cannula

Days 9-12

- Stable on room air, transferred to ward

Vitals Chart

Day	HR	BP	Temp	RR	SpO2
Day 1	98	108/60	100.4°F	20	95% RA
Day 2 AM	112	102/58	100°F	24	92% RA
Day 2 PM	118	98/54	100.2°F	32	85% despite O2
Day 3	114	100/58	99°F	Vent-controlled	SpO2 94% FiO2 60%
Day 5	112	102/60	98.6°F	Vent-controlled	SpO2 96% FiO2 40%
Day 7	106	104/58	98°F	Vent-controlled	SpO2 97% FiO2 30%
Day 9	92	110/65	98.2°F	18	Extubated → 94% on 3 L NC
Day 12	86	112/68	98.0°F	16	97% RA

FiO2 = fraction of inspired oxygen; IV = intravenous; NC = nasal cannula; NIV = noninvasive ventilation; PEEP = positive end expiratory pressure

XFG vs. NB.1.8.1 Variant Comparison

Key Findings:

✓ Enhanced transmissibility, no increased severity

✓ Public health Risk: LOW for both variants

✓ Vaccines remain effective

✓ Consistent symptom profiles with prior omicron variants

Parameter	XFG	NB.1.8.1
Global Prevalence (Oct-Nov 2025)	71% of sequences	15% of sequences
Transmissibility	Moderate growth advantage; low ACE2 binding affinity highest relative growth rate	High ACE2 binding: 2.5-fold higher infectivity than LP.8.1
Severity	No increase vs. prior variants	No increase vs. prior variants
Immune Evasion	2-fold antibody reduction in antibody neutralization	1.6-fold antibody reduction in antibody neutralization
WHO Public Health Risk Level	Low	Low
Vaccine Effectiveness	Expected to remain effective	Expected to remain effective

World Health Organization (WHO).2025. https://data.who.int/dashboards/covid19/summary; Geddes, et al. Gavi. 2025. https://www.gavi.org/vaccineswork/eight-things-you-need-know-about-new-nimbus-and-stratus-covid-variants; World Health Organization (WHO). *WHO TAG-VE Risk Evaluation for SARS-CoV-2 Variant Under Monitoring: XFG2025*. https://www.who.int/docs/default-source/coronaviruse/25062025_xfg_ire.pdf; World Health Organization (WHO). *WHO TAG-VE Risk Evaluation for SARS-CoV-2 Variant Under Monitoring: NB.1.8.1*. 2025. https://cdn.who.int/media/docs/default-source/documents/epp/tracking-sars-cov-2/23052025_nb.1.8.1_ire.pdf; Kavanagh K. Nature Website. 2025. https://www.nature.com/articles/d41586-025-03412-x; Guo C, et al. *Lancet Infect Dis*. 2025;25(7);374-377; Abir HP, et al. *Health Sci Rep*. 2025;8(11):e71453.

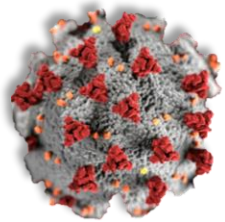
Inpatient Treatment: Regional Variations

Organization	Severity Classifications	First-Line Treatments	Second-Line Treatments	VTE Prophylaxis
WHO	• Non-severe • Severe (SpO2 < 90%) • Critical (ARDS/sepsis/shock)	• Corticosteroids (dexamethasone) • Antivirals • Supportive care	• Tocilizumab/baricitinib for severe cases	• Standard prophylactic doses LMWH
NICE (UK)	• Similar to WHO classifications	• Corticosteroids • Antivirals • Oxygen therapy (CPAP/HFNC)	• Tocilizumab for severe cases	• Risk-based approach
IDSA (USA)	• Mild-Moderate (SpO2 > 94%) • Severe (SpO2 ≤ 94%) • Critical (mechanical ventilation/ECMO)	• Nirmatrelvir/ritonavir • Remdesivir • Corticosteroids	• Tocilizumab/baricitinib for severe cases	• ASH recommends prophylactic over intermediate doses
ICMR (India)	• Mild: URTI, no hypoxia • Moderate: RR ≥ 24/min, SpO2 90–93% on room air • Severe: RR > 30/min, SpO2 < 90% on room air	• Awake proning for all hypoxic patients • Corticosteroids: (moderate/severe) • Antivirals: Restricted emergency use for moderate cases	• Tocilizumab (off-label): Considered only for rapidly progressive severe disease with raised inflammatory markers within 24-48h of steroid use	• Prophylactic anticoagulation: UFH or LMWH

ASH = American Society of hematology; ARDS = acute respiratory distress syndrome; CPAP = continuous positive airway pressure; ECMO = extracorporeal membrane oxygenation; HFNC = high-flow nasal cannula; ICMR = Indian Council of Medical Research; IDSA = Infectious Diseases Society of America; LMWH = low molecular weight heparin; NICE = National Institute for Health and Care Excellence; UFH = unfractionated heparin; URTI = upper respiratory tract infection; VTE = venous thromboembolism

Infectious Diseases Society of America (IDSA). 2025. https://www.idsociety.org/practice-guideline/SARS-CoV-2-guideline-treatment-and-management/.
National Institute for Health and Care Excellence (NICE). 2021. https://www.nice.org.uk/guidance/ng191/resources/covid19-rapid-guideline-managing-covid19-pdf-66142077109189. World Health Organization (WHO). 2025. https://iris.who.int/server/api/core/bitstreams/d1021eff-f570-4c22-b630-a44bf4267a6c/content. Siegal et al. *Blood Advances*. 2025; 9(6):1247–1260; Sharma S, et al. *Sens Int*. 2020; 1:100013; Indian Council for Medical Research. *Clinical Guidance for Management of Adult COVID-19 Patients*. 2023. https://covid19dashboard.mohfw.gov.in/pdf/ClinicalGuidanceforManagementofAdultCOVID19Patientsupdatedason05thjan2023.pdf.

Key Takeaways for Global HealthCare



Variants do not dictate treatment

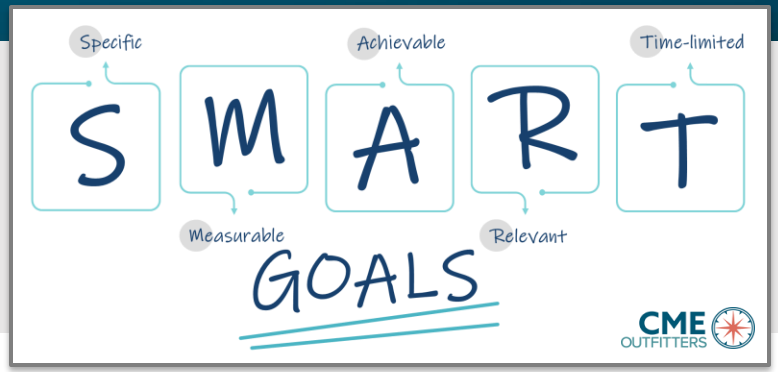
- Apply the same evidence-based standard of care across variants according more to disease severity rather than lineage

Time is of the essence

- Early intervention is the single biggest predictor of outcome

Treat the patient, not the variant

- Focus on age, comorbidities, and immune status when developing individualized treatment plan



Put information into action!

Takeaways from this program can be implemented into your practice to improve patient care.

- Utilize guideline-concordant protocols and disease severity rather than specific variants when making inpatient SARS-CoV-2 treatment decisions in at least 80% of patients over the next 6-12 months
- Prioritize patient vulnerabilities over specific variants when selecting inpatient treatment plans in at least 80% of patients over the next 6-12 months
- Recognize the benefit of earlier versus delayed initiation of inpatient SARS-CoV-2 treatment in at least 80% of patients over the next 6-12 months

To Receive Credit

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Participants will be able to download and print their certificate immediately upon completion.

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Early Diagnosis and Timely Treatment in Hospitalized Patients with SARS-CoV-2 Infection

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Risk Stratification in Hospitalized SARS-CoV-2 Patients

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