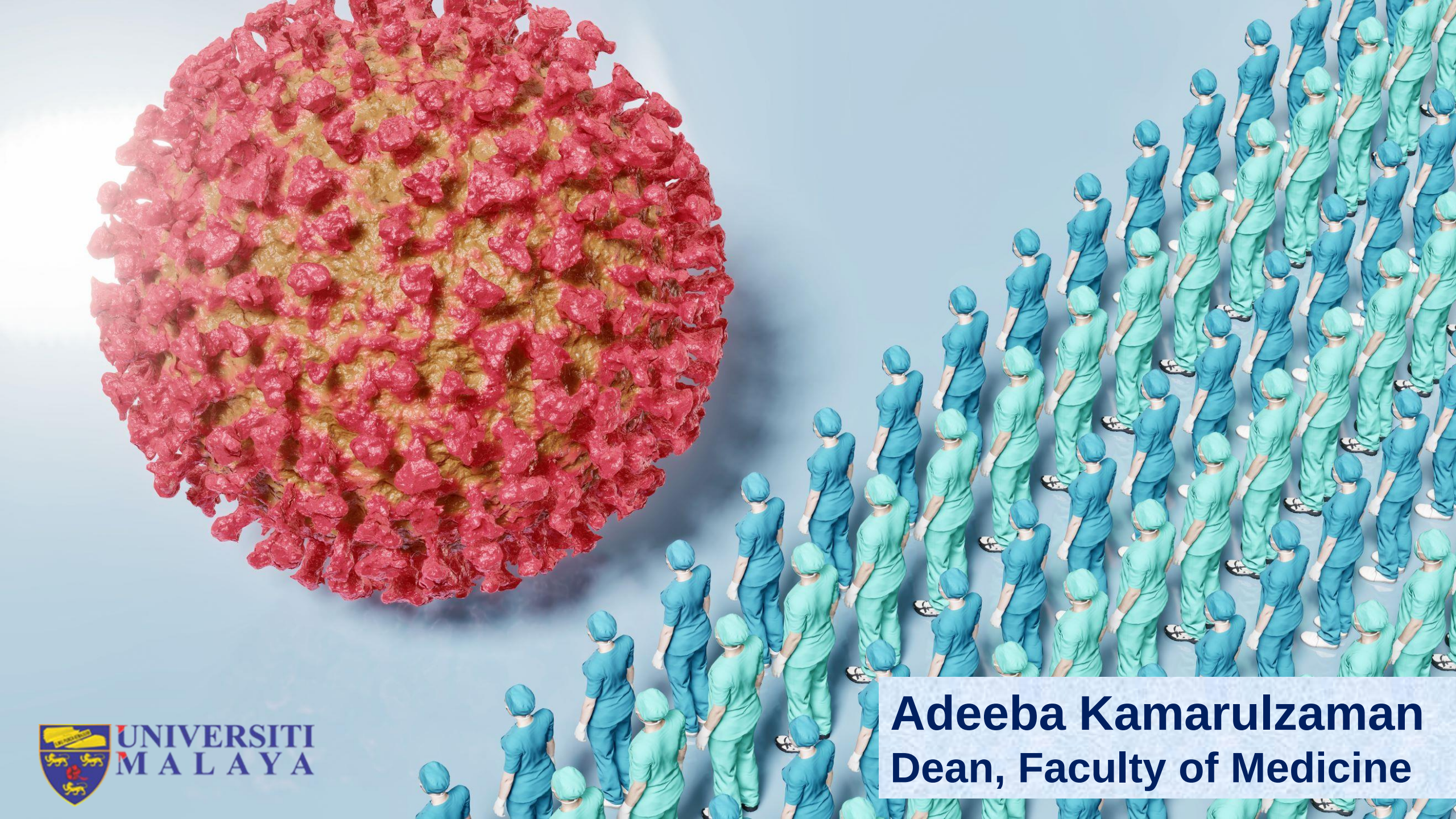


UNIVERSITI MALAYA

Adeeba Kamarulzaman
Dean, Faculty of Medicine

COVID-19 Dashboard by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins Universit...

Global Cases
50,517,420

Cases by Country/Region/Sovereignty

- 9,973,563 US
- 8,553,657 India
- 5,664,115 Brazil
- 1,835,187 France
- 1,781,997 Russia
- 1,328,832 Spain

Admin0

Last Updated at (M/D/YYYY)
11/9/2020, 8:25 PM

Cumulative Cases | Active Cases | Incidence Rate | Case-Fatality Ratio | Testing Rate

190
countries/regions

Lancet Inf Dis Article: Here. Mobile Version: Here. Data sources: Full list. Downloadable database: GitHub, Feature Layer.

Global Deaths
1,257,922

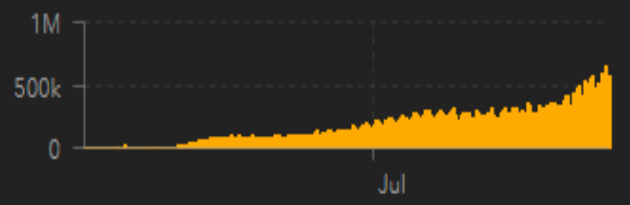
- 237,584 deaths US
- 162,397 deaths Brazil
- 126,611 deaths India

Global Deaths

US State Level
Deaths, Recovered

- 33,694 deaths, 80,646 recovered New York US
- 19,184 deaths, 820,215 recovered Texas US
- 17,977 deaths,

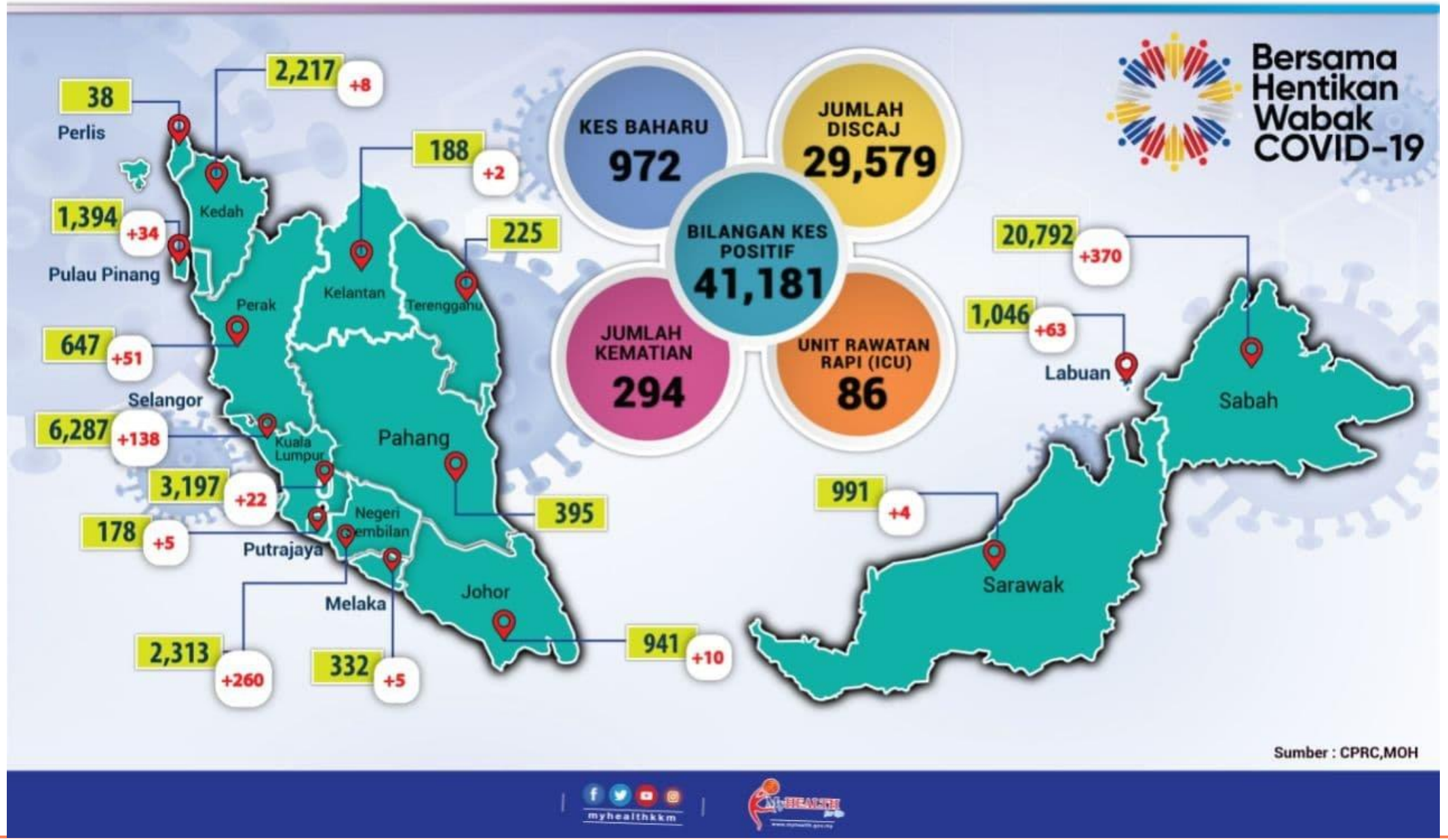
US Deaths, R...



Daily Cases

KES POSITIF MENGIKUT NEGERI (setakat 9/11/2020,12 PM)

KEMENTERIAN KESIHATAN MALAYSIA



Situasi Semasa Pandemik COVID-19 Di Malaysia

Dikemaskini sehingga 09 November 2020, 12.00pm

Jumlah Keseluruhan Kes

41181

+972

Kes Import: 5

Kes Tempatan: 967

Jumlah Kes Sembuh (Discaj)

29579 +1345

71.8%
Daripada Keseluruhan Kes

Jumlah Kes Aktif

11308

ICU
86

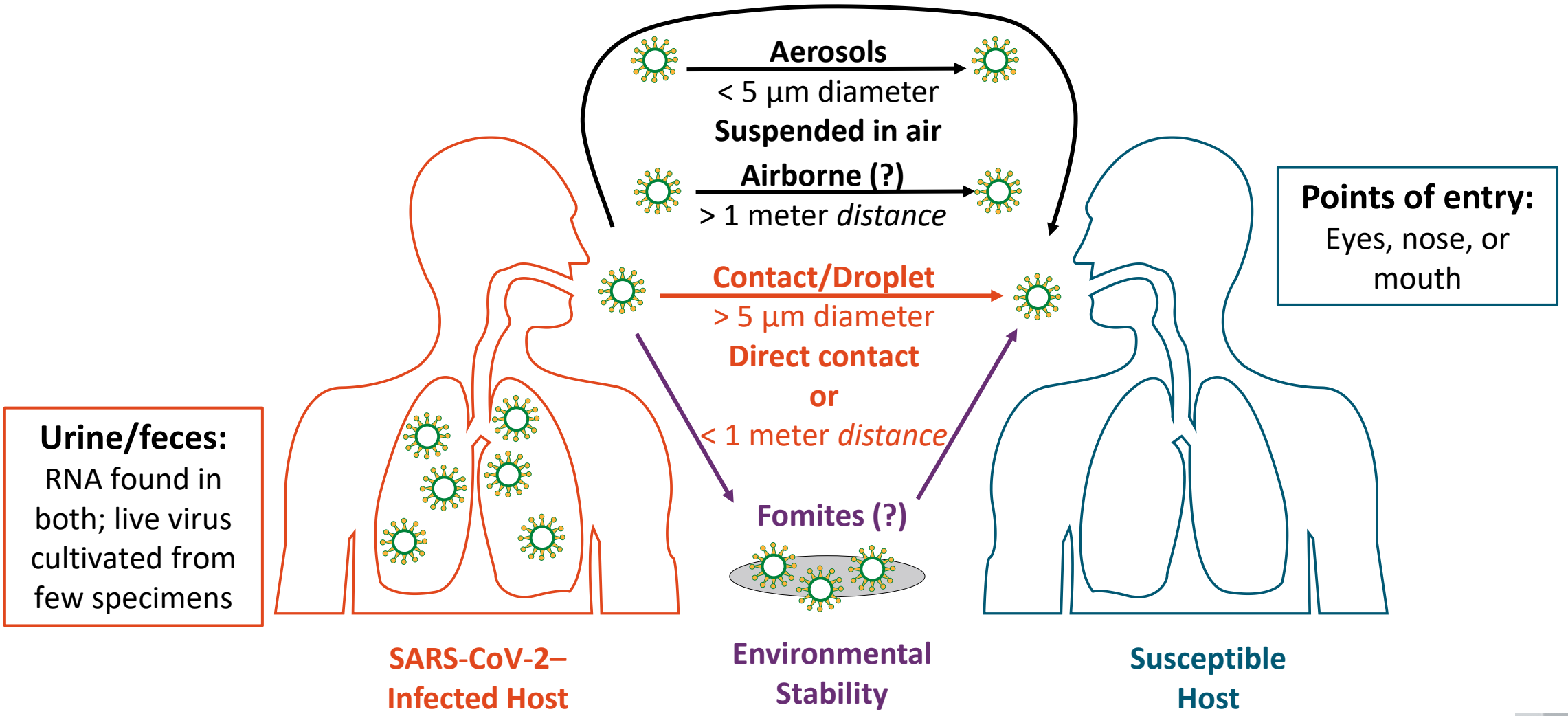
Bantuan Pernafasan
31

Jumlah Kematian

294 +8

0.7%
Daripada Keseluruhan Kes

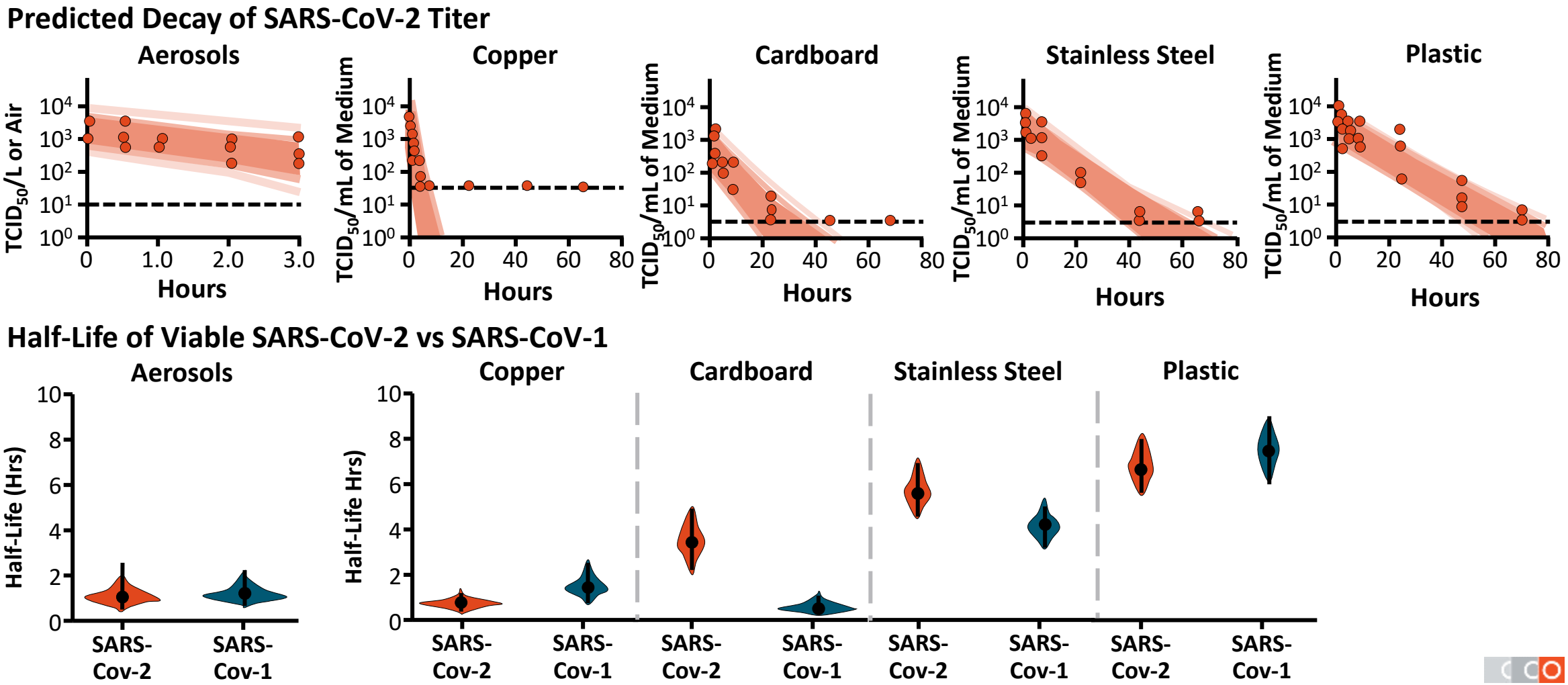
Proposed Routes of SARS-CoV-2 Transmission



Galbadage. Front Public Health. 2020;8:163. WHO. Scientific Brief. July 9, 2020.

Slide credit: clinicaloptions.com

SARS-CoV-2: Aerosol and Surface Viability



Doremalen. NEJM. 2020;382:1564.

Slide credit: clinicaloptions.com

Key Considerations on Modes of SARS-CoV-2 Transmission

- Person-to-person considered predominant mode of transmission, likely via respiratory droplets from **coughing, sneezing, or talking**[1,2]
  - Airborne transmission suggested by multiple studies, but frequency unclear in absence of aerosol-generating procedures in healthcare settings[2]
- Virus **rarely cultured in respiratory samples > 9 days after symptom onset**, especially in patients with mild disease[5]

1. https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/how-covid-spreads.html
2. WHO. Scientific Brief. July 9, 2020. 3. Wölfel. Nature. 2020;581:465. 4. Zou. NEJM. 2020;382:1177.
5. WHO. Scientific Brief. June 17, 2020. 6. ACOG. COVID-19 FAQs for Obstetrician-Gynecologists, Obstetrics.

Timing of SARS-CoV-2 Transmission Based on Symptoms

- Prospective study of lab-confirmed COVID-19 cases (n = 100) and their close contacts (n = 2761) in Taiwan[1]
  - Paired index-secondary cases (n = 22) occurred more frequently with exposure **just before or within 5 days of symptom onset** vs later
- **Pre-symptomatic infections**
  - Accounted for 6.4% of locally acquired infections in a study in Singapore (N = 157)[2]
  - Modelling study of transmission in China (n = 154) estimated that 44% of transmissions may have occurred just before symptoms appeared[3]
- A recent systematic review and meta-analysis estimated that the proportion of total infections that are **truly asymptomatic range from 6% to 41% (pooled estimate of 15%)**[4]
  - Asymptomatic transmission rates ranged from 0% to 2.2% vs symptomatic transmission rates of 0.8% to 15.4%

1. Cheng. JAMA Intern Med. 2020;180:1156. 2. Wei. MMWR. 2020;69:411. 3. He. Nature Medicine. 2020;26:672.
4. Byambasuren. MedRxiv. 2020;[Preprint]. Note: this study has not been peer reviewed.

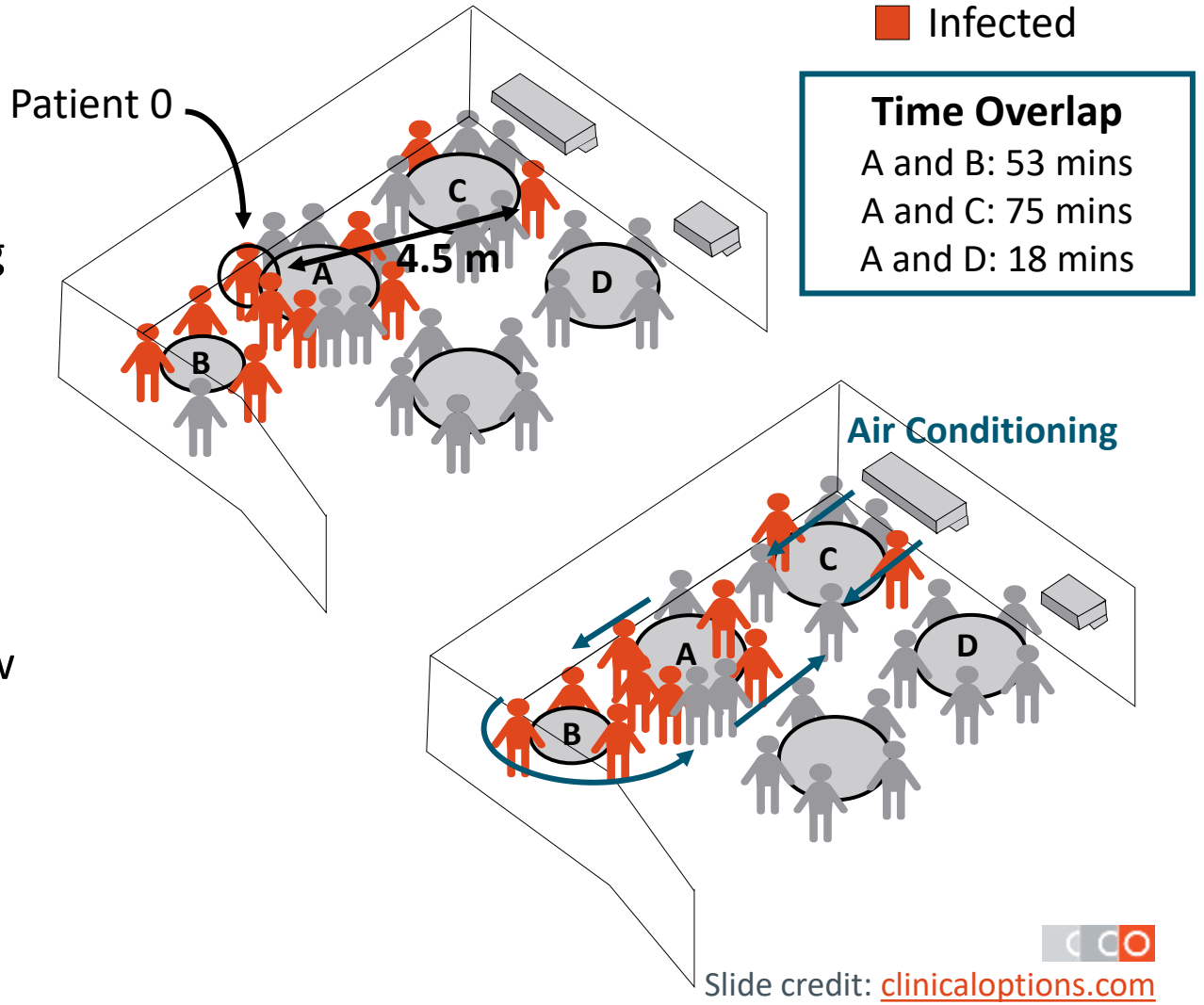
SARS-CoV-2 Transmission in Enclosed vs Outdoor Settings

- Study in Japan traced contacts of 110 people with COVID-19 in ten indoor clusters and assessed the environment in which transmission between contacts occurred[1]
  - 27 primary cases generated secondary cases (24.6%)
- Odds that a primary case transmitted SARS-CoV-2 in an enclosed environment **18.7 x higher** compared with odds of estimated transmission rates in an open-air environment (95% CI: 6.0-57.9)[1]
- **6 of 7 superspreading events** (to 3 or more people) occurred in enclosed environments (OR vs open-air environments: 32.6; 95% CI: 3.7-289.5)[1]
- Consistent with cluster in Germany from indoor work meeting, cluster from a ski chalet France, cluster from choir practice in the US, and church- and hospital-associated clusters in South Korea[2-5]

1. Nishiura. medRxiv;[Preprint]. Note: this study has not been peer reviewed. 2. Hijnen. Emerging Infectious Diseases. 2020;[Epub]. 3. Danis. Clin Infect Dis. 2020;71:825. 4. Hamner. MMWR. 2020;69:606. 5. Shim. Int J Infect Dis. 2020;93:339.

SARS-CoV-2 Transmission: Recirculated Air and Poor Ventilation

- 3 families (A, B, and C) ate lunch at a restaurant on January 24, 2020 at 3 neighboring tables
  - 10 of those sitting at these tables (including the index case) were later found to have been infected with sARS-CoV-2 at the restaurant
  - None of the waiters or 68 patrons at the remaining 15 tables became infected
  - Authors note that these results do not show that long-range aerosol transmission can occur in *any* indoor space, but that transmission may occur in crowded/poorly ventilated spaces



Li. medRxiv;[Preprint]. Note: this study has not been peer reviewed.

Slide credit: clinicaloptions.com

Summary of SARS-CoV-2 Transmission in Various Settings

- Crowded enclosed spaces facilitate SARS-CoV-2 transmission
- Transmission rates in enclosed spaces appear to be correlated with duration of exposure
  - Longer duration → greater risk of transmission
- Airborne transmission hypothesized
  - Biologically plausible → aerosol generated with greater than normal force or if air current moves aerosol > 1 meter and droplets remain intact

Slide credit: clinicaloptions.com

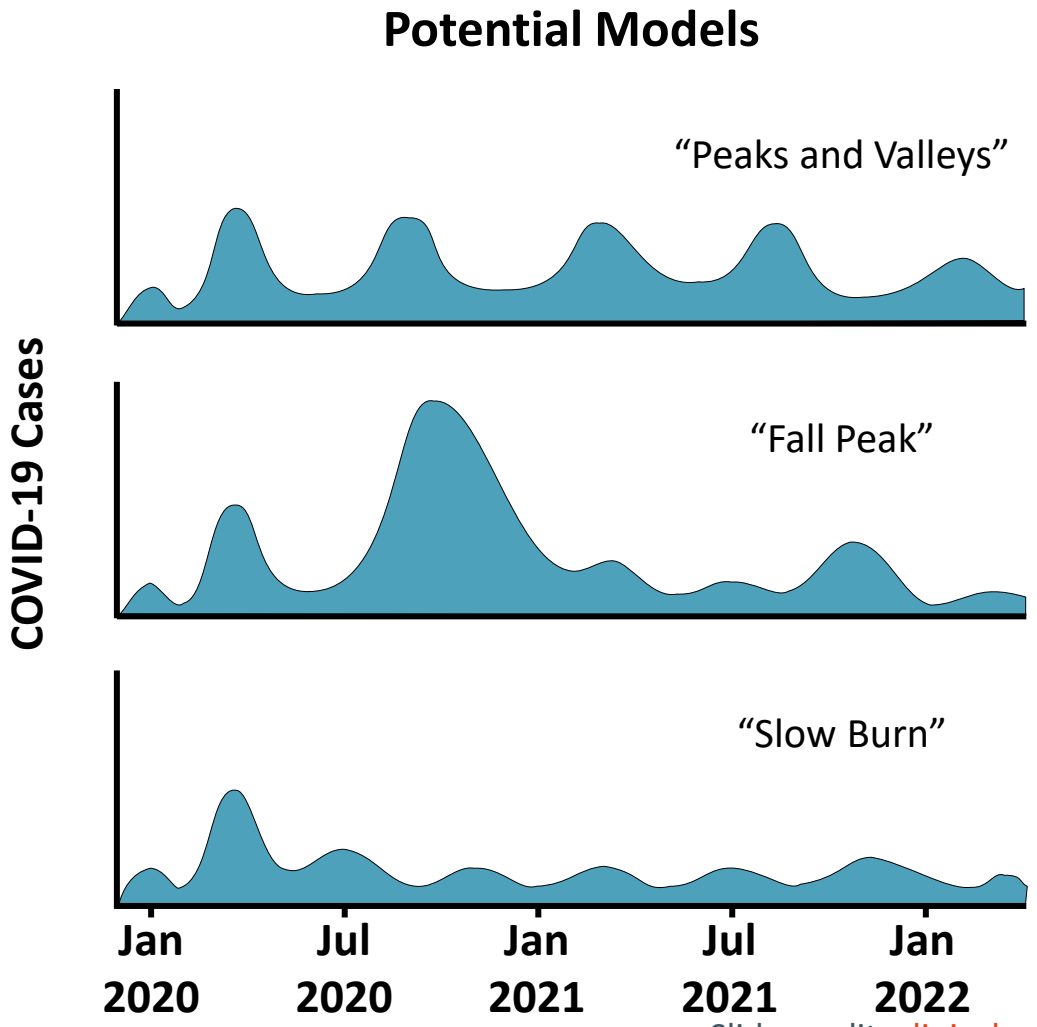
Efficacy of Social Distancing & Face Coverings in Prevention of SARS-CoV-2 Transmission

https://www.nytimes.com/interactive/2020/04/14/science/coronavirus-transmission-cough-6-feet-ar-ul.html

https://www.nytimes.com/interactive/2020/10/30/science/wear-mask-covid-particles-ul.html

Projecting Postpandemic SARS-CoV-2 Transmission

- Recurrent outbreaks likely after initial, most severe pandemic period
  - Interval and height of coming waves will depend on multiple factors, including control measures
  - Prepare for ≥ 18-24 mos of significant COVID-19 activity with periodic hot spots across diverse geographies



Kissler. Science. 2020;368:860. COVID-19: The CIDRAP Viewpoint. April 30, 2020.

Slide credit: clinicaloptions.com

COVID-19 Elimination in New Zealand

"Rapid, science-based risk assessment linked to early, decisive government action was critical."

Feb 26, 2020	Mid March 2020	Mar 26, 2020	Early May 2020	June 8, 2020	Post Elimination
First COVID-19 case diagnosed in New Zealand	Recognized insufficiency of current testing and contact tracing capacity; considered switch from mitigation to elimination approach	Implemented stringent countrywide lockdown (ie, 7 wks of national stay-at-home order)	Last known COVID-19 case isolated, marking end of community spread	Pandemic over, 103 days after first case	Only known cases among international travelers, kept in quarantine 14 days
		Alert Level 4		**Alert Level 1**	

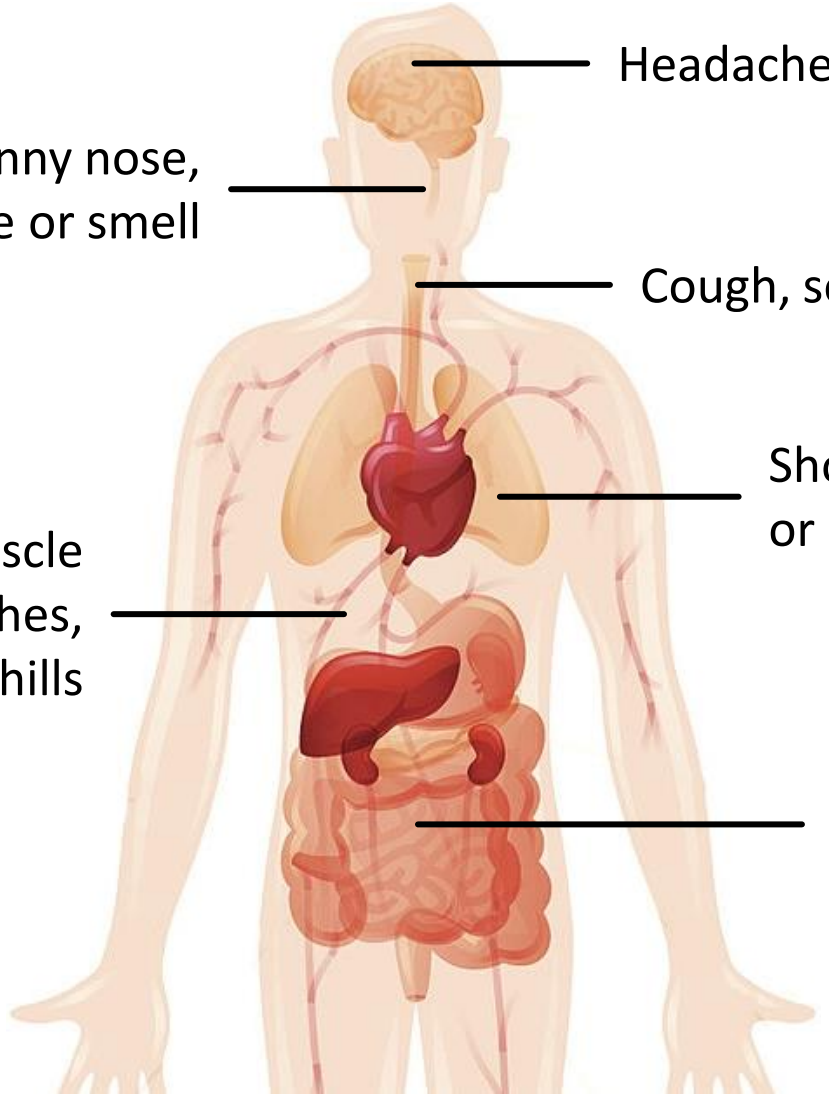
Cases: 1569, **Deaths**: 22
Mortality: 4 per 1 million

Baker. NEJM. 2020;383:e56.

Slide credit: clinicaloptions.com

Primary Symptoms of COVID-19

"Symptoms may appear **2-14 days after exposure** to the virus"



Li. J Med Virol. 2020;92:577.
https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html

Slide credit: clinicaloptions.com

COVID-19 Clinical Presentation May Vary by Age, Sex

- Observational study of Europeans with mild-to-moderate COVID-19 (ie, no ICU admission) via standardized questionnaire during March 22-April 10, 2020 (N = 1420)[1]
  - **Mean duration of symptoms** (n = 264): 11.5 ± 5.7 days
  - Ear, nose, throat complaints more common in **young patients**; fever, fatigue, loss of appetite, diarrhea in **elderly patients** (*P* < .01)
  - Loss of smell, headache, nasal obstruction, throat pain, fatigue more common in **women**; cough, fever in **men** (*P* < .001)
- Among 17 fatal COVID-19 cases detailed by the China National Health Commission, **median time from first symptom to death**: 14 days (range: 6-41)[2]
  - Numerically faster in **older patients**: 11.5 days if ≥ 70 yrs vs 20 days if < 70 yrs (*P* = .033)

Symptom,[1] %	N = 1420
Headache	70.3
Loss of smell	70.2
Nasal obstruction	67.8
Asthenia	63.3
Cough	63.2
Myalgia	62.5
Rhinorrhea	60.1
Taste dysfunction	54.2
Sore throat	52.9
Fever (> 38°C)	45.4

1. Lechien. J Intern Med. 2020;288:335. 2. Wang. J Med Virol. 2020;92:441.

Slide credit: clinicaloptions.com

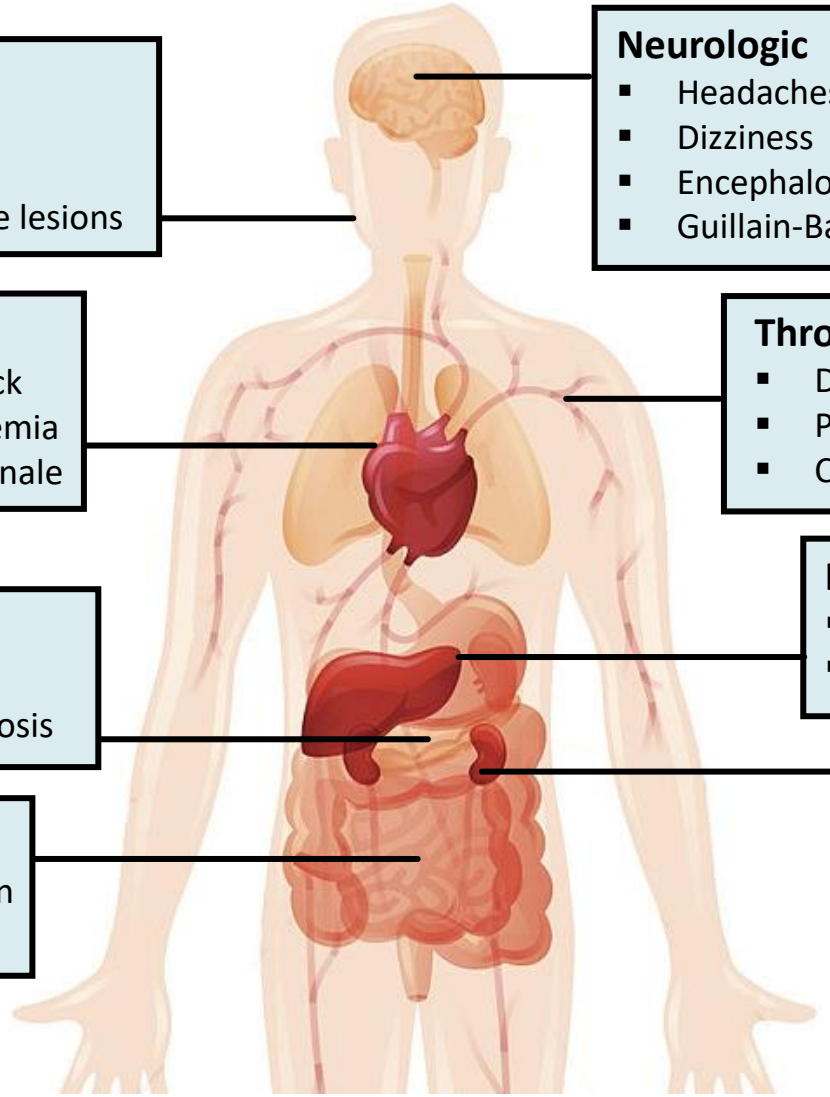
Extrapulmonary Manifestations of COVID-19: Which of These Return or Last?

Dermatologic
- Petechaie
- Livedo reticularis
- Erythematous rash
- Urticaria
- Vesicles
- Pernio-like lesions

Neurologic
- Headaches
- Dizziness
- Encephalopathy
- Guillain-Barré
- Ageusia
- Myalgia
- Anosmia
- Stroke

Cardiac
- Takotsubo cardiomyopathy
- Myocardial injury/myocarditis
- Cardiac arrhythmias
- Cardiogenic shock
- Myocardial ischemia
- Acute cor pulmonale

Thromboembolism
- Deep vein thrombosis
- Pulmonary embolism
- Catheter-related thrombosis



Hepatic
- Elevated ALT/AST
- Elevated bilirubin

Endocrine
- Hyperglycemia
- Diabetic ketoacidosis

Renal
- Acute kidney injury
- Proteinuria
- Hematuria

Gastrointestinal
- Diarrhea
- Nausea/vomiting
- Abdominal pain
- Anorexia

Gupta. Nat Med. 2020;26:1017.

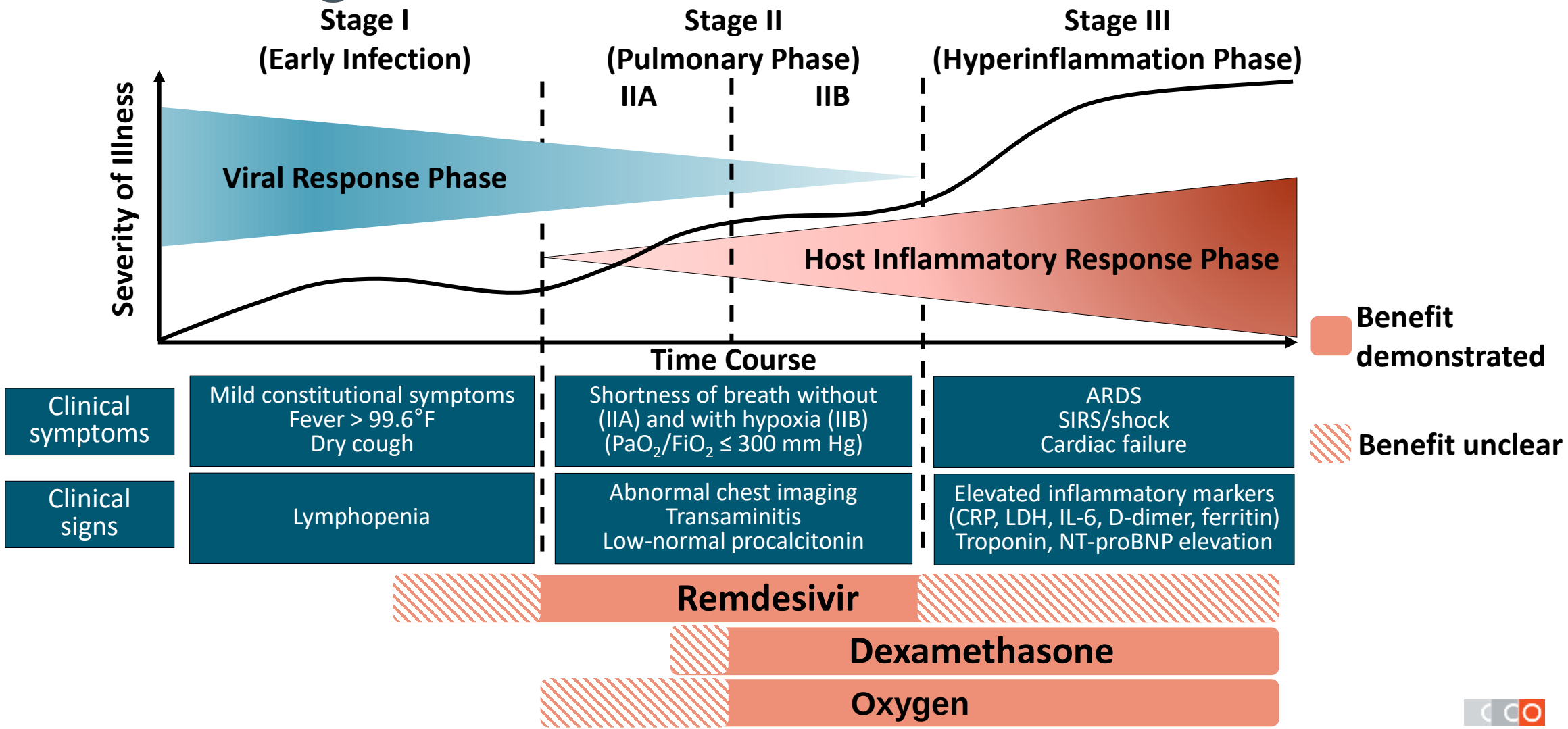
NIH Guidelines: Defining a COVID-19 Severity Spectrum

Stage	Characteristics
Asymptomatic or presymptomatic infection	▪ Positive test for SARS-CoV-2 but no symptoms
Mild illness	▪ Varied symptoms (eg, fever, cough, sore throat, malaise, headache, muscle pain) but no shortness of breath, dyspnea, abnormal imaging
Moderate illness	▪ $SpO_2 \geq 94\%$ and lower respiratory disease evidenced by clinical assessment or imaging
Severe illness	▪ $SpO_2 < 94\%$, $PaO_2/FiO_2 < 300$, respiratory rate > 30 breaths/min, or lung infiltrates > 50%
Critical illness	▪ Respiratory failure, septic shock, and/or multiorgan dysfunction

NIH COVID-19 Treatment Guidelines. Management of persons with COVID-19. Last updated October 9, 2020.

Slide credit: clinicaloptions.com

COVID-19 Therapies Predicted to Provide Benefit at Different Stages



Siddiqi. J Heart Lung Transplant. 2020;39:405.

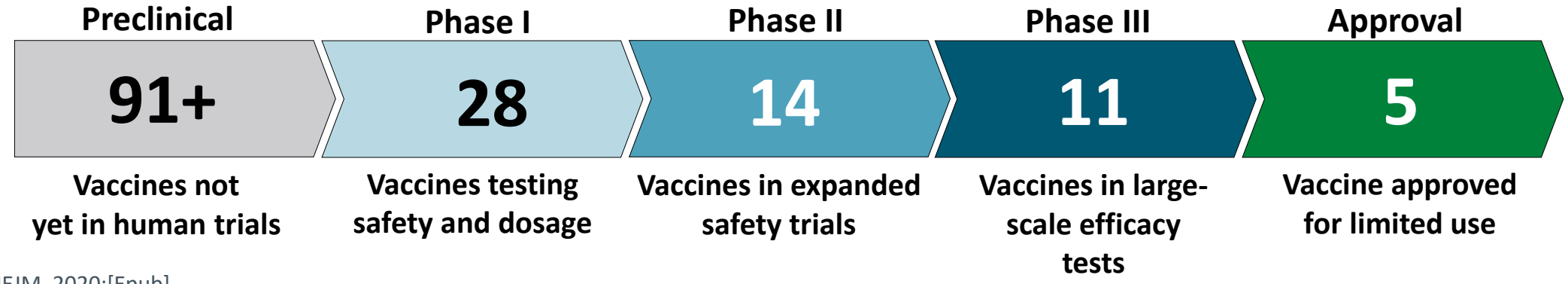
Slide credit: clinicaloptions.com

Vaccine Development

Vaccine Development Pathway

- **Traditional vaccine development pathway[1]**
  - Target discovery/validation, preclinical stage, manufacturing development, clinical assay optimization: **3-8 yrs**
  - Phase I (safety), phase II (safety/immunogenicity), phase III (safety/efficacy) clinical trials: **2-10 yrs**
  - Regulatory review: **1-2 yrs**

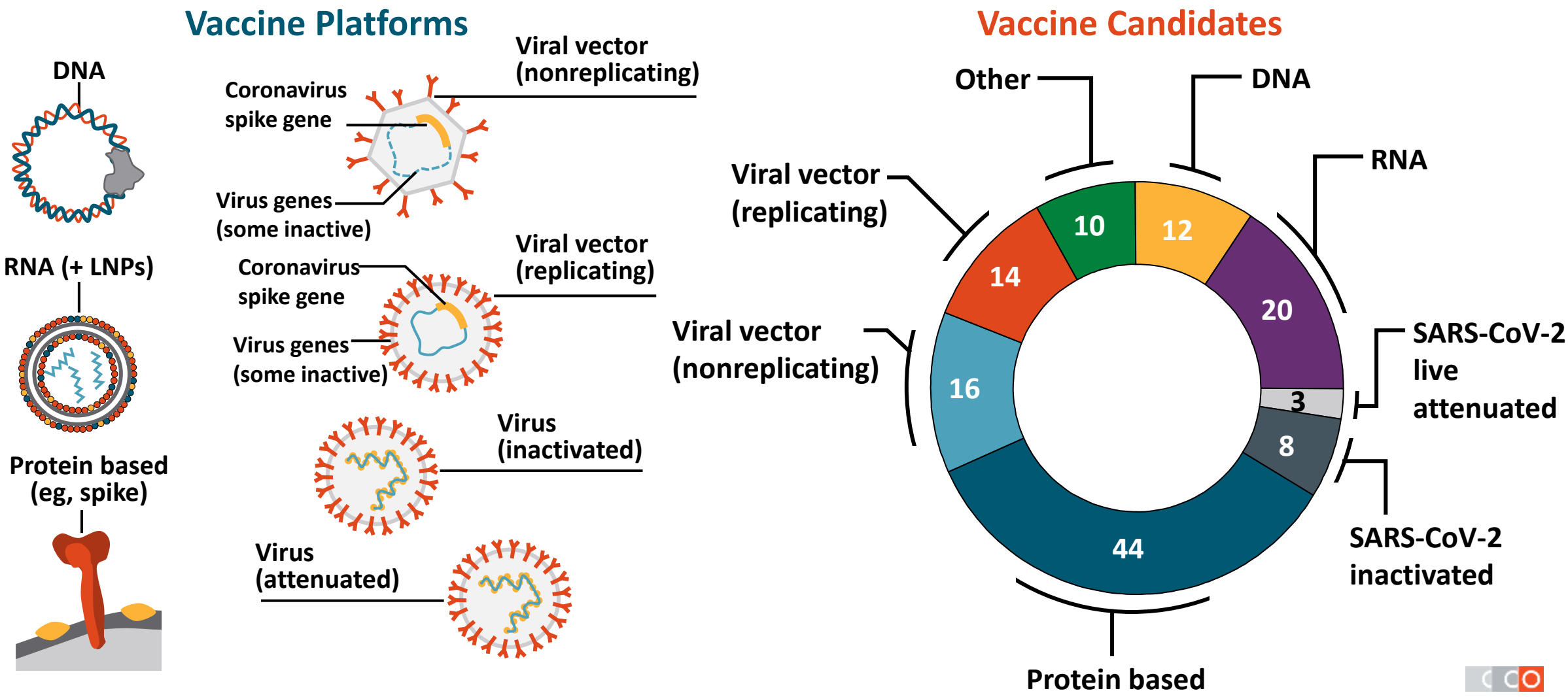
SARS-CoV-2 Vaccine Candidates in Development[2]



1. Heaton. NEJM. 2020;[Epub].
2. The New York Times. Coronavirus Vaccine Tracker. https://www.nytimes.com/interactive/2020/science/coronavirus-vaccine-tracker.html

Slide credit: clinicaloptions.com

Vaccine Candidates in Development for SARS-Cov-2



Funk. Frontiers in Pharmacology. 2020; 11:937.

Slide credit: clinicaloptions.com

Before COVID-19 vaccines can be delivered, several important challenges must be overcome:

- The vaccines must be proven safe and effective in large (phase III) clinical trials.
- A series of independent reviews of the efficacy and safety evidence
- Individual countries must decide whether to approve the vaccines for national use and develop policies for how to use the vaccines in their country based on the WHO recommendations.
- The vaccines must be manufactured in large quantities, which will be a major and unprecedented challenge – all the while continuing to produce all the other important life-saving vaccines already in use.
- As a final step, vaccines will be distributed through a complex logistical process, with rigorous stock management and temperature control.

Manage your risks

- Consider where you are going
- How close you will be to other people
- How long you will be there.
- Avoid crowded places and events
- Poorly ventilated indoor locations
- Prolonged contact with others.
- Open windows when indoors to increase the amount of outdoor air.
- Avoid touching surfaces, especially in public settings
- Frequently clean your hands with soap and water, or an alcohol-based hand rub.