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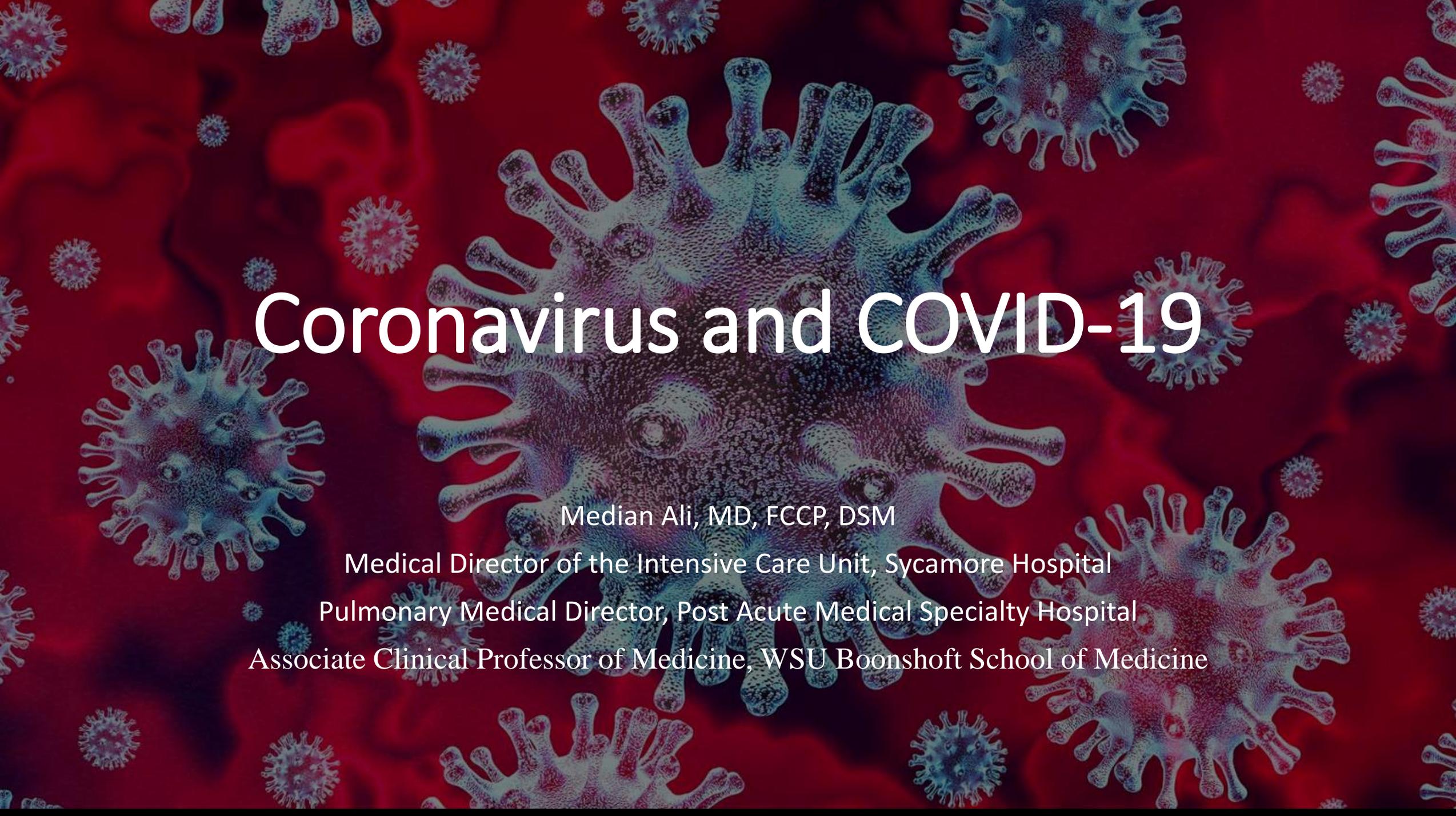


Important Information

Please use the chat function to ask any questions you may have during the presentation.

All questions will be addressed at the **end** of the presentation.

CME Credit: Number will posted in the chat section

The background of the slide is a dark red color with numerous 3D renderings of coronavirus particles scattered across it. The particles are spherical with a textured surface and many small, protruding spikes. A large, central particle is the most prominent, showing more detail than the smaller ones around it.

Coronavirus and COVID-19

Median Ali, MD, FCCP, DSM

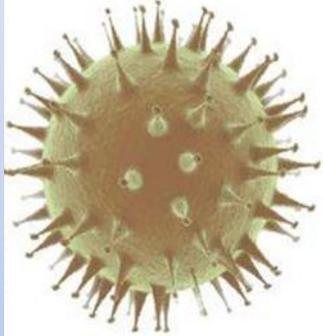
Medical Director of the Intensive Care Unit, Sycamore Hospital

Pulmonary Medical Director, Post Acute Medical Specialty Hospital

Associate Clinical Professor of Medicine, WSU Boonshoft School of Medicine

Coronavirus Emergence

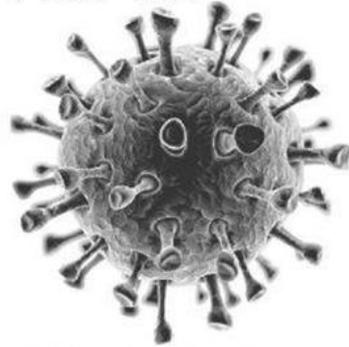
Severe Acute
Respiratory Syndrome
(SARS-CoV)



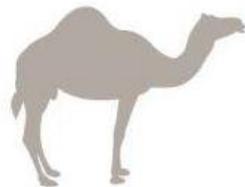
- Identified in 2003, first infected humans in China in 2002
- Thought to be from bats, spread to civet cats to humans



Middle East
Respiratory Syndrome
(MERS-CoV)



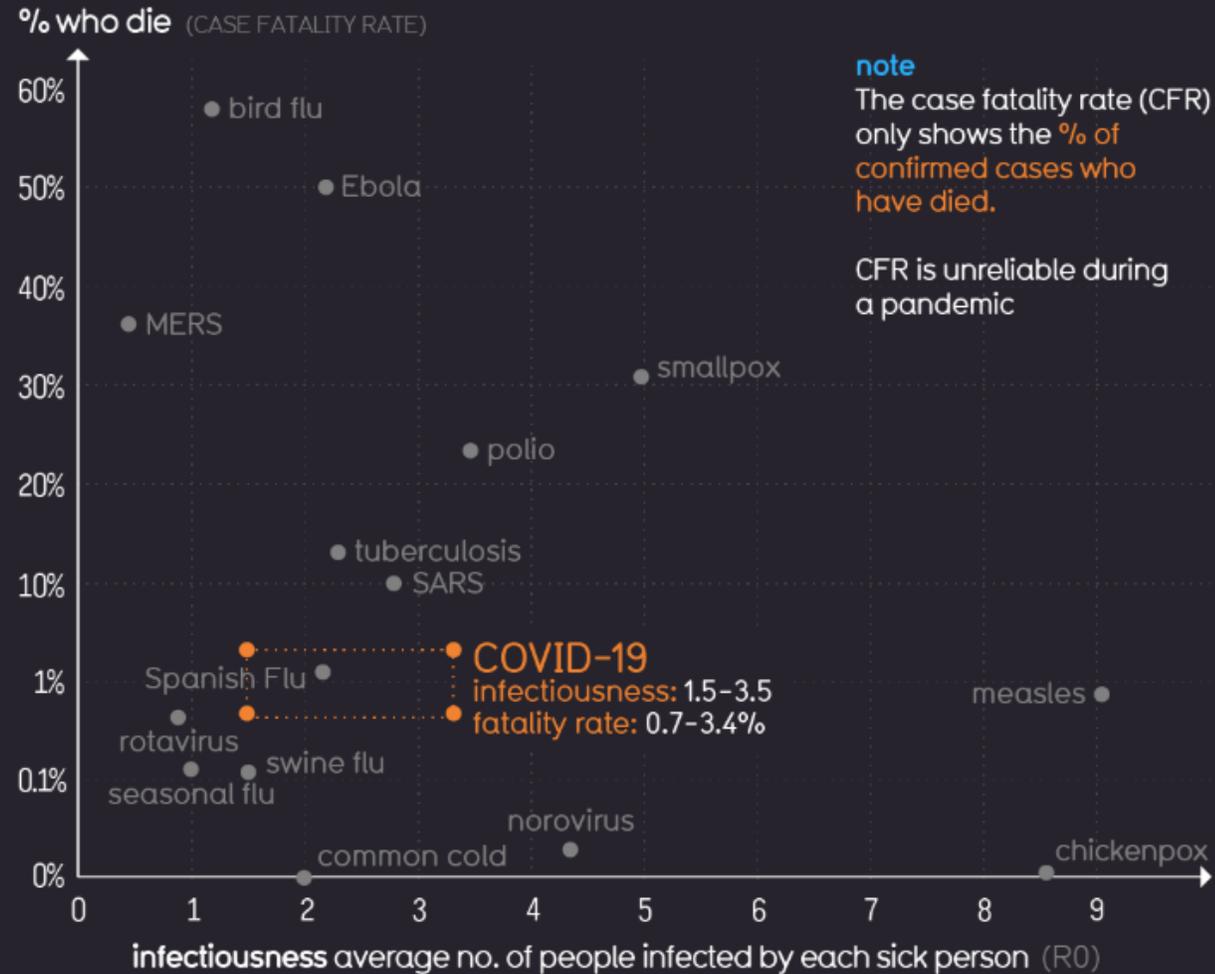
- First identified in Saudi Arabia in 2012
- From dromedary camels to humans



- Coronaviruses are a large family of viruses that are known to cause illness similar to common cold
- 229E (alpha)
- NL63 (alpha)
- OC43 (beta)
- HKU1 (beta)
- Two more severe diseases such as **Middle East Respiratory Syndrome (MERS)** and **Severe Acute Respiratory Syndrome (SARS)**.
- **2019-novel coronavirus (COVID-19)** was identified in Wuhan, China. This is a new coronavirus that has not been previously identified in humans.

How Contagious & Deadly is It?

We don't fully know yet but it's in **this range**



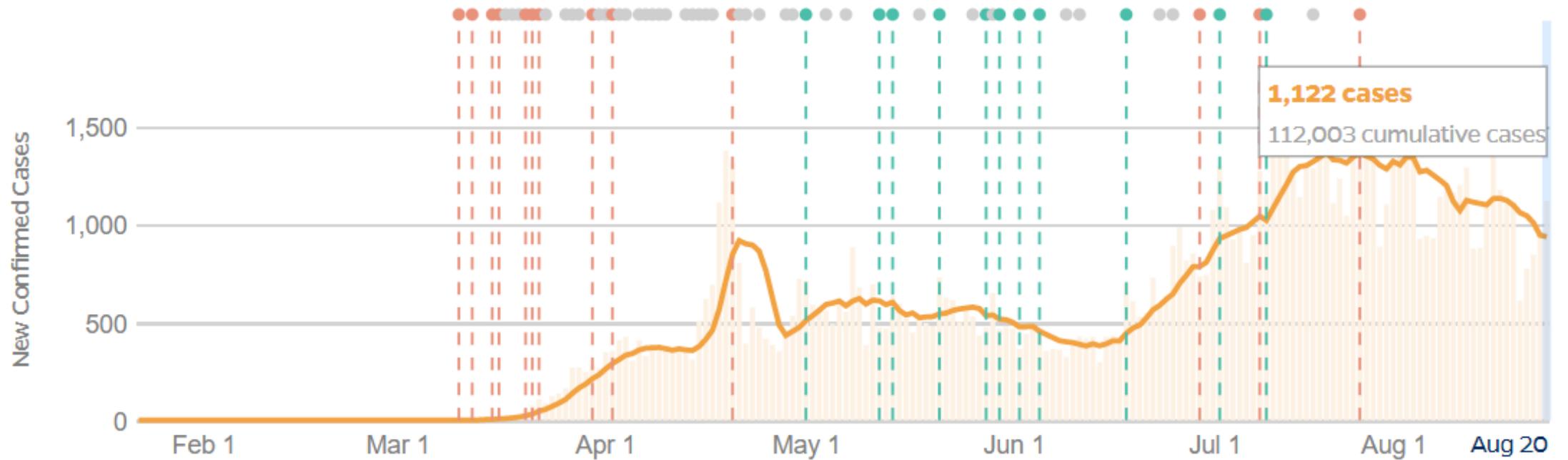
sources: US Centers for Disease Control & Prevention, WHO, New York Times

OHIO

RECENT OPENING AND CLOSING POLICY DECISIONS

● Restriction/closing ● Opening ● Deferring decisions to county ● Other

← Previous 🔍 Next →

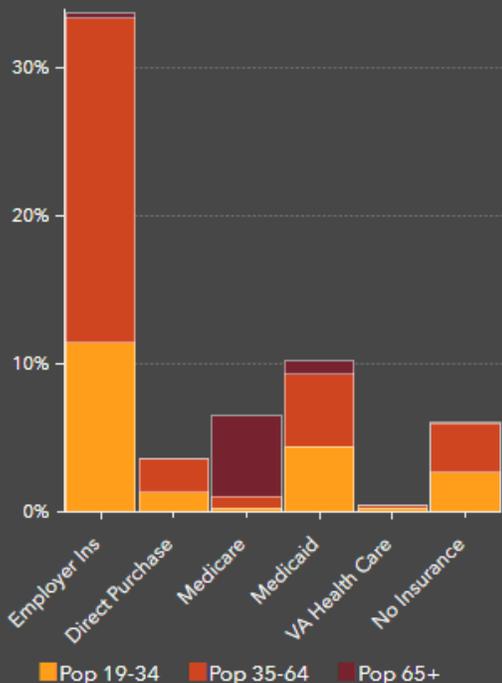


COVID-19 STATUS REPORT

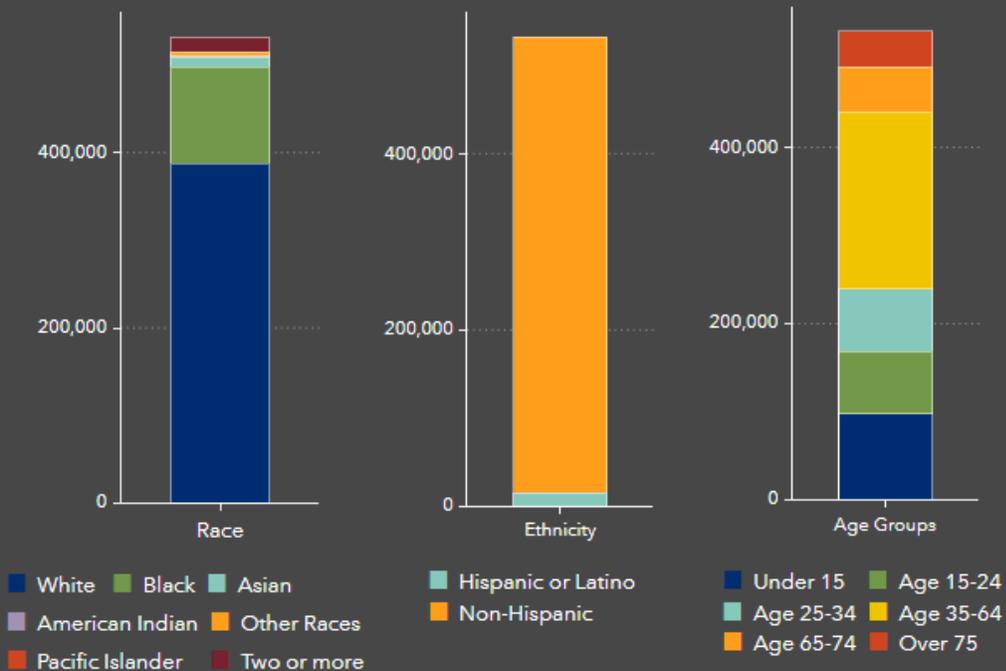
Montgomery, Ohio

POLICIES AND CASES

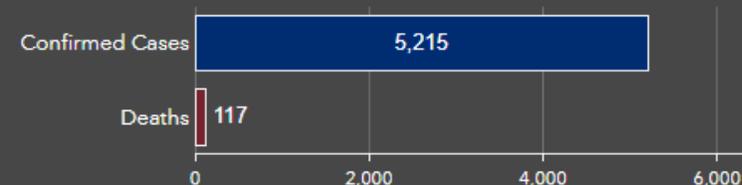
HEALTHCARE FACTS



POPULATION RACE, ETHNICITY AND AGE



COUNTY CASE DATA



Ohio State Statistics			
Total Confirmed	Deaths	Fatality Rate	Tested
117,584	4,044	3.44%	2,047,906

NUMBER OF CASES IN LAST 14 DAYS



1,977

Number of Staffed Beds



2,362

Number of Licensed Beds



252

Number of ICU Beds



87,187

People in Poverty (ACS)



532,034

Total Population (ACS)



91,990

Population Aged 65+ (ACS)



71

New Cases Since Previous Day



980

County Case Per 100,000 Population



2.24

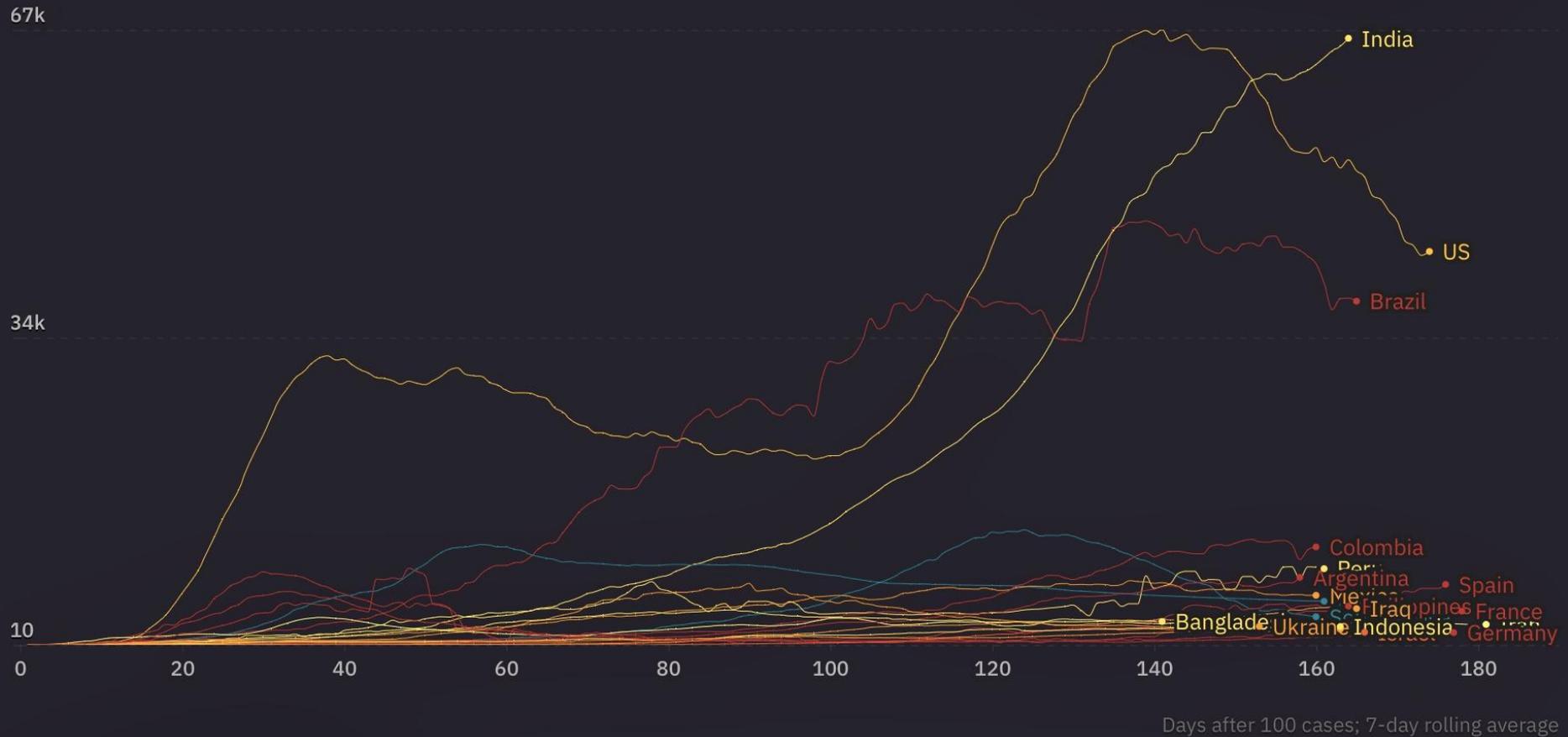
County Fatality Rate

Coronavirus Infection Trajectories

Which countries are seeing the most new cases?

New cases ▾

Avg 7-day change: <0% 0% 0-10% 10-20% >20% >10% Log



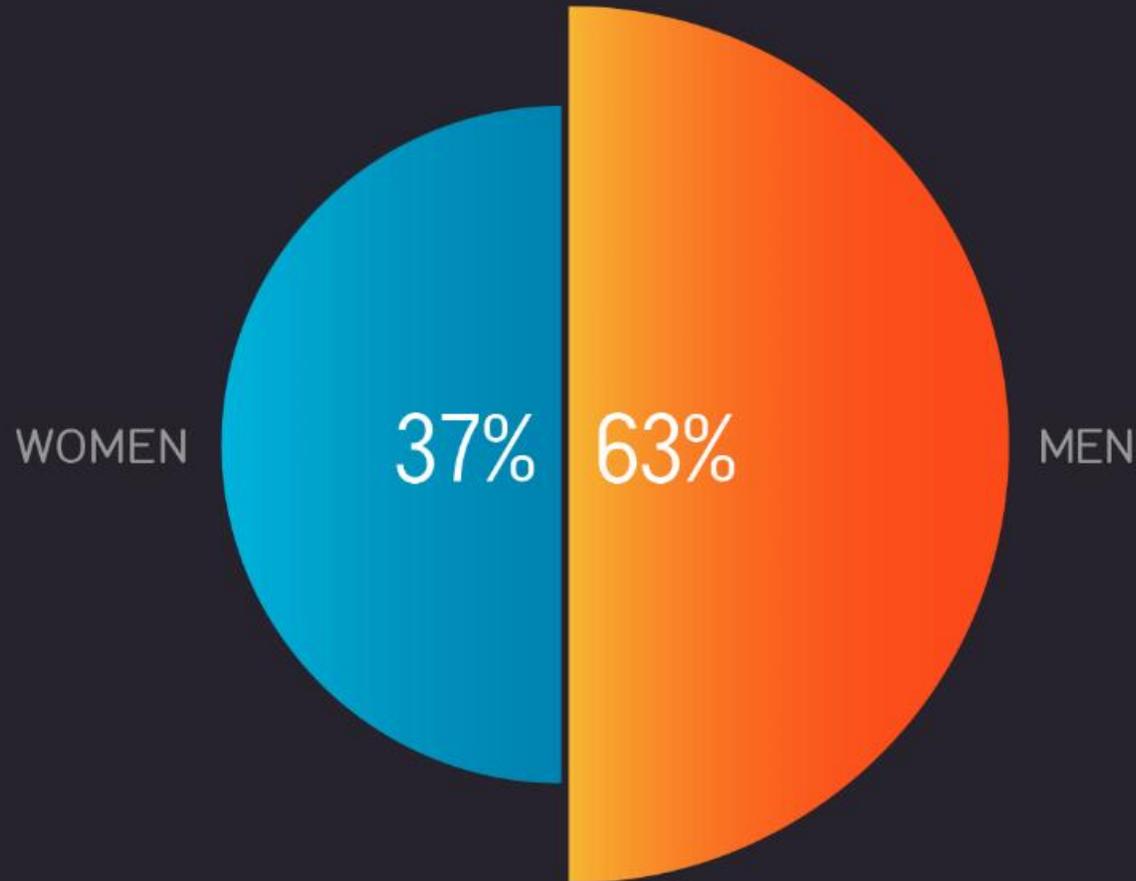
informationisbeautiful

code: Omid Kashan

Top nations for each stat. Sources: Johns Hopkins University, Financial Times

Biological Sex is also a Risk-Factor

% of COVID-19 deaths



source: studies of 24,922 deaths in UK & Italy

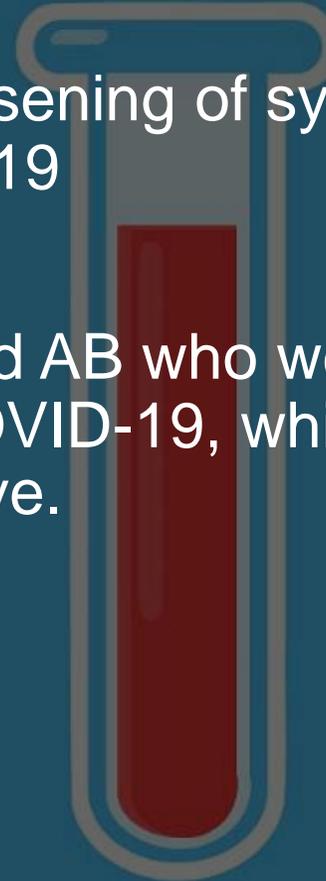
Italian Portal of Epidemiology for Public Health, UK Office of National Statistics

- **Some scientists believe the advantage lies in the X chromosome, which carries genes linked to immune function**
- **Hormonal, The role of estrogen and progesterone.**
- **Women follow health guidelines better than men**
- **Female-led countries had half as many COVID-19 deaths as those with male leaders.**



COVID-19 and Blood Type

- Blood type is not associated with a severe worsening of symptoms in people who have tested positive for COVID-19
- Symptomatic individuals with blood types B and AB who were Rh positive were more likely to test positive for COVID-19, while those with blood type O were less likely to test positive.



Coronavirus Riskiest Activities

According to 500+ epidemiologists & health professionals

- risk factors to consider**
- people** how many?
- space** how close is the contact?
- time** how long the exposure?
- location** inside or outside?
- surfaces** lots of high touch?
- area** high number of cases?
- covidcioc** how likely is compliance?

LOW RISK



MEDIUM RISK



HIGH RISK

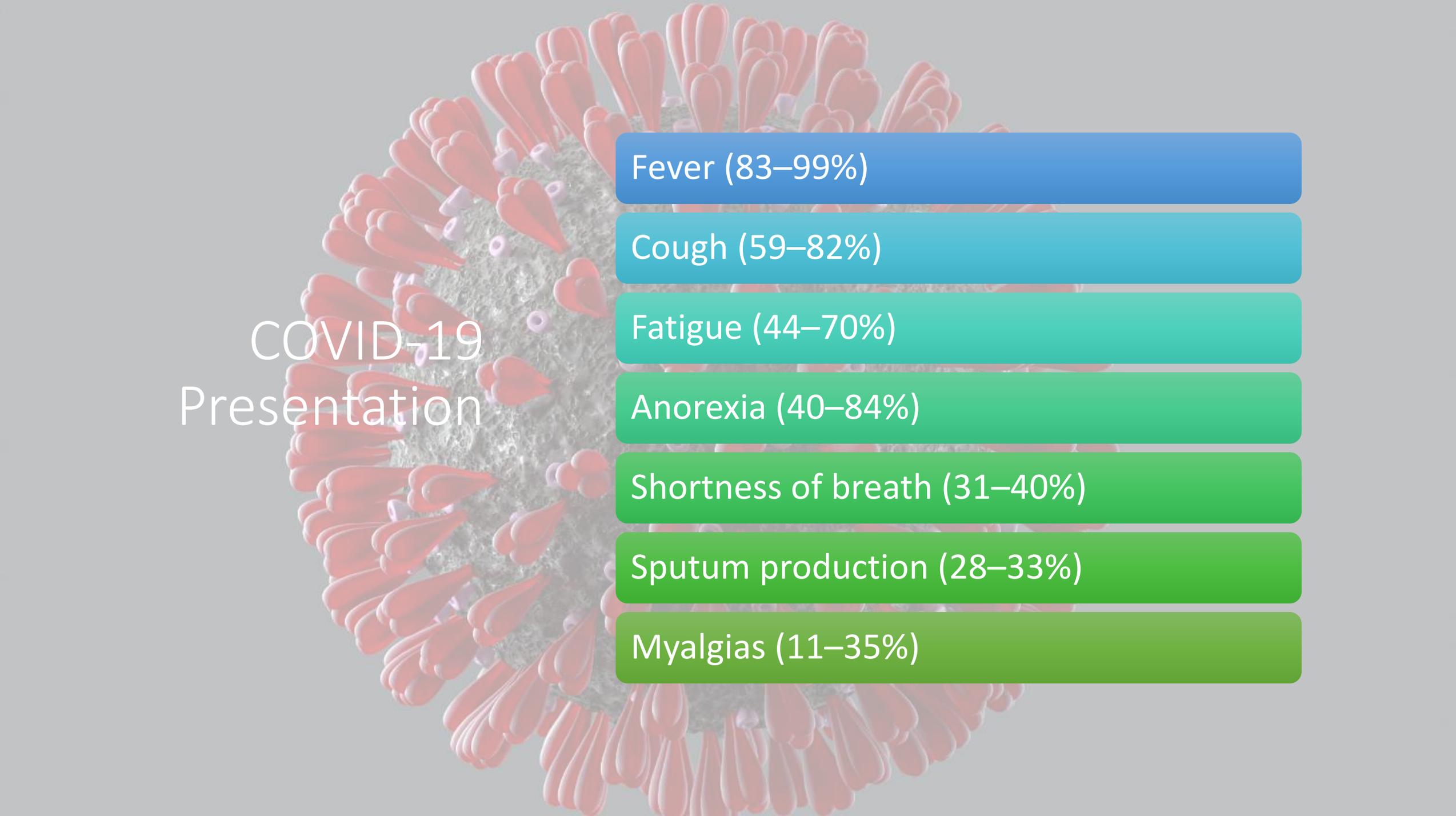


INCREASING RISK →

Risk reduced by wearing a mask, social distancing & washing hands

informationisbeautiful

sources: New York Times, Reuters, NPR, SF Gate & others



COVID-19 Presentation

Fever (83–99%)

Cough (59–82%)

Fatigue (44–70%)

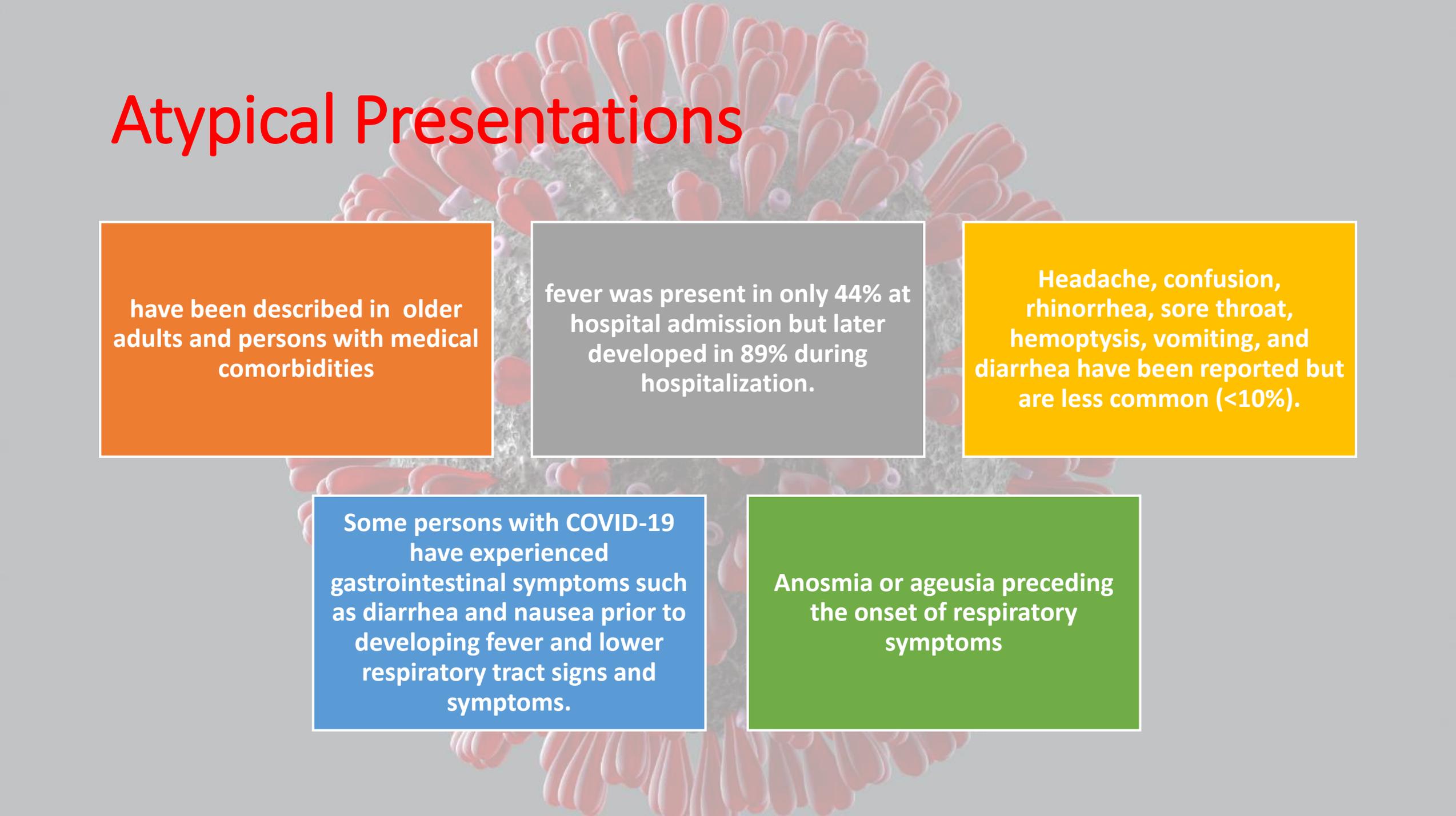
Anorexia (40–84%)

Shortness of breath (31–40%)

Sputum production (28–33%)

Myalgias (11–35%)

Atypical Presentations



have been described in older adults and persons with medical comorbidities

fever was present in only 44% at hospital admission but later developed in 89% during hospitalization.

Headache, confusion, rhinorrhea, sore throat, hemoptysis, vomiting, and diarrhea have been reported but are less common (<10%).

Some persons with COVID-19 have experienced gastrointestinal symptoms such as diarrhea and nausea prior to developing fever and lower respiratory tract signs and symptoms.

Anosmia or ageusia preceding the onset of respiratory symptoms

Immunity and risk of reinfection

- If I have the Antibodies does that make me immune to COVID 19 future infection? The answer: we don't know for sure.
- There is not enough evidence about the effectiveness of antibody-mediated immunity to guarantee the accuracy of an “immunity passport” or “risk-free certificate.”
- Laboratory tests that detect antibodies to SARS-CoV-2 in people need further validation to determine their accuracy and reliability.
- The antibody tests will be most useful as surveillance tools to estimate the relative proportions of different populations that have been exposed to SARS CoV2.



Herd Immunity

- Herd immunity occurs when enough people become immune to a disease to make its spread unlikely, It is usually achieved through vaccination or through natural infection.
- Most of the population appears to have remained unexposed to SARS-CoV-2, even in areas with widespread virus circulation based on the antibody's tests.
- Positive antibodies means previous exposure, rather than immunity, as no neutralizing antibodies are measured.

Herd Immunity:

- Immunity after SARS-CoV-2 infection is thought to be incomplete and temporary, lasting only several months to a few years.
- A subset of asymptomatic SARS-CoV-2 cases shows a lower antibody response and titers that wane quickly.
- Any proposed approach to achieve herd immunity through natural infection is not only highly unethical, but also could be unachievable.



HERD IMMUNITY COVID-19



Cell-mediated immunity for COVID 19

- New study published in Journal nature involved analyzing blood samples from 18 Covid-19 patients, ages 21 to 81, and healthy donors, ages 20 to 64, based in Germany.
- The study found that T cells reactive to the coronavirus were detected in 83% of the Covid-19 patients and in 35 % of healthy donors.
- There is a significant proportion of individuals that have this cross-reactive T cell immunity from other coronavirus infections that may have some impact on how they fare with the novel coronavirus ?

Pre-symptomatic and Asymptomatic

- People in the pre-symptomatic stage are highly contagious.
- The peak of viral shedding occurs right before symptoms develop and immediately after, when the symptoms are still mild.
- According to new research from the CDC **one carrier recently spread coronavirus to at least 71 individuals in her community**, all without experiencing any symptoms.
- CDC now estimates that 40% of people infected with Covid-19 don't have any symptoms
- **CDC changes asymptomatic COVID-19 testing recommendations... Don't test** 🤪
- Infected children have at least as much of the coronavirus in their noses and throats as infected adults.
- Children younger than age 5 may host up to 100 times as much of the virus in the upper respiratory tract as adults
- Between March 9, 2020, and May 7, 2020, school closure in the US was temporally associated with decreased COVID-19 incidence and mortality.

Nucleic acid amplification testing (NAAT)

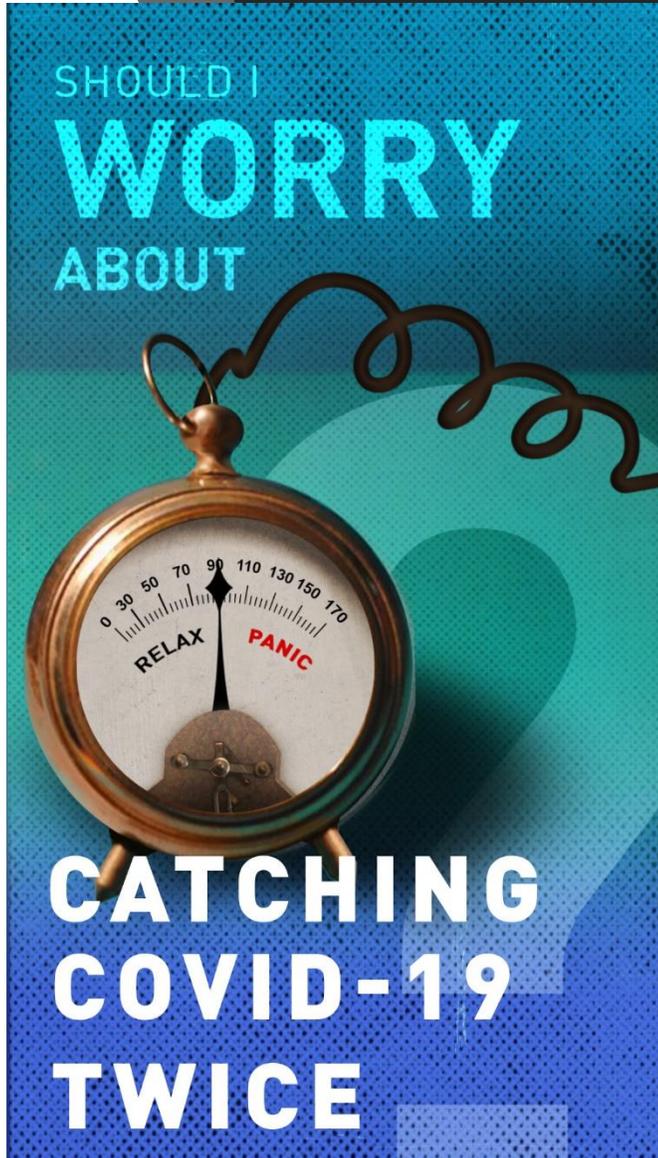
- Most commonly done with a reverse-transcription polymerase chain reaction (RT-PCR) assay, to detect SARS-CoV-2 RNA from the upper respiratory tract
- **Positive NAAT result** — confirms the diagnosis of COVID-19. No additional diagnostic testing is necessary.
- Very rare false positive (less than 0.2%)
- **Negative NAAT result**
 - For low suspicion individuals, a single negative NAAT result is sufficient to exclude the diagnosis of COVID-19.
 - For high suspicion repeat the test in 24 to 48 hours after the initial test. Repeat testing within 24 hours is not recommended.
 - False negative 2-29%
 - In patients with evidence of lower respiratory tract illness, lower respiratory tract specimens can be an option for NAAT testing

RT-PCR test for COVID-19

the sensitivity of testing likely depends on the:

- precise RT-PCR assay
- the type of specimen obtained
- the quality of the specimen
- duration of illness at the time of testing.

The likelihood of a positive upper respiratory RT-PCR may be higher early in the course of illness, >90 percent on days 1 to 3 of illness, <80 percent at day 6, and <50 percent after day 14.



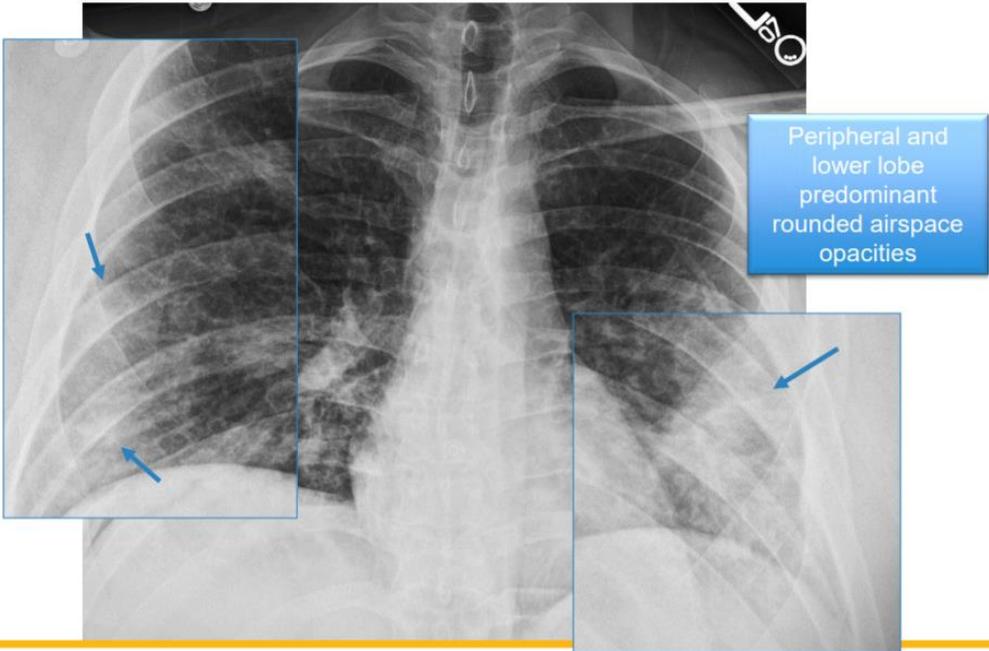
Reinfection

- Reinfection with SARS-CoV-2 has not yet been definitively confirmed in any recovered persons to date (except on case in Hong Kong 4.5 month after first infection)
- Persons infected with related endemic human betacoronavirus appear to become susceptible again at around 90 days after onset of infection.
- In persons recovered from SARS-CoV-2 infection, a repositive PCR during the 90 days after illness onset more likely represents persistent shedding of viral RNA than reinfection.

Primary features are of atypical pneumonia or organizing pneumonia.
Bilateral findings in about 85% of patients; 33 - 86% predominantly peripheral and 70 - 80% predominantly posterior



Typical – COVID-19+

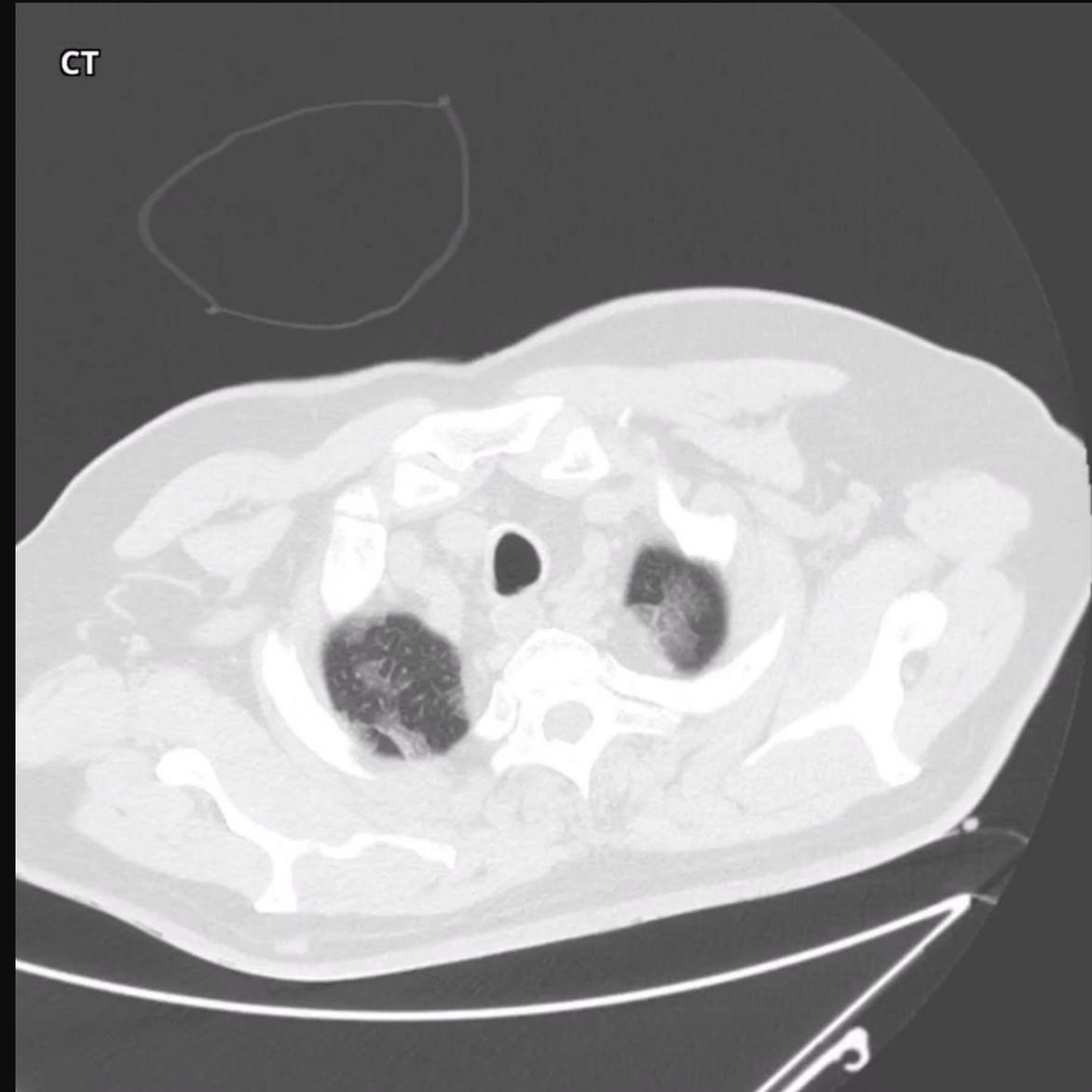


Timeline of Radiographic Findings

Ground glass opacities to develop on CT between days 0-4 of symptom onset with a peak between 6-13 days.

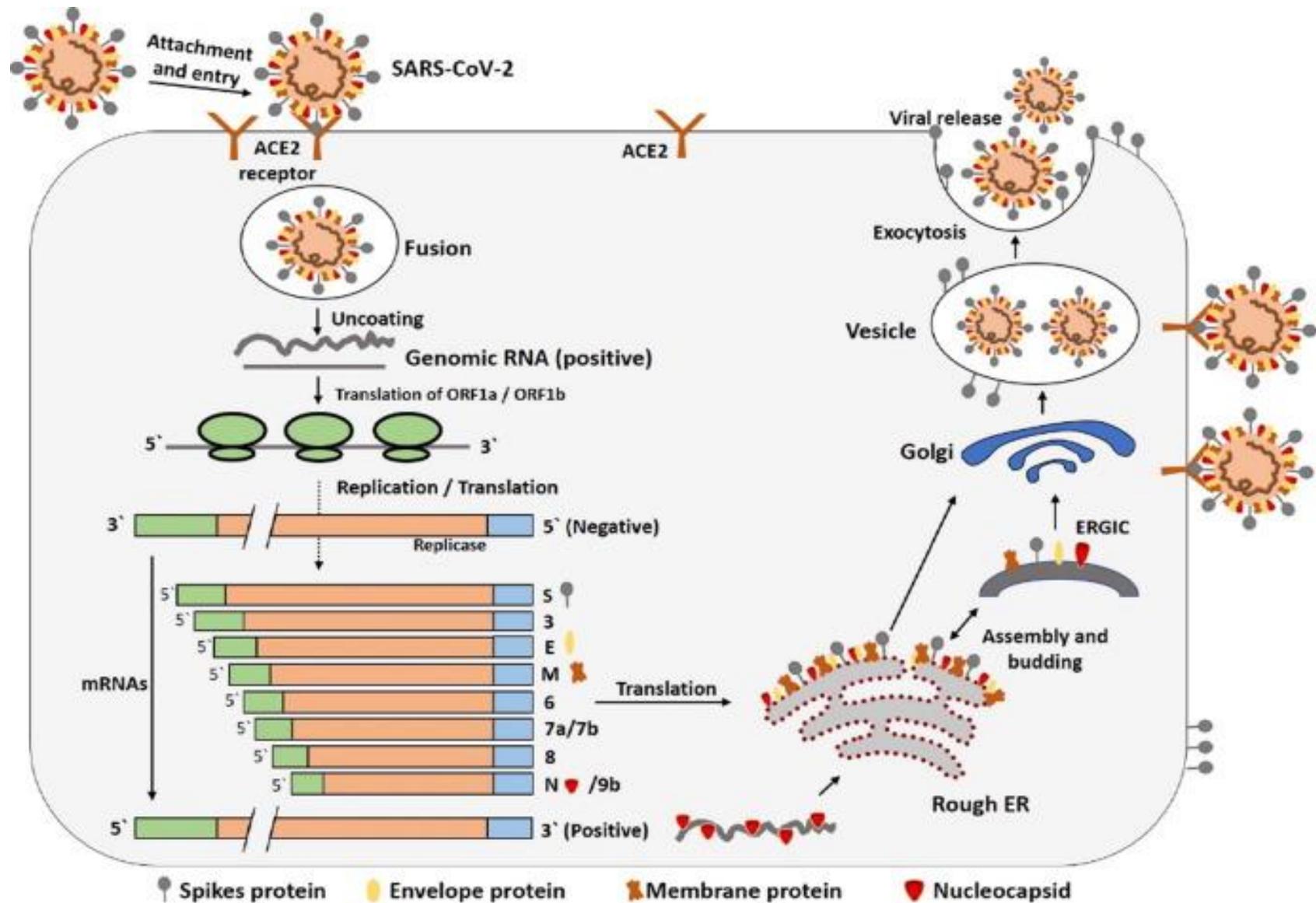
CT should not be used to screen for COVID-19, or as a first-line test to diagnose COVID-19

CT should be used sparingly and reserved for hospitalized, symptomatic patients with specific clinical indications for CT

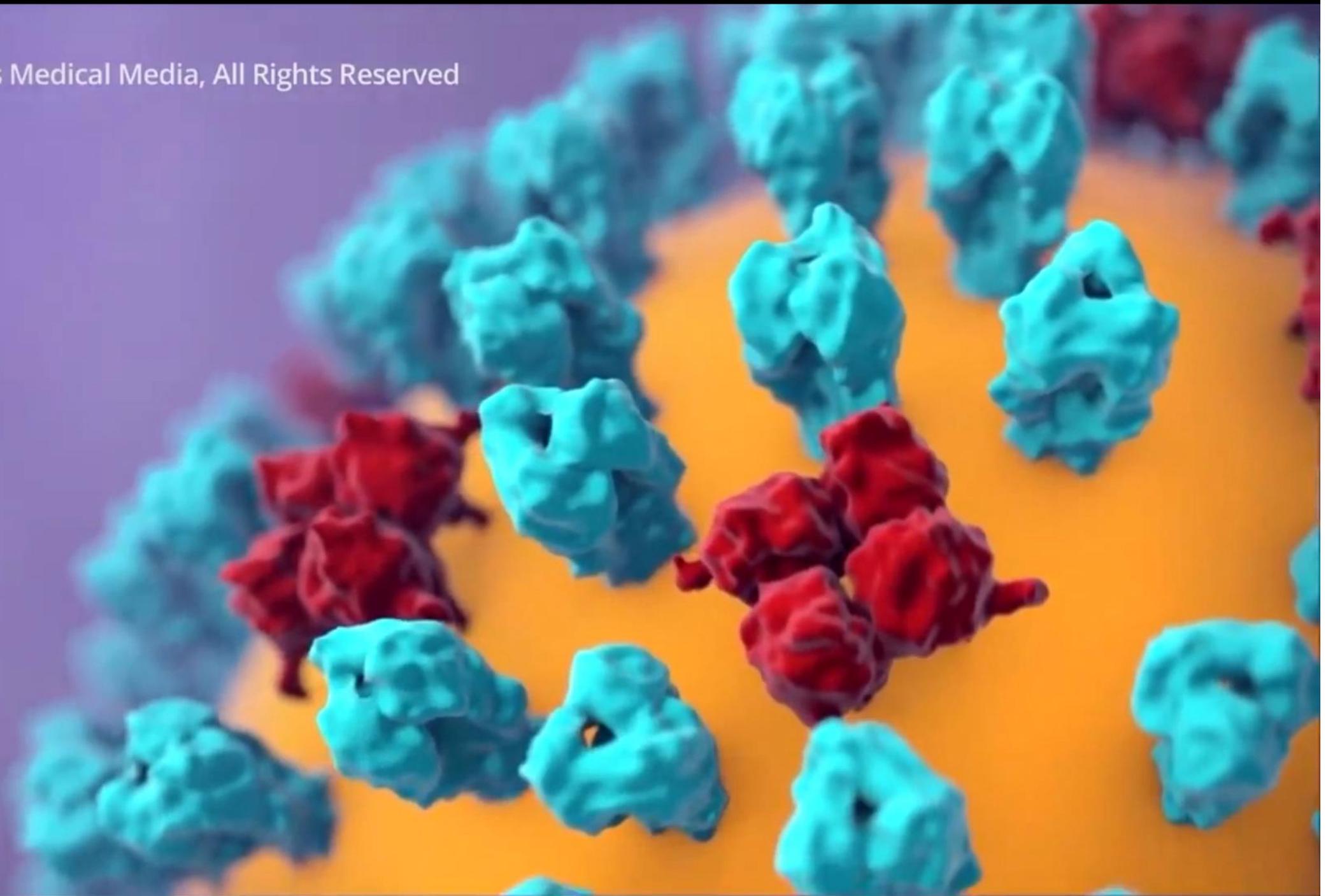


Laboratory features associated with severe COVID-19.

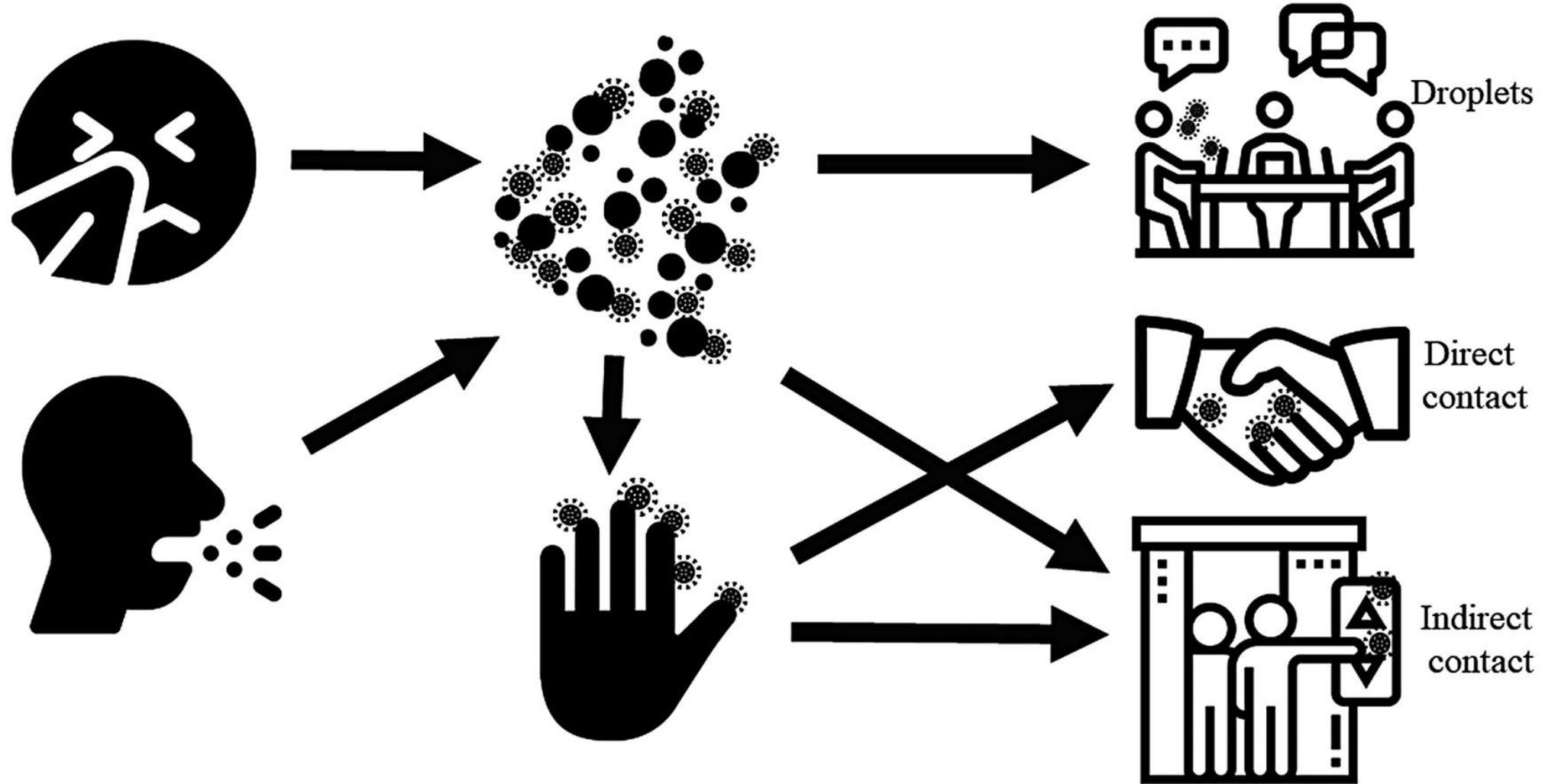
Abnormality	Possible threshold
Elevations in:	
•D-dimer	>1000 ng/mL (normal range: <500 ng/mL)
•CRP	>100 mg/L (normal range: <8.0 mg/L)
•LDH	>245 units/L (normal range: 110 to 210 units/L)
•Troponin	>2× the upper limit of normal (normal range for troponin T high sensitivity: females 0 to 9 ng/L; males 0 to 14 ng/L)
•Ferritin	>500 mcg/L (normal range: females 10 to 200 mcg/L; males 30 to 300 mcg/L)
•CPK	>2× the upper limit of normal (normal range: 40 to 150 units/L)
Decrease in:	
•Absolute lymphocyte count	<800/microL (normal range for age ≥21 years: 1800 to 7700/microL)



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COVID-19 transmission routes: droplets, direct contact, and indirect contact



Surfaces could pose only a modest risk for household spread

- Researchers at the University of Bonn analyzed the air and various household surfaces for coronavirus in 21 German households in which at least one person tested positive for COVID-19.
- None of the air samples tested positive for the virus, and only 3.36 % of all object samples tested positive. Some (15.15%) wastewater samples from washbasins, showers and toilets tested positive for the virus, but it is not known whether wastewater is a source of infection for people who co-habit. M

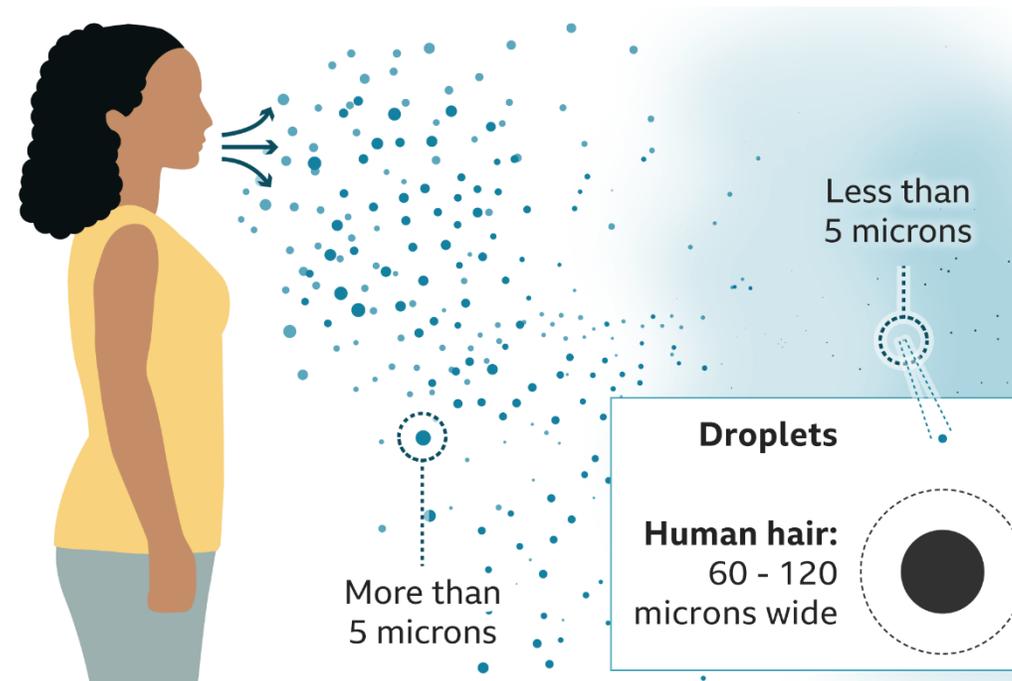
The difference between droplet and airborne transmission

Droplet transmission

Coughs and sneezes can spread droplets of saliva and mucus

Airborne transmission

Tiny particles, possibly produced by talking, are suspended in the air for longer and travel further



Source: WHO

BIB

Airborne transmission.

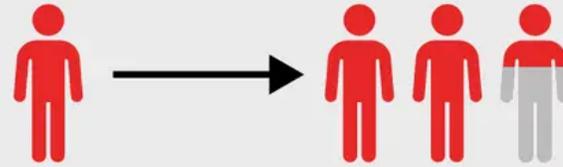
- In the new WHO guidelines released July/9/2020 airborne transmission of COVID-19 in crowded, indoor locations with poor ventilation "cannot be ruled out"
- Some reports of outbreaks occurring in restaurants, [choir practice](#) and [fitness classes](#) have suggested the possibility of airborne transmission.

The average number of people that one person with a virus infects, based on the R0 scale

COVID-19: 2–2.5

Infected person

Average people infected



H1N1: 1.2–1.6

Infected person

Average people infected

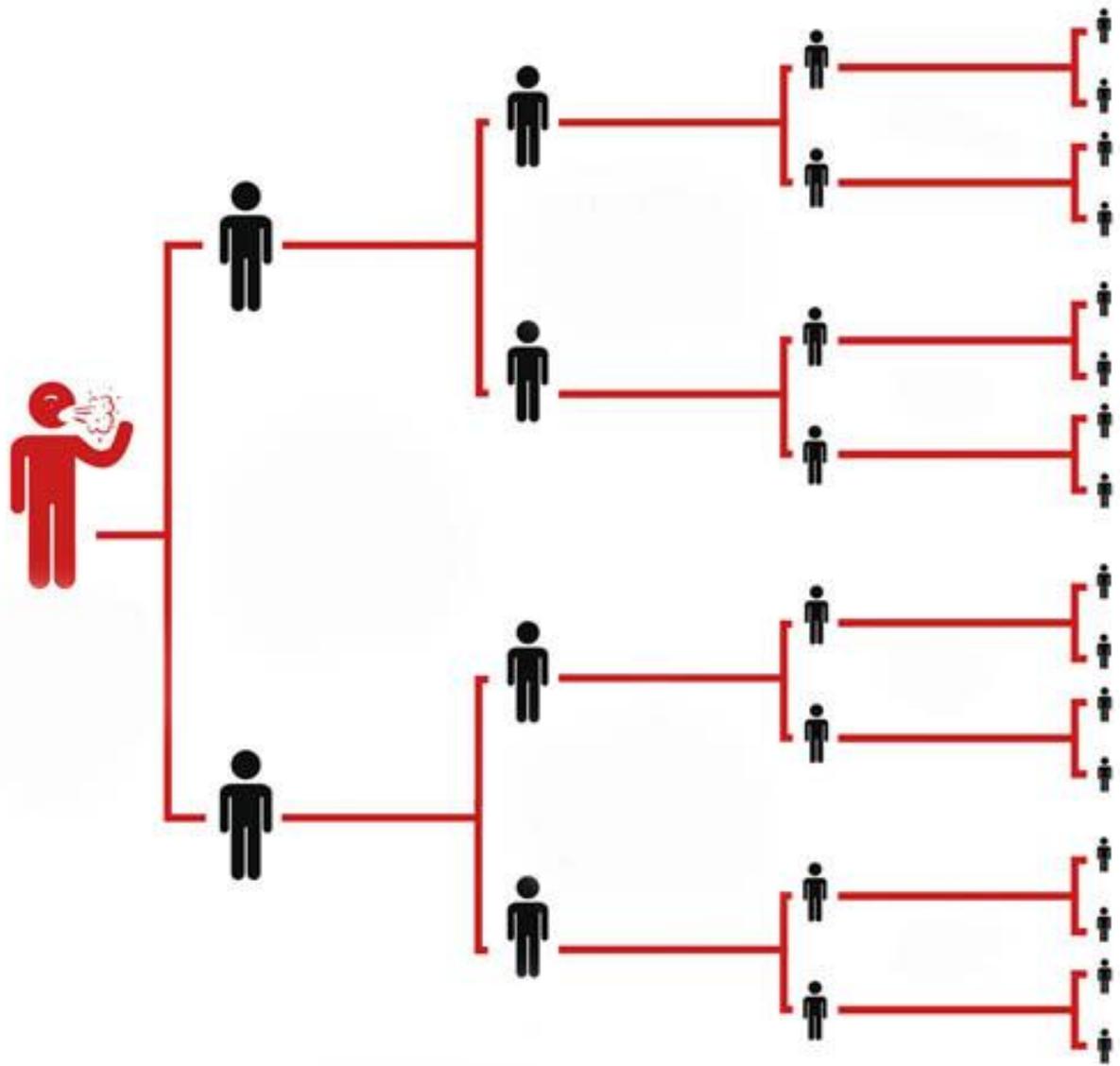


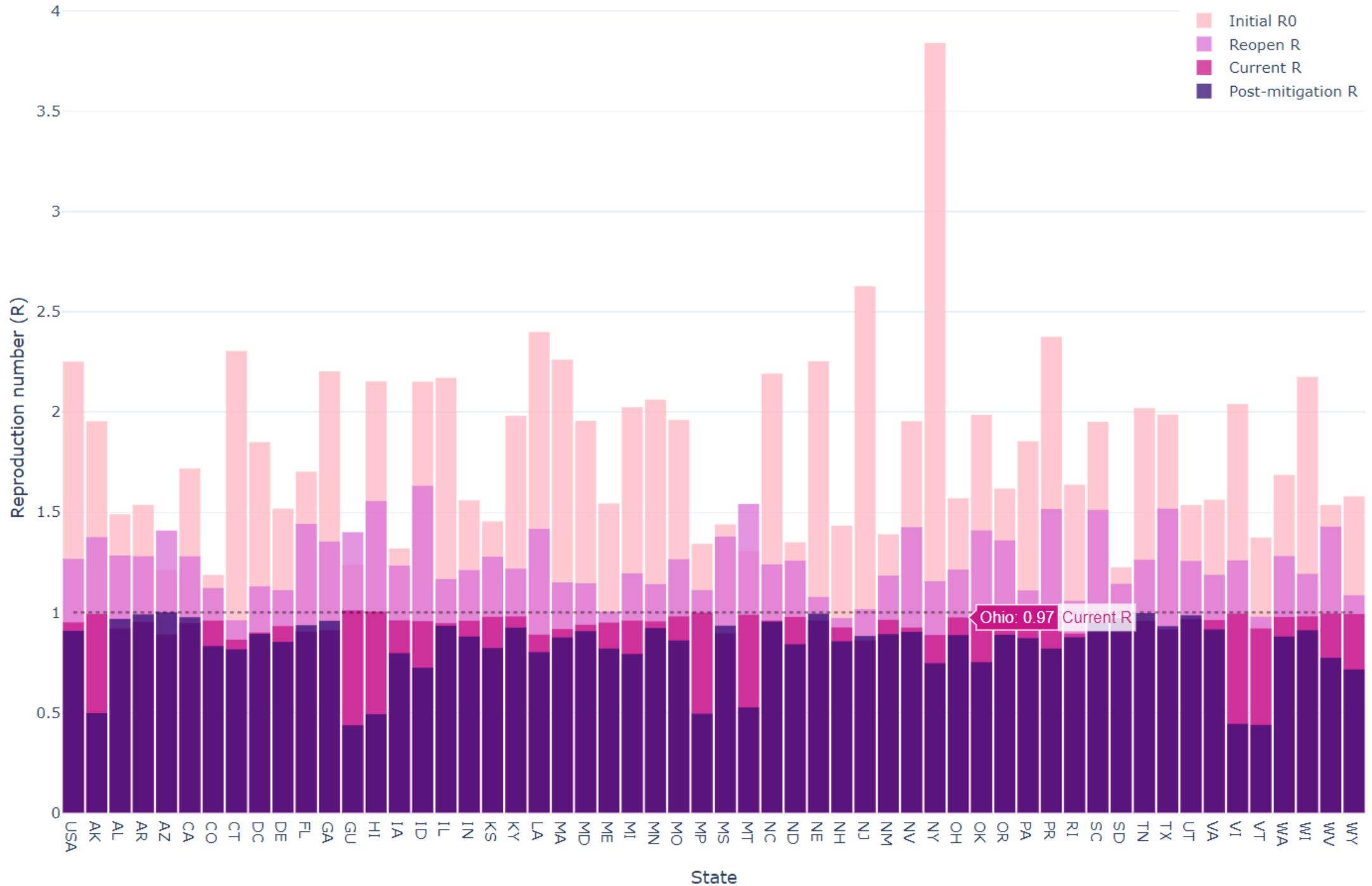
Ebola: 1.6–2

Infected person

Average people infected









'Superspreading' Events

- large numbers of people congregate.
- The longer a group stays in contact, the greater the likelihood that the virus will spread among them (for contact tracing CDC uses 15 minutes).
- What people are doing matters:
 - Talking Loud (conversation in bars)
 - Singing (karaoke parties, churches, choir)
 - Breathing hard (dance class, Gym)
- Poor ventilation System
- They could be responsible for much of the new coronavirus's transmission.

COVID-19 SPREADS EASILY IN GROUP GATHERINGS

PRIMARY CASES



2 symptomatic people attended church events March 6-8, later tested positive for COVID-19

CDC.GOV

CHURCH CASES



At least 35 of 92 attendees acquired COVID-19, 3 deaths

bit.ly/MMWR051920

COMMUNITY



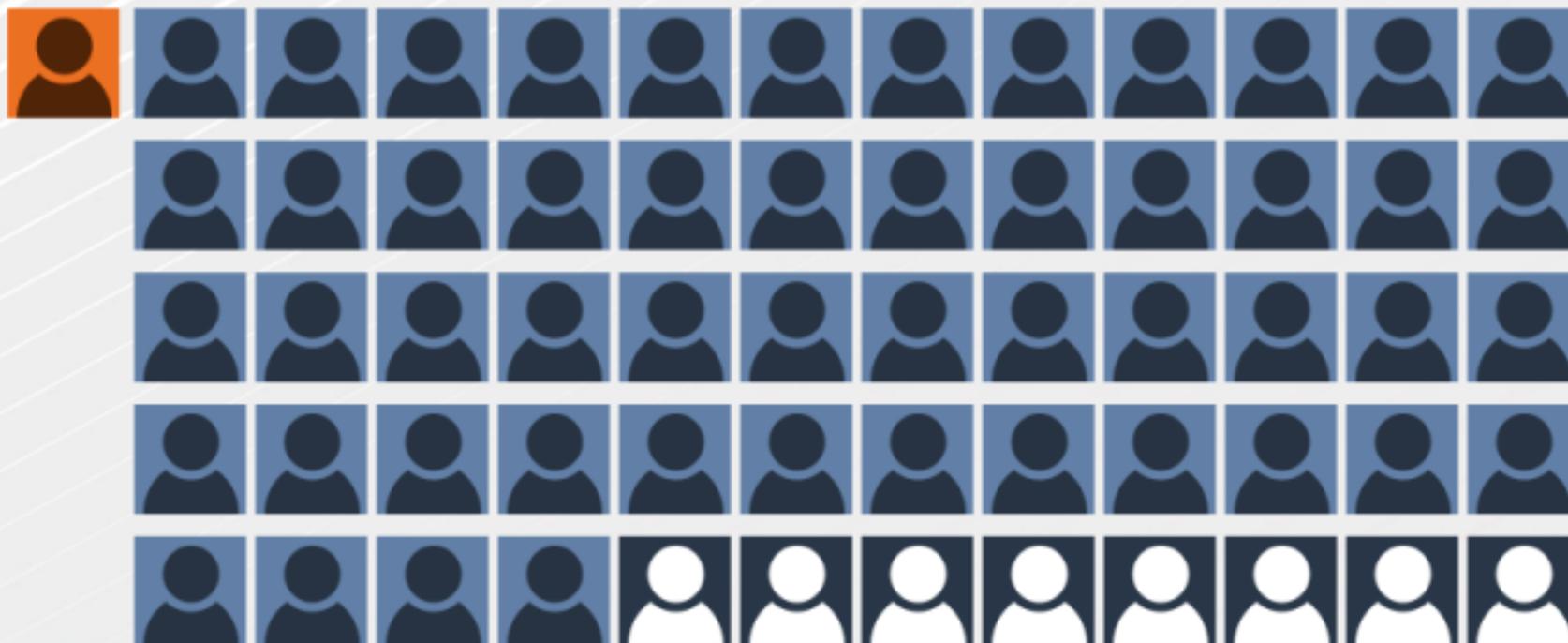
From contact with church cases, at least 26 additional cases were confirmed, 1 death

MMWR

AFTER CHOIR PRACTICE WITH ONE SYMPTOMATIC PERSON

87% OF GROUP DEVELOPED COVID-19

CDC.GOV



 INDEX CASE

 32 CONFIRMED &
20 PROBABLE CASES

 UNAFFECTED
PERSON

Symptom-Based Strategy for Discontinuing Transmission-Based Precautions.



- *Patients with mild to moderate illness who are not severely immunocompromised:*
 - At least 10 days have passed since symptoms first appeared (or 10 days since positive test if asymptomatic)
 - At least 24 hours have passed *since last* fever without the use of fever-reducing medications
 - Symptoms have improved
- *Patients with severe to critical illness or who are severely immunocompromised:*
 - At least 20 days have passed *since symptoms first appeared* **and**
 - At least 24 hours have passed *since last* fever without the use of fever-reducing medications **and**
 - Symptoms have improved

COVID-19 post exposure prophylaxis

- No effective prophylactic therapy to this date
- After high-risk or moderate-risk exposure to Covid-19, hydroxychloroquine did not prevent illness compatible with Covid-19 or confirmed infection when used as postexposure prophylaxis within 4 days after exposure.
- There are no vitamins or supplements known to help prevent coronavirus, including COVID-19.
- **Future potential Prophylactic Therapy and Trials:**
 - **Monoclonal Antibodies**
 - **Nasal Interferon alpha**

Treatment form Mild to Moderate Disease (outpatient) or Hospitalized with no severe disease (not on O2, sat above 94%)

- Infection control
- **Symptomatic Treatment**
 - Antipyretics and analgesics for fever, myalgias, and headaches.
 - Use Acetaminophen as first line
 - NSAID use is acceptable if symptoms do not respond to acetaminophen.
 - Symptomatic improvement with self-proning.
- Hydration
- Rest as needed
- Frequent repositioning and ambulation
- HCQ trials have not suggested a clear clinical benefit for patients with COVID-19, including those managed in the outpatient setting.
- Steroid is not recommended for these patients.
- **Future Treatments and Trials:**
 - Favipiravir
 - AT-527.
 - Inhaled Remdesivir.
 - Monoclonal Antibodies.
 - Inhaled Interferon

Treatment for Patients with Severe Disease (Hospitalized with Hypoxia, not on MV)

- **Remdesivir:**
 - Hospitalized patients with COVID-19 who require supplemental oxygen but who are not on high-flow oxygen, noninvasive ventilation, mechanical ventilation, or ECMO.
 - 200 mg IV on day 1 followed by 100 mg daily for 5 days total (with extension to 10 days if there is no clinical improvement and in patients on mechanical ventilation)
- **Steroid:**
 - is recommended for the patients who require O₂
 - Dexamethasone 6 mg po or IV x 10 days or until discharge
- **Trials:**
 - Consider Convalescent Plasma
 - Ravulizumab Trial
 - Monoclonal Antibodies
 - Ruxolitinib trial

Treatment for Patients with Severe Disease (on High Flow O₂ ,MV or ECMO)

- **Dexamthasone** 6 mg po/IV daily x 10 days
- Due to limited resources of Remdesivir and less certain clinical benefit we don't recommend Remdesivir for these Patients.
- **Trials:**
 - Consider Convalescent Plasma
 - Ravulizumab Trial
 - Monoclonal Antibodies
 - Ruxolitinib trial

Remdesivir for COVID-19

- Remdesivir resulted in a faster time to recovery and discharge from the hospital (median 11 versus 15 days)
- In patients who were on oxygen supplementation but did not require high-flow oxygen or ventilatory support (either noninvasive or invasive), there was a statistically significant 14 days mortality benefit (2.5 versus 11 percent)
- Indicated for hospitalized patients with COVID-19 who require supplemental oxygen but who are not on high-flow oxygen, noninvasive ventilation, mechanical ventilation, or ECMO.
- Should not be initiated or should be stopped if ALT is $\geq 5x$ ULN.
- If eGFR < 30 ml/min, may be considered on an individual basis considering risk/benefit.
- Black patient, patients younger than 65 years, patients who were not on a ventilator did better.

Steroid in COVID-19

1. strong consideration of low-dose systemic steroids for COVID+ patients who are critically ill or require supplemental oxygen. .

Dosing regimens to consider include:

- Dexamethasone 6mg IV or PO daily x 10 days
- Hydrocortisone 50mg IV Q8h x 10 days
- Methylprednisolone 15mg IV BID x 10 days
- Prednisone 40mg PO daily x 10 days

2. If also treating shock, we recommend hydrocortisone 50mg IV Q6h until improvement in shock followed by consideration of steroid dosing as above to complete 10 days of total treatment.

RECOVERY

Randomised Evaluation of COVID-19 Therapy

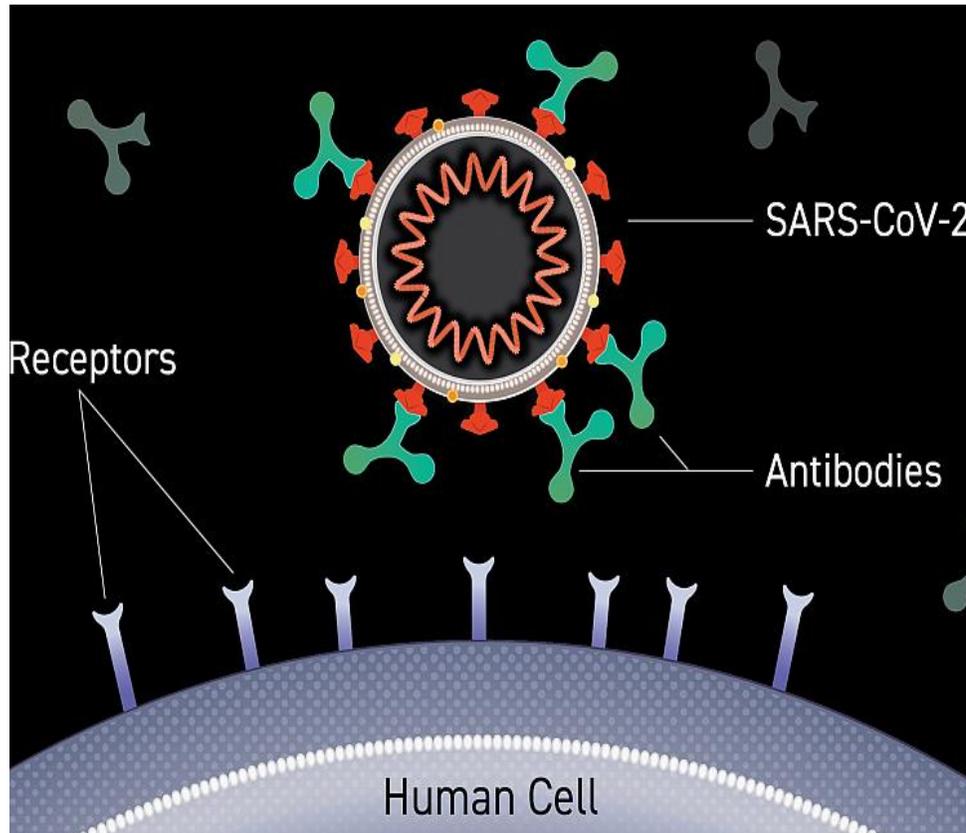
- Dexamethasone reduced deaths by one-third in ventilated patients and by one fifth in other patients receiving oxygen only.
- There was no benefit among those patients who did not require respiratory support
- Based on these results, 1 death would be prevented by treatment of around 8 ventilated patients or around 25 patients requiring oxygen alone.

Convalescent Plasma for COVID-19



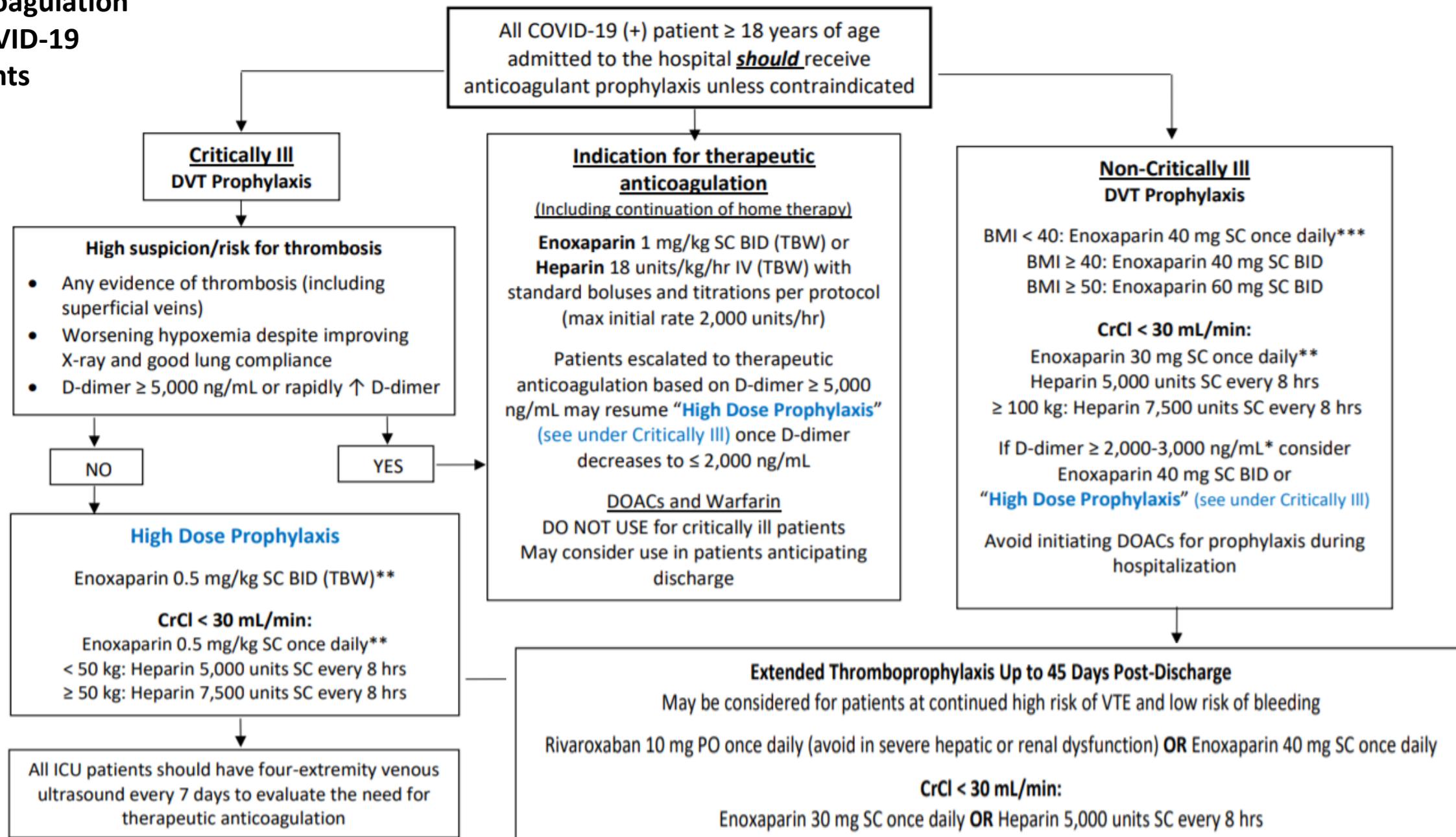
- The first known trial of convalescent serum, as [described in JAMA](#) in 1893
- Convalescent plasma is more effective if it's given earlier in the course of the disease usually the first 3 days
- In patients critically ill with ARDS convalescent plasma doesn't seem to be as effective
- Plasma with higher titers of anti-COVID-19 neutralizing antibodies is thought to be most effective.
- It is relatively safe.
- The data to support using it is very weak
- **FDA Issues Emergency Use Authorization for Convalescent Plasma on August/23**

Monoclonal Antibodies for treatment and prevention of COVID-19



- Clone antibody genes from COVID-19–induced B cells to try to determine which one accounts for a convalescent plasma donor’s effective immune response against SARS-CoV-2.
- Two Phase 3, randomized, placebo-controlled, double-blind clinical trials testing whether experimental monoclonal antibodies can prevent infection by SARS-CoV-2 coronavirus
- May provide short-term protection and could serve as important components of the COVID-19 pandemic response until vaccines become available.
- REGN-COV-2
- LY-CoV555

Anticoagulation in COVID-19 patients



***Patients presenting with trauma should continue to receive Enoxaparin 30 mg SC BID per standard practice.

DOACs = Direct oral anticoagulants (apixaban, rivaroxaban, dabigatran, edoxaban, betrixaban)

Empiric treatment for bacterial pneumonia in select patients: not indicated routinely

- Bacterial superinfection does not appear to be a prominent feature of COVID-19.

Treat with IV antibiotics if:

- when the diagnosis is uncertain.
- patients with documented COVID with high suspicion for superimposed Bacterial pneumonia

Viral Load



- Viral Load is the number of virus particles per volume of a person's blood or sputum.
- The higher a person's viral load, the more likely the person is to become infected with COVID-19, the more likely they will develop a severe case, and the more likely they will infect others.
- super-spreaders usually have higher viral load
- Masks help even those that only block 10 percent of particles.
- If the infected and the uninfected wear masks, the odds are lower that the uninfected will inhale a viral load sufficient to infect them.
- And if they do become infected, the odds are lower that their infection will be deadly.

Impact of wearing face mask

- We are projected to have 300000 death by December first.
- Nearly 70,000 lives could be saved in the next 3 months if 95 % Americans wore masks
- A team of economists, MDs, and other scholars, all based at Yale, estimate that a mask that blocks 10 percent of viral particles, produces a benefit of between \$3,000 - \$6,000 per person who regularly wears such a mask.



Causes of myocardial injury in patients with COVID-19

Myocarditis

Hypoxic injury.

Stress cardiomyopathy

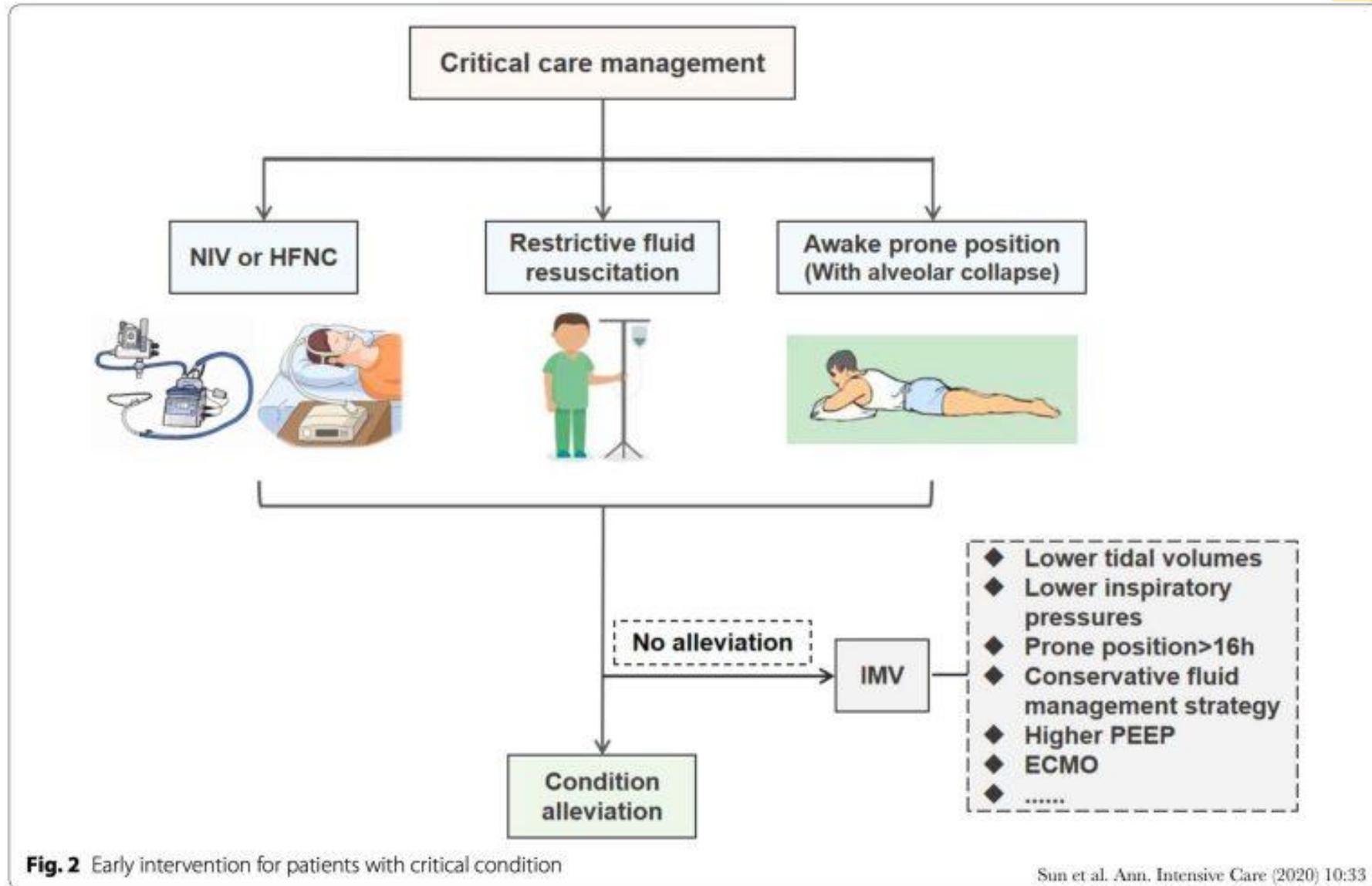
Ischemic injury caused by cardiac microvascular damage or epicardial coronary artery disease

Systemic inflammatory response syndrome (cytokine storm).

Heart Damage Even After COVID-19 'Recovery'

- A prospective cohort study with 100 patients recovered from a recent bout of the disease showed
 - Evidence of ventricular dysfunction and greater ventricular mass.
 - 78% had signs of myocardial inflammation by cardiac MRI.
 - 2/3 of patients in the study had mild-moderate disease
 - These changes potentially could become subacute or even chronic ??
- COVID-19 patients with high blood pressure who were taking ACEi/ARB medications were 0.67 times less likely to have a critical or fatal outcome than those not taking these medications.





THE DECISION TO INTUBATE



- Rapid progression over hours



- Lack of improvement on HHFNC



- Evolving hypercapnia, increasing work of breathing, increasing tidal volume, worsening mental status

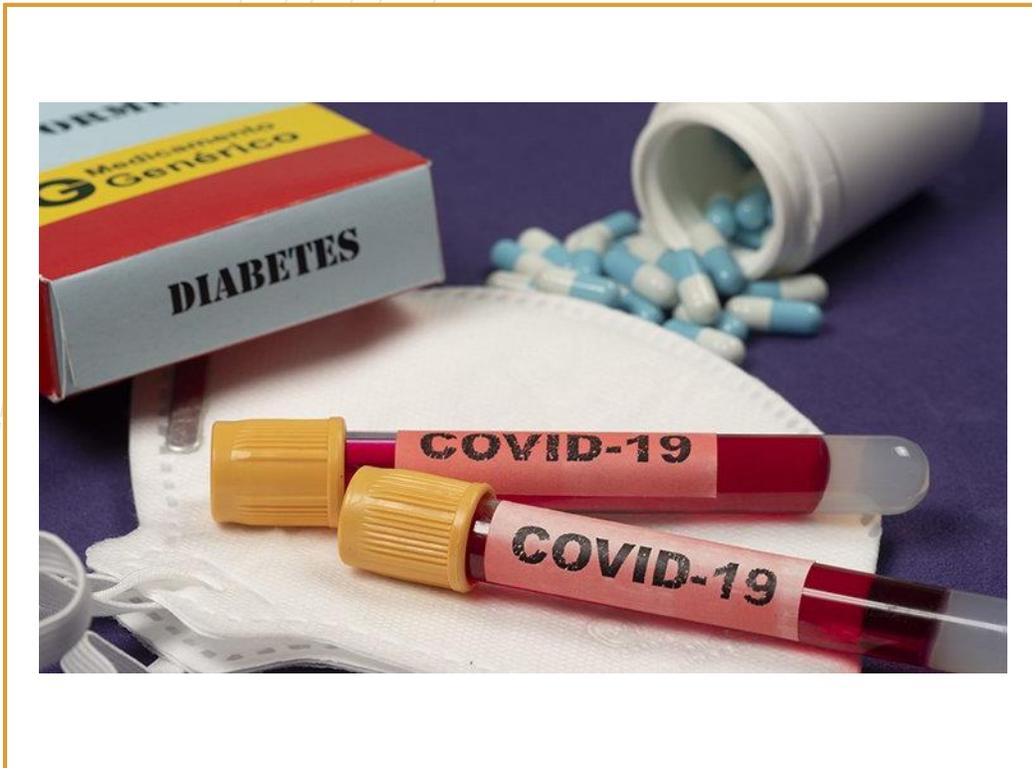


- Hemodynamic instability or multiorgan failure

After Intubation:

- Low tidal volume ventilation (LTVV) targeting ≤ 6 mL/kg predicted body weight (PBW)
- Targets a plateau pressure ≤ 30 cm H₂O
- PEEP 10-16 (use the network study data)
- Recommend initiate proning when a patient requires an FiO₂ $\geq 60\%$ to achieve an SpO₂ $\geq 92\%$ (or PaO₂ ≥ 65) with a P:F ≤ 150 prior Add Epoprostenol.
- Paralysis
- Steroid for Severe ARDS
- ECMO?

COVID-19 and Diabetes Mellitus



- Patients with Type 1 diabetes are three and a half times more likely to die than non-diabetics who catch COVID-19
- Type 2 DM Patients are twice as likely to die than non-diabetics.
- Patients with diabetes have an increased risk of severe complications including ARDS and multi-organ failure.
- There is a definitive link between blood sugar control, as assessed by A1c, and mortality. Increased risk was found to begin at an A1c of **7.5%** and rose thereafter.

COVID-19 and Obesity



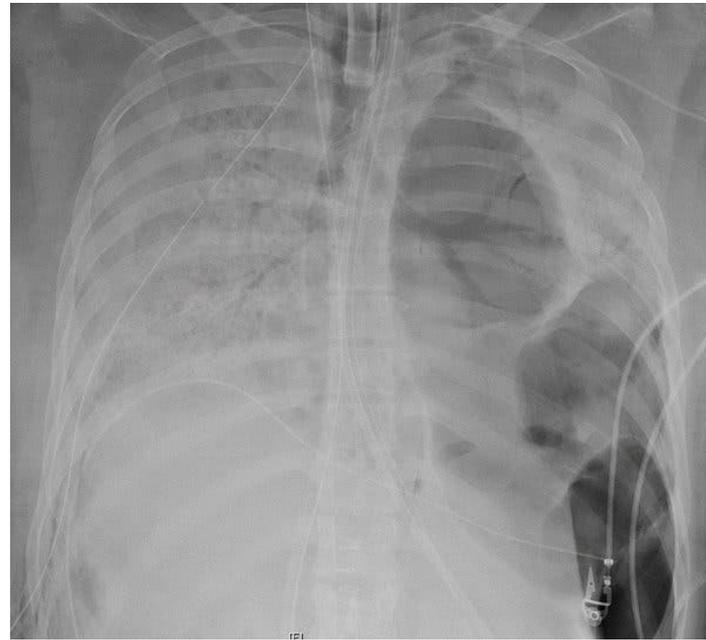
- Obese patients have worse outcomes with COVID-19, including respiratory failure, need for mechanical ventilation, and higher mortality.
- A larger study of over 4,000 patients with COVID-19 in New York City found that severe obesity was a major risk factor for hospitalization, second only to age.
- ACE2 expression in adipose tissue is higher than that in lung tissue, which means that adipose tissue may be vulnerable to COVID-19 infection.
- Obesity is usually associated with other comorbidities (DM2, HTN, Heart diseases).
- Obesity is associated with low lung volumes, impaired respiratory mechanisms and gas exchange.



Post COVID-19 Syndrome?

- COVID-19 can result in prolonged illness, even among young adults without underlying chronic medical conditions (20%).
- Chronic Fatigue Syndrome (Myalgic encephalomyelitis (ME)-like illness)?
- One study found **55% of coronavirus patients still have neurological problems three months later**
- Chronic SOB, lower PFTs for months
- Post COVID-19 pulmonary Fibrosis.
- Post COVID-19 Heart disease?

COVID 19 and Lung Transplant.

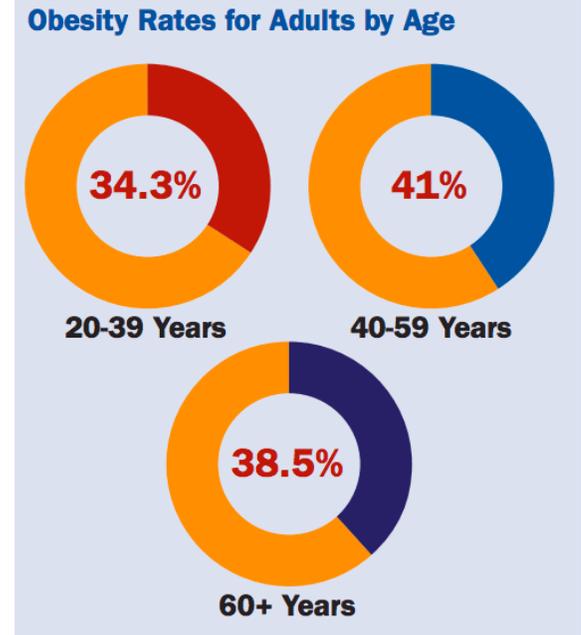


DEFIES DR. TUTTLE

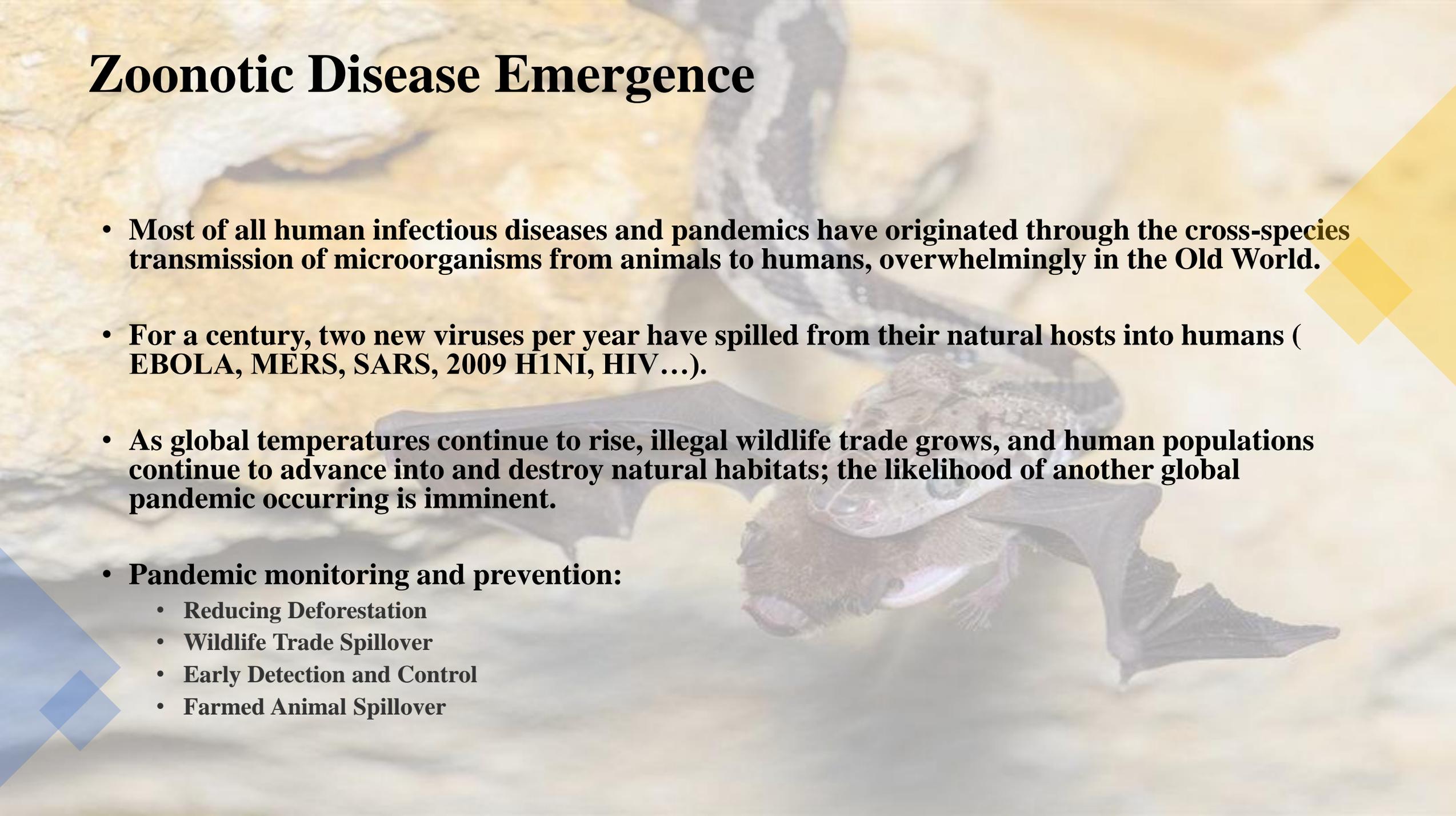
OLYMPIA, Wednesday, Jan. 15.—On the ground that Olympia and Thurston County could not justly be placed under more stringent influenza regulations than Seattle, Tacoma and other Sound cities, the Thurston County Board of Health, consisting of the county commissioners, today rejected the quarantine and other restrictions submitted by Dr. T. D. Tuttle, state health commissioner, following an investigation of the local situation made on request of Governor Lister.

Dr. Tuttle immediately reported the county board's action to Governor Lister and left at once for Tacoma to confer with Dr. J. R. Brown of Tacoma, president of the state board of health. To enforce police authority given the state board by statute over county authority, it will be necessary for the state board of health to meet and formally issue an order. Governor Lister said the matter is now entirely in the hands of Dr. Tuttle and the state board.





Zoonotic Disease Emergence

A large snake is coiled around a bat, symbolizing zoonotic disease transmission. The background is a light, textured surface, possibly a rock or cave wall. The snake is dark and has a lighter pattern on its body. The bat is brown and is positioned in the foreground, facing the viewer. The overall scene is dimly lit, with a yellow diamond shape in the top right corner and a blue diamond shape in the bottom left corner.

- **Most of all human infectious diseases and pandemics have originated through the cross-species transmission of microorganisms from animals to humans, overwhelmingly in the Old World.**
- **For a century, two new viruses per year have spilled from their natural hosts into humans (EBOLA, MERS, SARS, 2009 H1NI, HIV...).**
- **As global temperatures continue to rise, illegal wildlife trade grows, and human populations continue to advance into and destroy natural habitats; the likelihood of another global pandemic occurring is imminent.**
- **Pandemic monitoring and prevention:**
 - **Reducing Deforestation**
 - **Wildlife Trade Spillover**
 - **Early Detection and Control**
 - **Farmed Animal Spillover**

PRECLINICAL

PHASE 1

PHASE 2

PHASE 3

APPROVAL

135+

21

13

8

2

Vaccines
not yet in
human trials

Vaccines
testing safety
and dosage

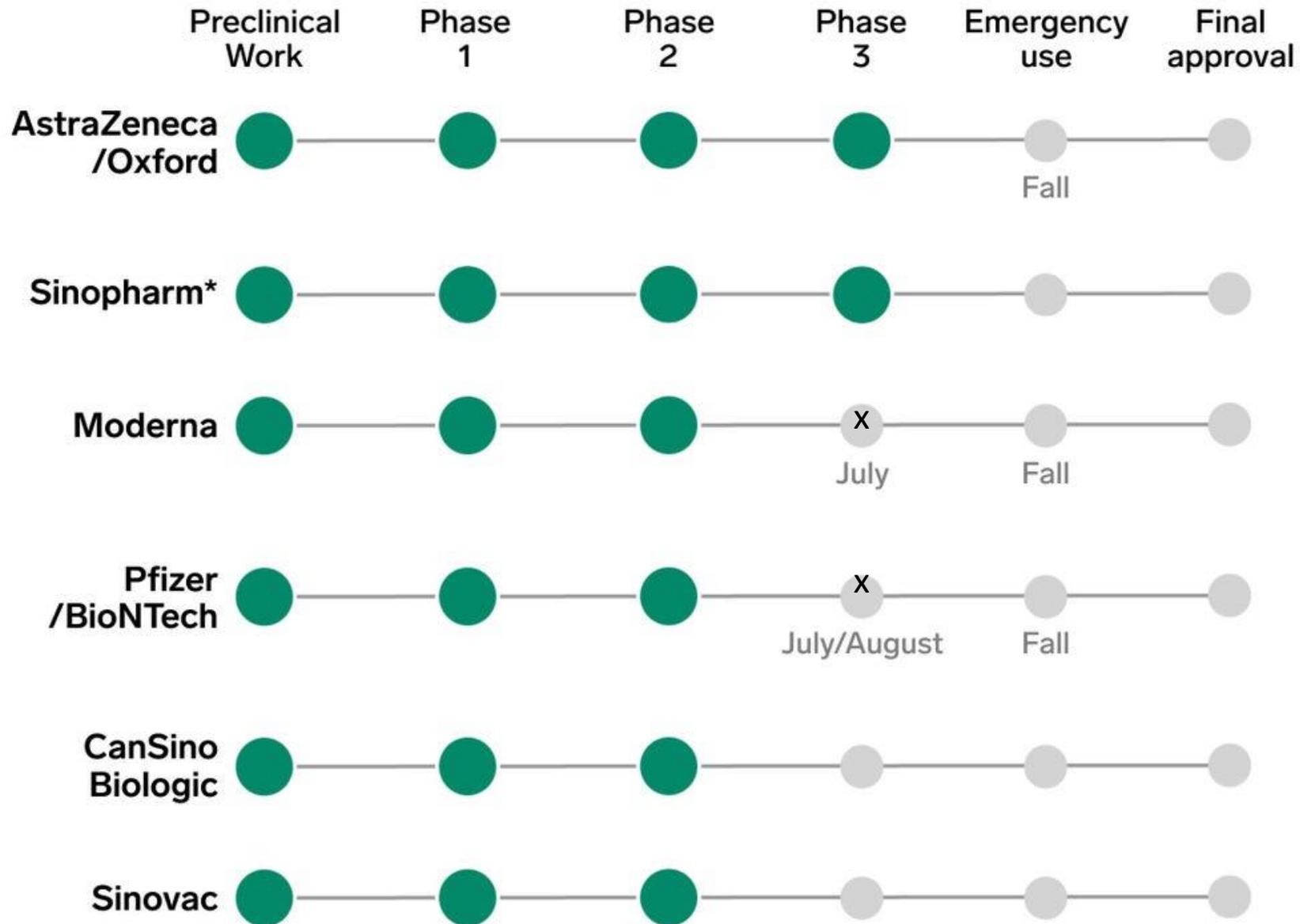
Vaccines
in expanded
safety trials

Vaccines
in large-scale
efficacy tests

Vaccines
approved for early
or limited use

Coronavirus Vaccine Tracker

Coronavirus vaccine tracker

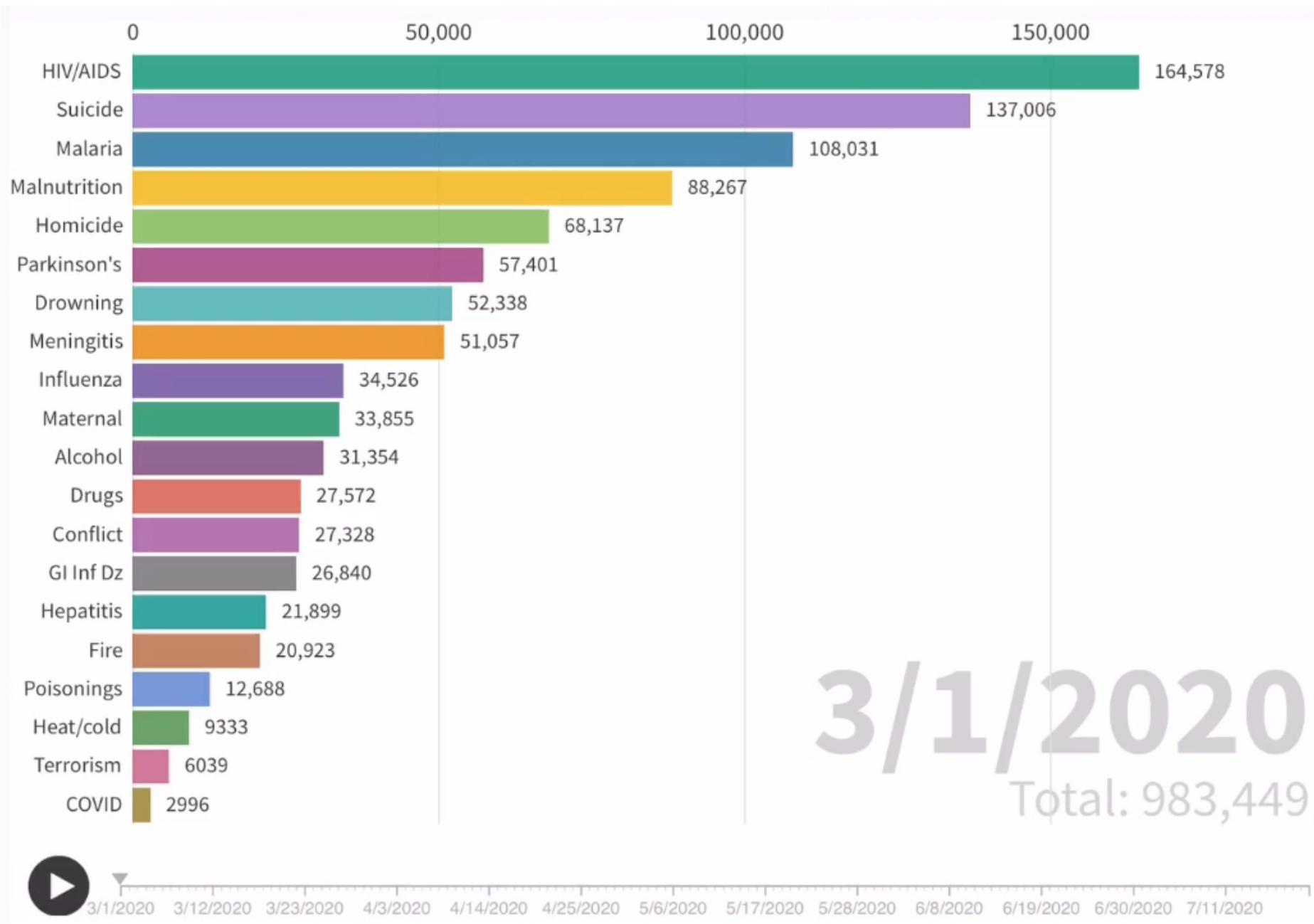




The Role of Physicians in Fighting The Pandemic



- Educating the public by providing an accurate and clear public health message; avoid spreading misinformation based on political beliefs
- Use scientific, evidence-based approach to treat patients
- Pandemic anywhere is pandemic everywhere, work together globally to fight the pandemic all over the world.
- Work together to end healthcare disparities.
- Insisting on transparency and ethical approaches when it comes to research, guidelines, vaccine developments and distribution.



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