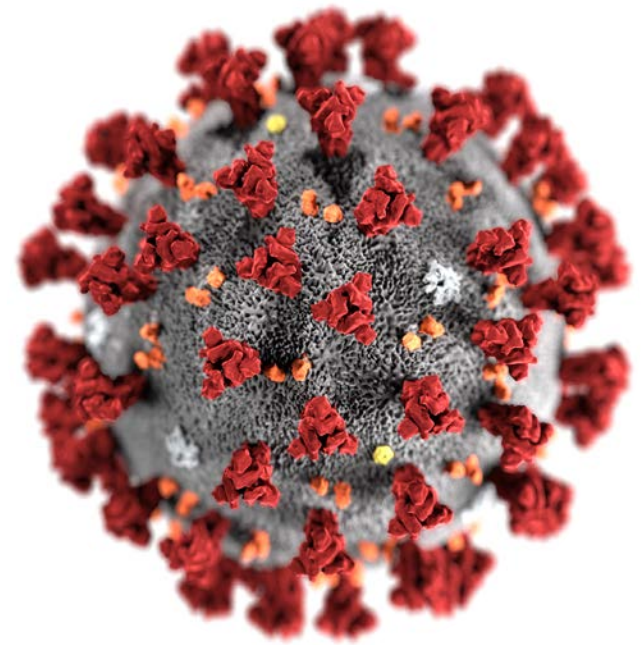




COVID-19



Training for Health Professionals

Preparedness-Prevention-Treatment

The Basics: Epidemiology

- Median patient age: 59.
- Most cases in China (77.8%): ages 30–69.
- Case fatality rate: approximately 2%.
 - In patients >60 years: 3.6% in 60–69; 8% in 70–79; 14.8% in ≥80.
- Estimated basic reproduction number (R_0): 2.2.
- Estimated median incubation time: 5.1 days.
 - Symptoms appear by 11.5 days in 97.5% of infected persons.
- Mean interval between illness onset and hospitalization 9.1–12.5 days



ARDS = Acute respiratory distress syndrome

Median time from onset of symptoms, including fever (in 98% of patients), cough (75%), myalgia or fatigue (44%) and others.

Common Symptoms

- Most common symptoms at illness onset among hospitalized patients:

- Fever (77–98%)
- Cough (46%–82%)
- Myalgia or fatigue (11–52%)
- Shortness of breath (3–31%)
- Nausea or vomiting (5.0%)
- Diarrhea (3.8%)



Case Fatality Rates

- If no underlying medical conditions: Overall 0.9%.
- For patients with comorbidities:
 - Cardiovascular disease: 10.5%.
 - Diabetes: 7%.
 - Cancer, chronic respiratory disease, hypertension: 6% for each.
- For patients developing respiratory failure, septic shock, multiple organ dysfunction: 49%.

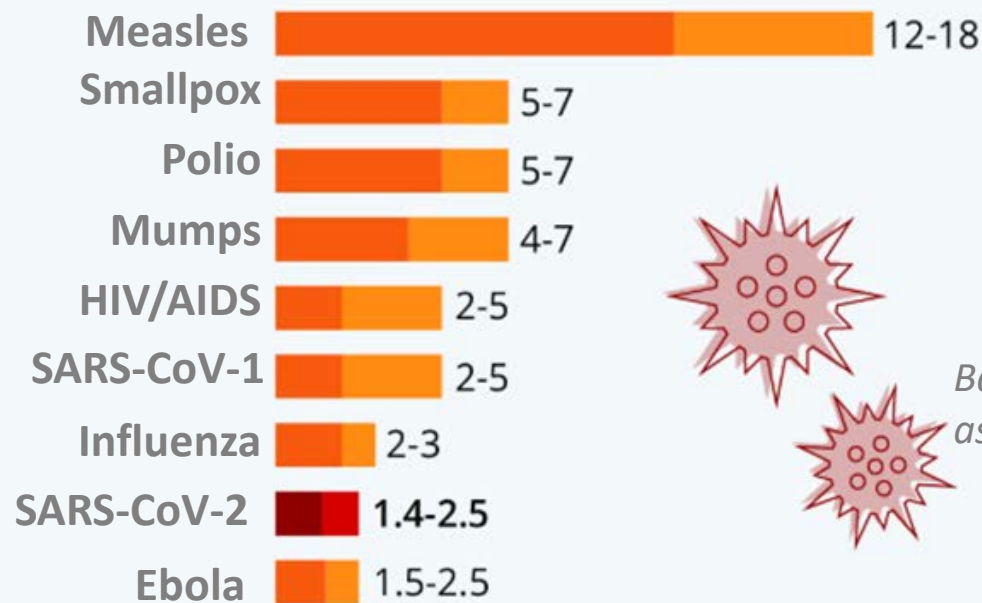
Symptoms: Cold vs Flu vs COVID-19

<i>Symptoms</i>	COLD	FLU	COVID-19*
Fever	Rare	High <i>100–102°F / 37.8–38.9°C Can last 3–4 days</i>	Common
Headache	Rare	Intense	Sometimes
General Aches and Pains	Slight	Common Often severe	Sometimes
Fatigue, Weakness	Slight	Common <i>Often severe, 2–3 weeks</i>	Sometimes
Extreme Exhaustion	Never	Common <i>Starts early</i>	Sometimes <i>Progresses slowly</i>
Stuffy Nose	Common	Sometimes	Rare
Sneezing	Common	Sometimes	Rare
Sore Throat	Common	Common	Rare
Cough	Mild to moderate	Common <i>Can become severe</i>	Common <i>Dry cough</i>
Runny nose	Common	Sometimes	Rare
Diarrhea	No	Sometimes	Sometimes
Shortness of Breath	Rare	Rare	In serious infections

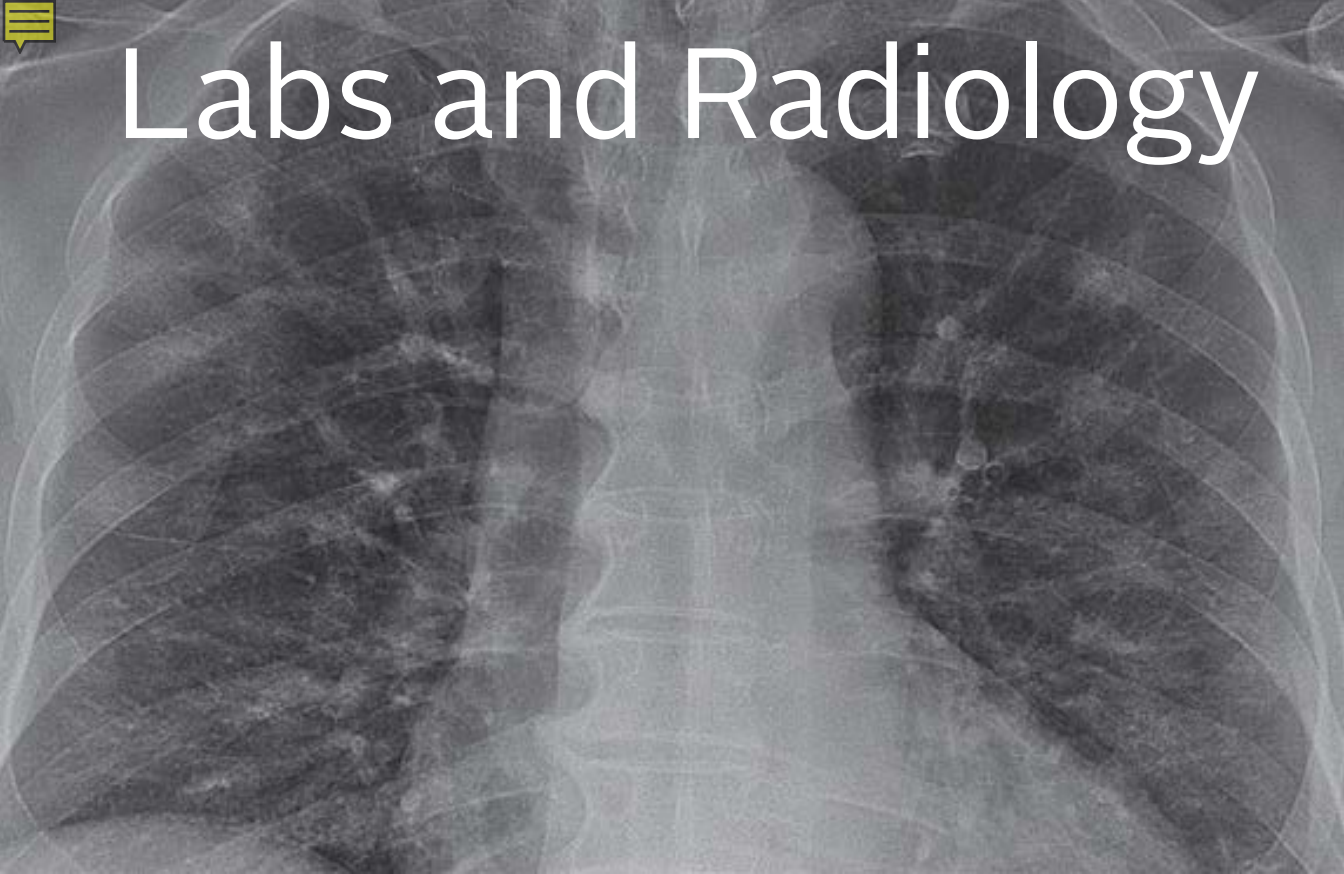
Transmission

- Respiratory secretions, Fecal–oral, Reported transmissibility in asymptomatic individuals, Reported transmission among individuals in latent period.

How Contagious Is COVID-19?



Labs and Radiology



Radiology (chest X-ray)

- Bilateral involvement in most patients.
- Multiple areas of consolidation and ground glass opacities.

Chest CT

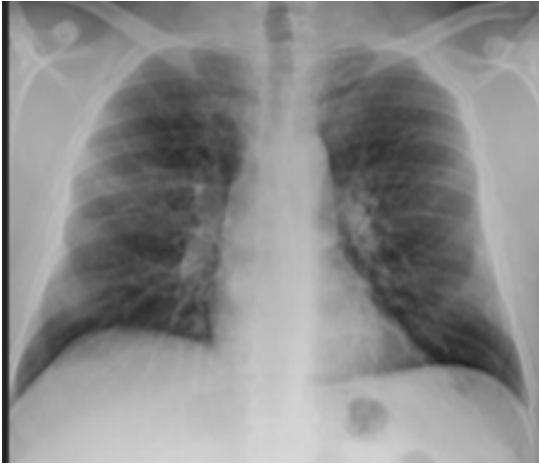
- Ground glass.
- Consolidation.

Laboratory abnormalities among hospitalized patients with pneumonia on admission:

- Leukopenia (9–25%).
- Leukocytosis (24–30%).
- Lymphopenia (63%).
- Elevated alanine aminotransferase and aspartate aminotransferase levels (37%).



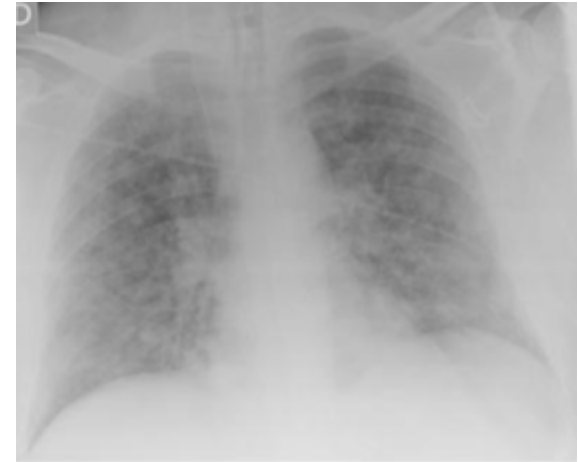
Progression



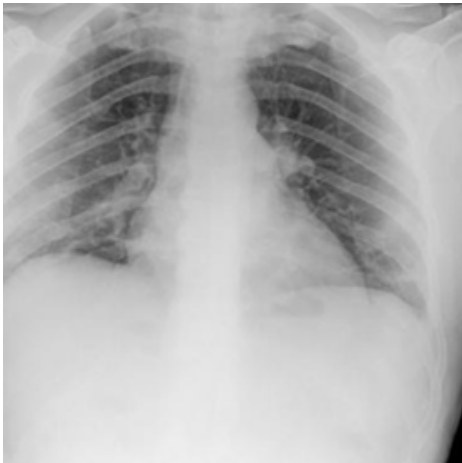
Patient 1 - March 12



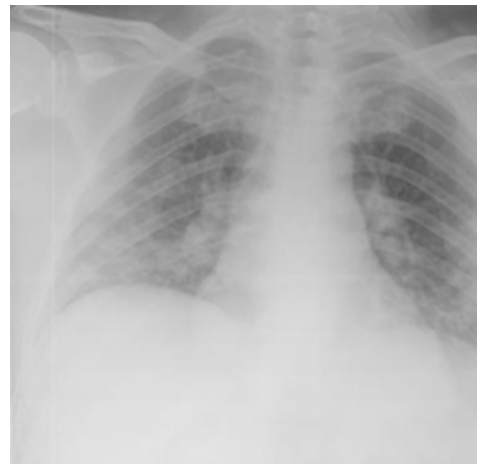
Patient 1 - March 16



Patient 1 - March 18



Patient 2 - March 13



Patient 2 - March 14



Complications

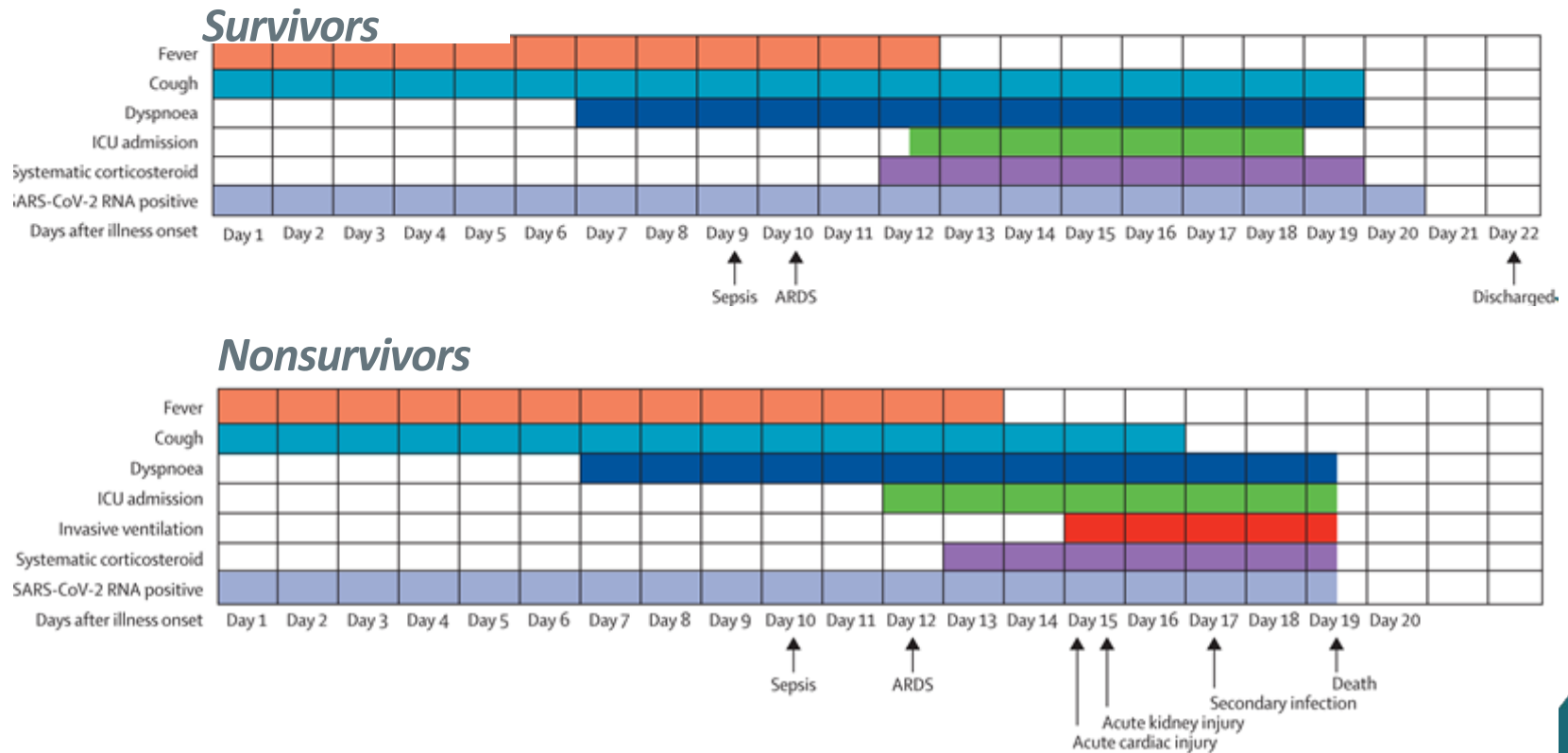
Most Common Complications –

- Sepsis
- Respiratory failure
- Acute respiratory distress syndrome (ARDS)
- Heart failure,
- Septic shock

Survivor Patient Population Compared to Nonsurvivors

- Frequency of the above complications were higher.
- 50% of nonsurvivors acquired secondary infection.
- 31% of nonsurvivors had ventilator-associated pneumonia.
- Baseline lymphocyte count was significantly lower.
- Levels of d-dimer, high-sensitivity cardiac troponin I, serum ferritin, lactate dehydrogenase, and IL-6 were higher in nonsurvivors.

Survivor Patient Population Compared to Nonsurvivors





Study Findings

- *Older age is a risk factor for higher mortality.*
- *Poor outcomes in older individuals might be caused by age-dependent defects in T-cell and B-cell function and excess production of type 2 cytokines.*

Sepsis

- SARS-CoV-2 might have caused the sepsis seen in >50% of older patients.

Cardiac Complications

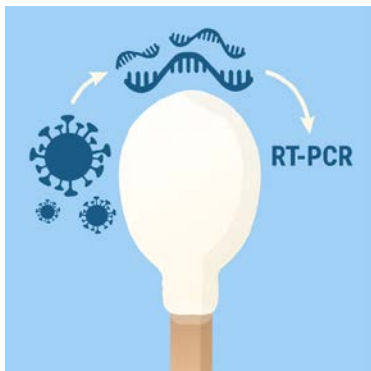
- Higher levels of high-sensitivity cardiac troponin I detected in >50% of nonsurvivors.
- Cardiac dysfunction and ischemic and thrombotic events might arise from:
 - Systemic proinflammatory cytokine responses increasing atherosclerosis and plaque rupture.
 - Induction of procoagulant factors.
 - Hemodynamic changes that predispose to ischemia and thrombosis.
 - Possibility of direct cardiac involvement by the virus, as angiotensin converting enzyme 2, the receptor for SARS-CoV-2, is expressed on myocytes and vascular endothelial cells.



Diagnostic Testing Recommended

Specific Recommendations Vary by Country

- Hospitalized patients with symptoms of COVID-19 infection, to inform infection control measures.
- Symptomatic individuals at higher risk of developing severe illness (e.g., older adults and those with chronic medical conditions and/or immunocompromised state).
- Healthcare personnel and others who have had close contact with a suspected or confirmed case within 14 days of symptom onset or who have traveled to an affected geographic area within 14 days of symptom onset.



Testing

- Reverse-transcription polymerase chain reaction, or RT-PCR&N (sensitivity 30–80%). Oro- or nasopharyngeal swab, sputum.
- Nucleic acid amplification test (NAAT).

Special Populations: Older Adults

- Adults aged 65 and up are at higher risk for severe and critical illness.
- In the US, between February 12 and March 16, adults older than 65 years accounted for:
 - 31% of illnesses.
 - 45% of hospitalizations.
 - 53% of ICU admissions.
 - 80% of deaths associated with COVID-19.

Comorbidities

- Large case series from the Chinese Center for Disease Control and Prevention reported increased case fatality rate among those with preexisting comorbidities:
 - Cardiovascular disease
 - Diabetes
 - Chronic respiratory disease
 - Hypertension
 - Cancer

Special Populations: Children

- Vast majority of infected children have mild or no symptoms.
- Data from 2,143 children in China infected January 16–February 8 showed:
 - Severe or critical illness in 6% compared to 18.5% of adults.
 - 4% of the children were asymptomatic, 51% had mild illness, and 39% had moderate illness.
 - Serious illness more frequent in infants than in older children: in approximately 11% of infants, compared to 7% of children aged 1–5, 4% of those 6–10, 4% of those 11–15, and 3% of those >16.



Special Populations: People Living with HIV

- Data are limited on COVID-19 infection in people living with HIV/AIDS.
- What is known does not indicate that the disease course differs from that in the general population.
- PLHIV with comorbidities linked with an increased risk of severe disease (e.g., cardiovascular disease, lung disease) should avoid all risk of infection.
- Until more is known, additional cautions are warranted for PLHIV, especially those with advanced or poorly controlled disease.
- For those with suppressed HIV viral load and stable health:
Consider postponing routine medical and laboratory exams.

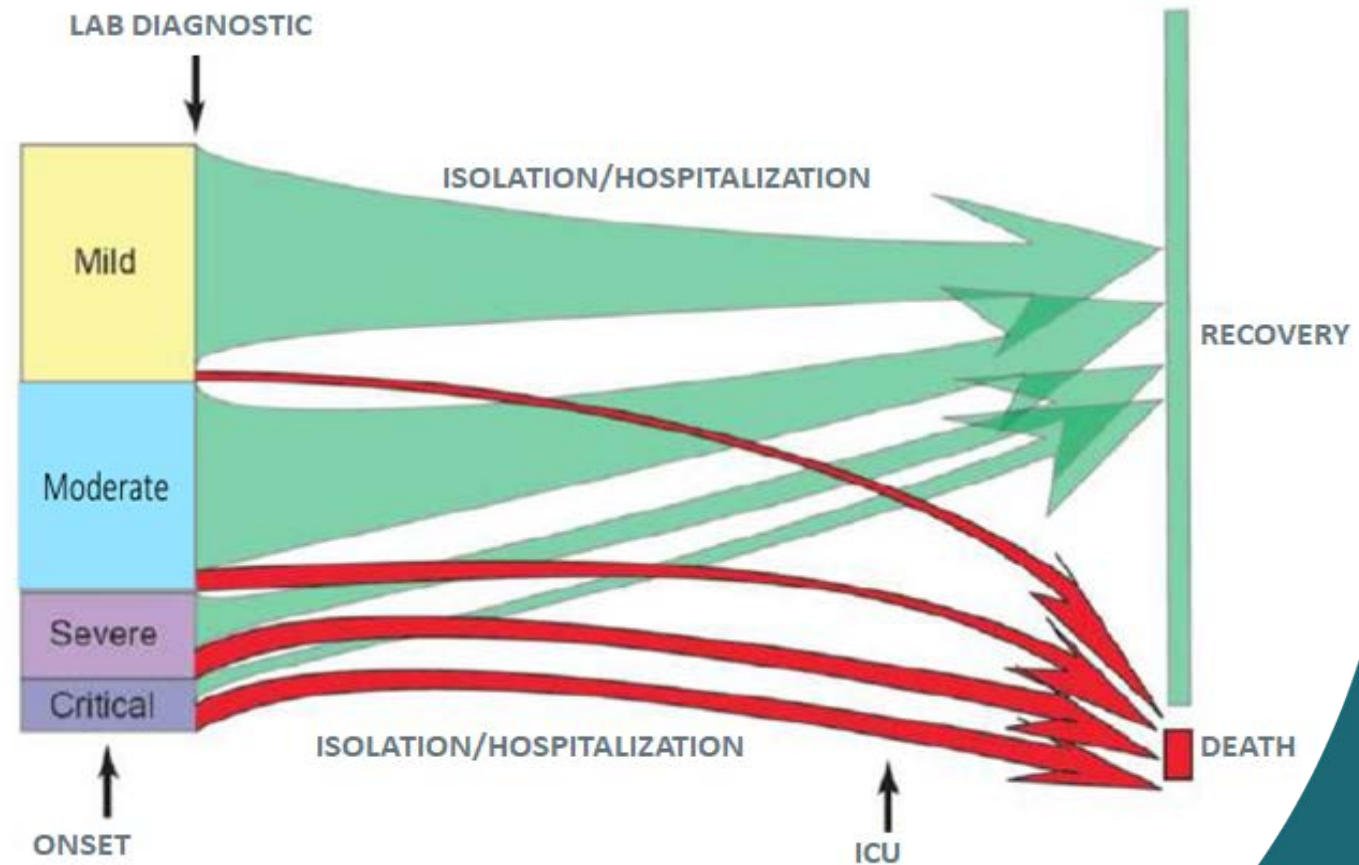
Prognosis with Preexisting Conditions

PRE-EXISTING CONDITION	DEATH RATE (CONFIRMED CASES)	DEATH RATE (ALL CASES)
Cardiovascular disease	13.2%	10.5%
Diabetes	9.2%	7.3%
Chronic respiratory disease	8.0%	6.3%
Hypertension	8.4%	6.0%
Cancer	7.6%	5.6%
No pre-existing conditions		0.9%

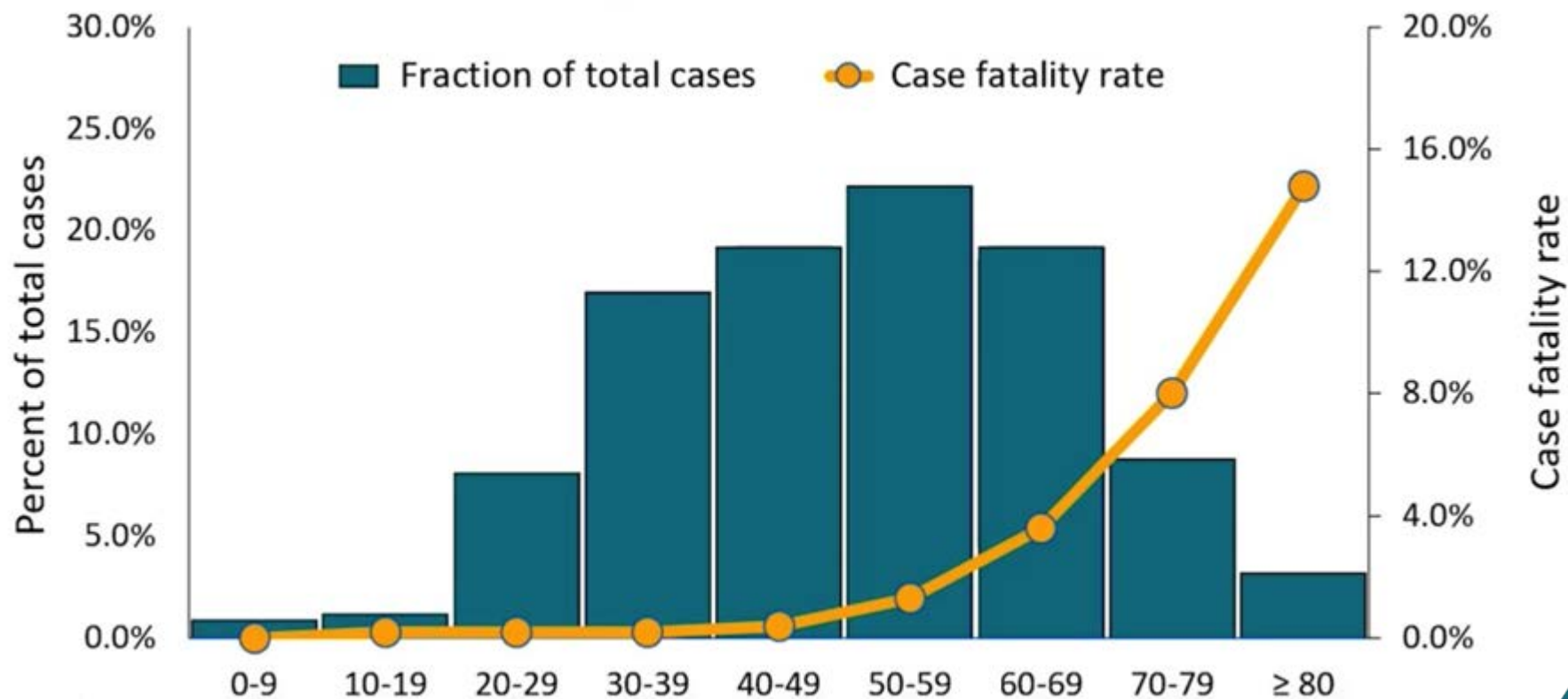
Clinical Prognosis and Recovery

Patterns of Disease Progression for COVID-19 in China

The size of the arrows above indicates the proportion of cases who recovered or died. Moderate cases have a mild form of pneumonia.



Case Fatality Rate by Age in China



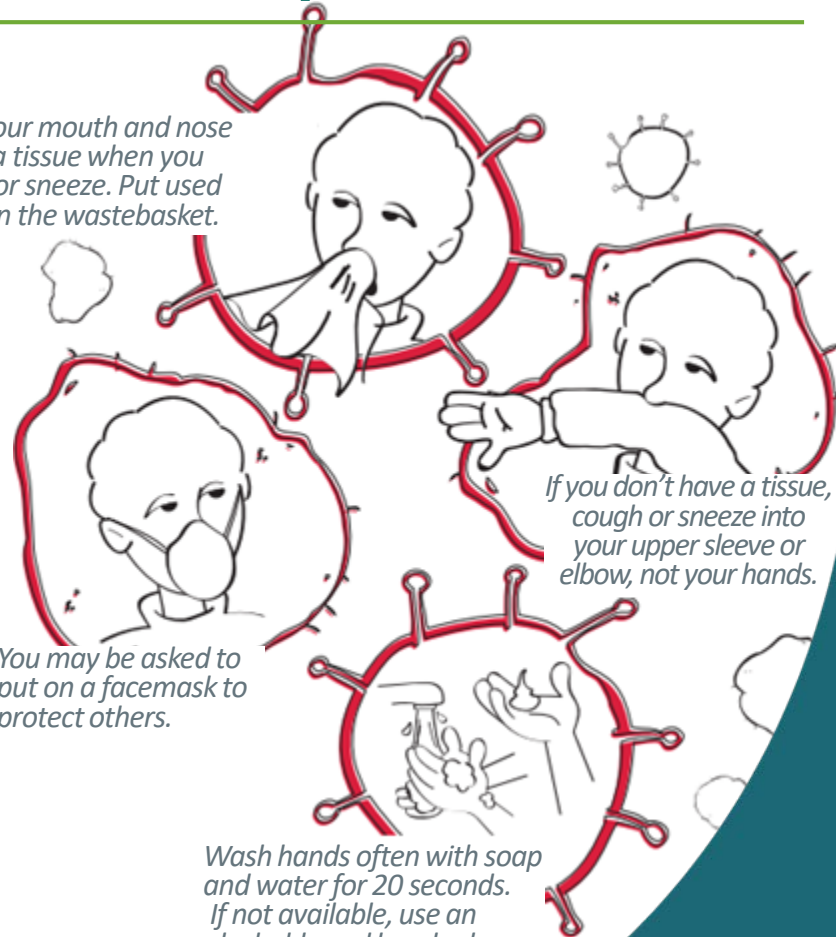
- As of 20 February 2020.
- N=44,672.

Adapted from Zhang 2020, *China CDC Weekly Report 2*, no. 8: 113-122.

Preventing Exposure in the Community

- Handwashing (at least 20 seconds) particularly after touching surfaces in public.
- Use of hand sanitizer that contains at least 60% alcohol.
- Respiratory hygiene (e.g., covering coughs and sneezes).
- No touching of face (particularly eyes, nose, mouth).
- Avoiding crowds (particularly in poorly ventilated spaces) and close contact with sick people.
- Cleaning and disinfecting of frequently touched objects and surfaces.

Cover your mouth and nose with a tissue when you cough or sneeze. Put used tissue in the wastebasket.



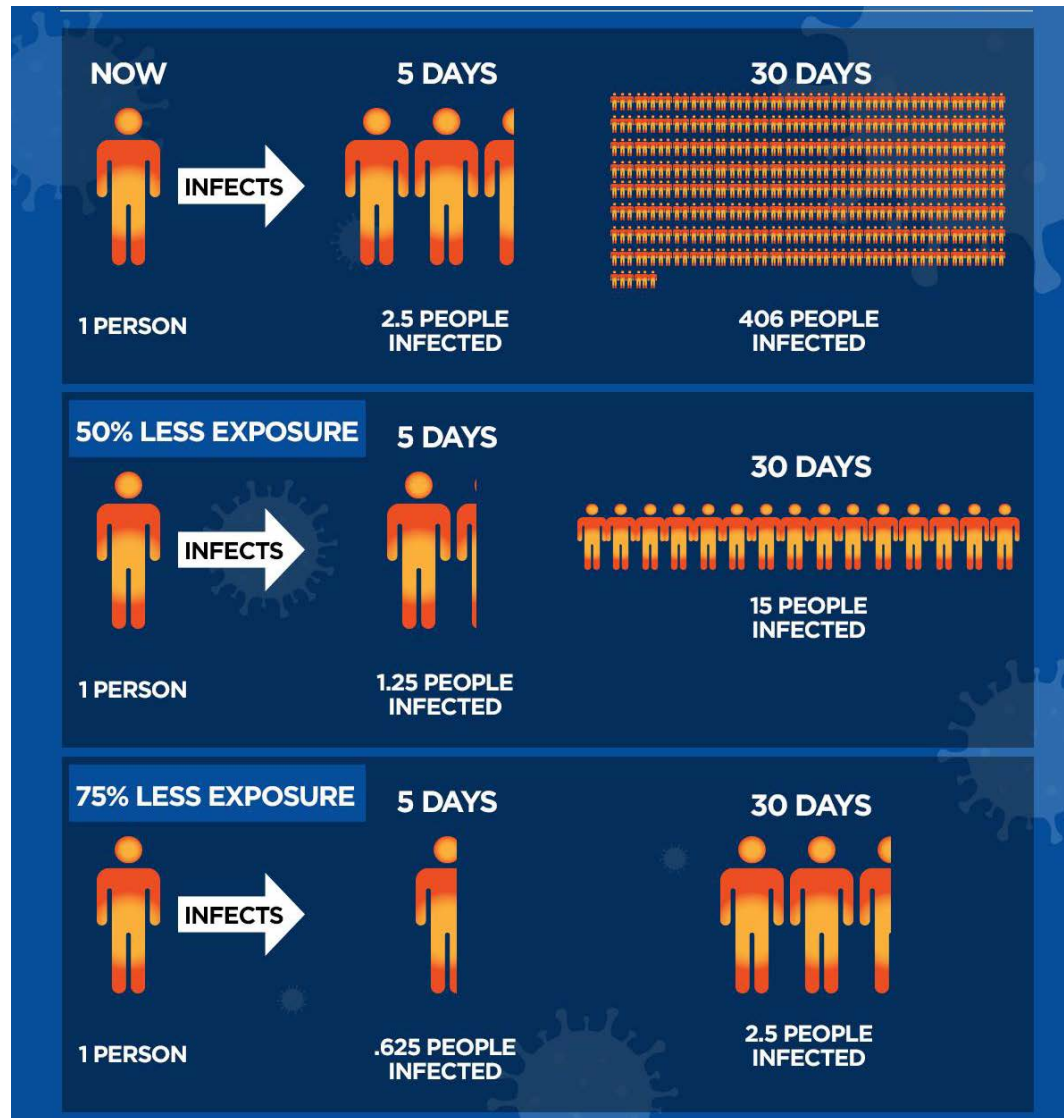
If you don't have a tissue, cough or sneeze into your upper sleeve or elbow, not your hands.

You may be asked to put on a facemask to protect others.

Wash hands often with soap and water for 20 seconds. If not available, use an alcohol-based hand rub.

The Math Behind Social Distancing

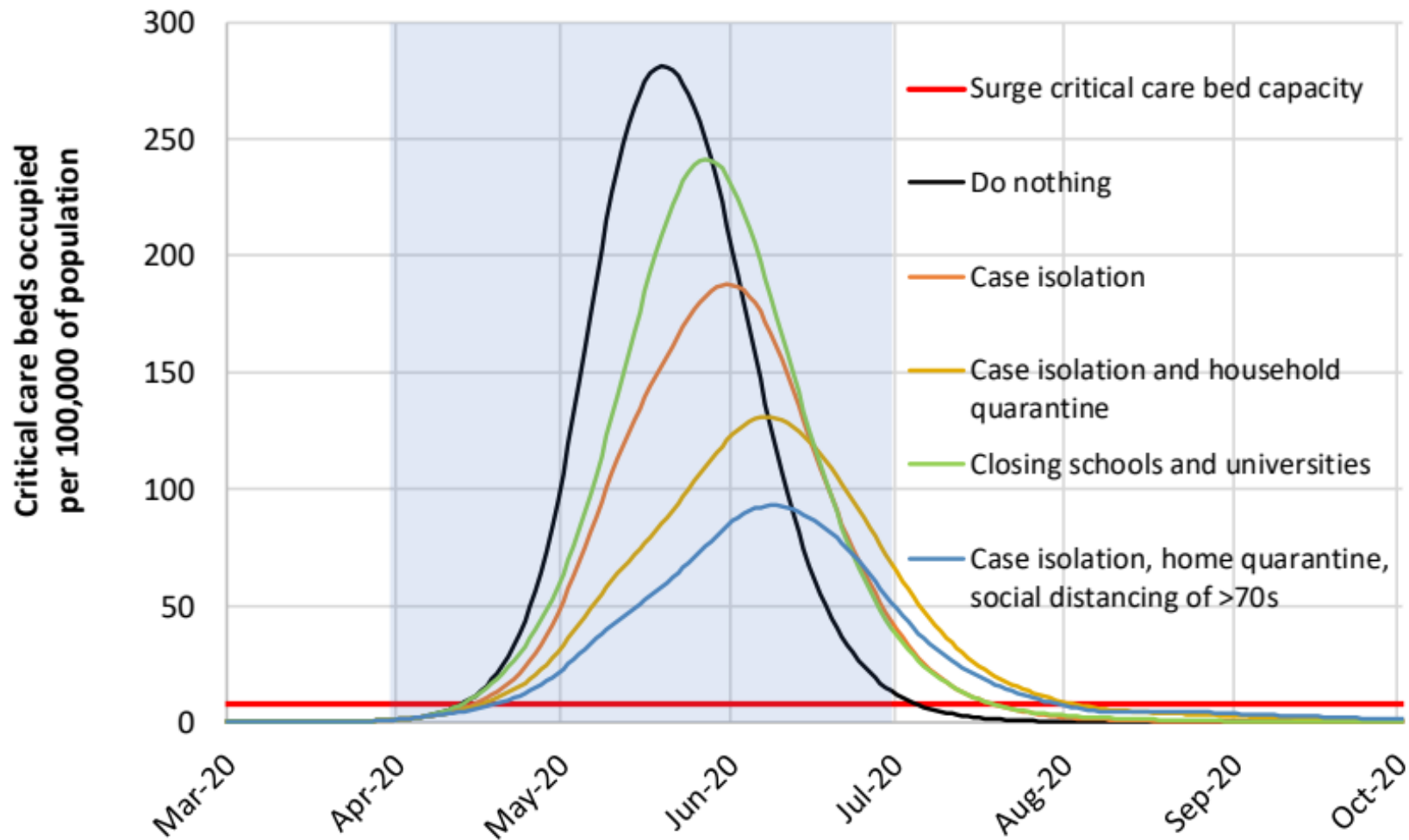
Credit: Robert A.J. Signer, Ph.D., University of California, San Diego © Global News



Nonpharmaceutical Interventions

- Case isolation in the home
- Self home quarantine
- Social distancing of those over 70 years
- Social distancing of entire population
- Closure of schools and universities
- Mask
- Hand Hygiene

Modeling Mitigation strategy scenarios for Gran Britain showing critical care (ICU) bed requirements



Source: Imperial College COVID-19 Response Team March 2020



Steps Healthcare Facilities Can Take Now to Prepare

BE PREPARED

- Stay informed about the local COVID-19 situation.
- Make a HF emergency plan.
- Establish relationships with key healthcare and public health partners.
- Make an emergency contact list.

PROTECT YOUR WORKFORCE

- Screen patients and visitors for symptoms of ARI.
- Use personal protective equipment (PPE) properly.
- Inventory available PPE.
- Encourage sick employees to stay home when they develop symptoms.

COMMUNICATE

- With staff: Share information about the situation and preparedness plans.
- With your patients: Update them on changes to appointments and nonurgent care.

PROTECT YOUR PATIENTS

- Stay up to date.
- Separate patients with respiratory symptoms to prevent their waiting with others seeking care.
- Strategize to prevent patients who can be cared for at home from coming to the HF, exposing themselves.



Protect Patients and Staff

CDC's Recommended Infection Control Procedures

Before patients arrive



Screen all patient for new respiratory symptoms



Explore alternatives to face-to-face triage and visits to reduce risk of transmission



Plan to receive patients via EMS. Follow agreed upon transport protocols

Upon arrival



Consider limiting facility points of entry. Establishing triage outside the facility



Display signs all entrance about COVID-19 symptoms.



Consider installing a barrier, such as a glass or plastic window, to limit between triage personnel and patients



Protect Patients and Staff

CDC's Recommended Infection Control Procedures

During the visit



Reserve airborne infection isolation rooms for aerosol generating procedures. Consider cohorting patients with suspected or confirmed COVID-19



Provide respirators for fit-tested HCW during aerosol-generating procedures. When respirators aren't available, use the best available alternative, like a face mask paired with eye protection.



Use PPE according to guidance from your facility. This includes clean, non-sterile gloves, gowns and eye protection, mask



Dedicate specific staff to care for only patients with suspected or confirmed COVID-19. Staff include medical, nursing, respiratory therapist, etc

Home Care for COVID-19 Patients



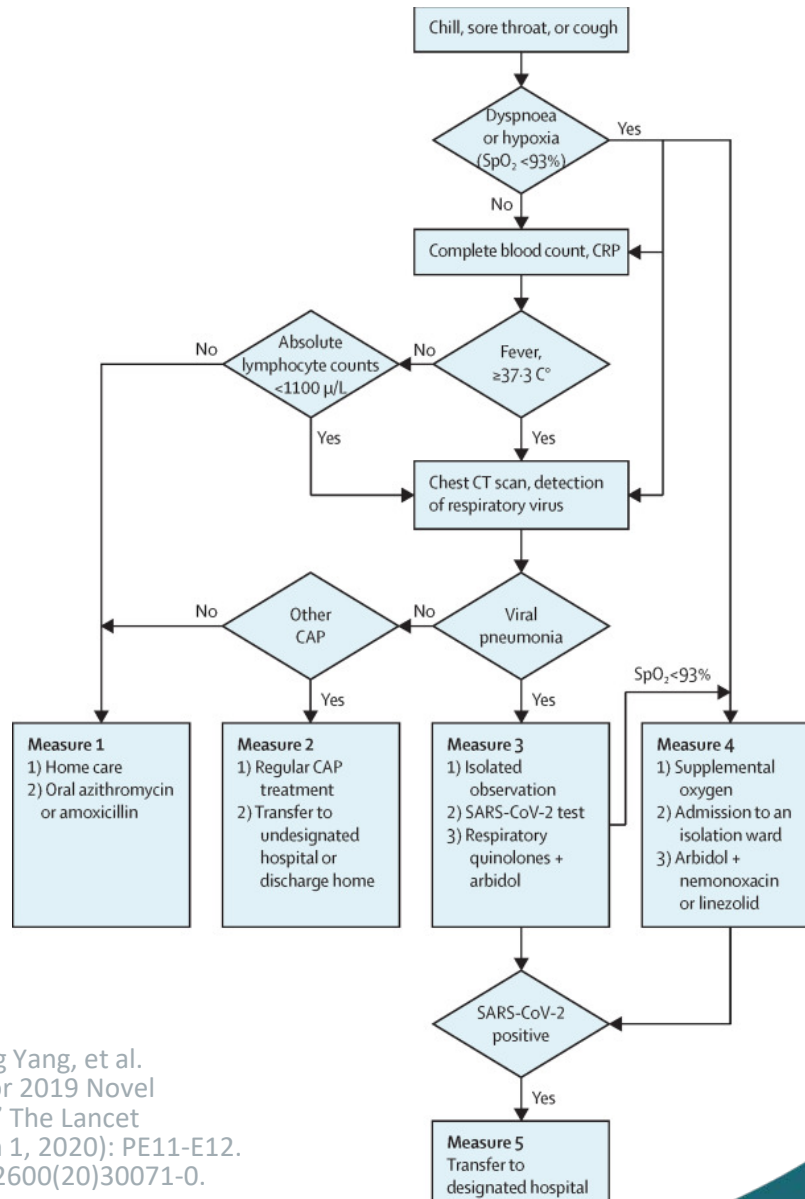
- Appropriate for those with mild infection who can be adequately isolated in the outpatient setting. They should:
 - Stay home.
 - Separate themselves from household people and animals.
 - Wear a facemask.
- Discontinue home isolation when:
 - Fever resolves without fever-reducing medications.
 - Respiratory symptoms improve (e.g., cough, shortness of breath).
 - Test results come back negative.

OR

- At least 7 days have passed since symptoms first appeared.
- At least 72 hours (three days) have passed since recovery of symptoms.

Home Care for COVID-19 Patients

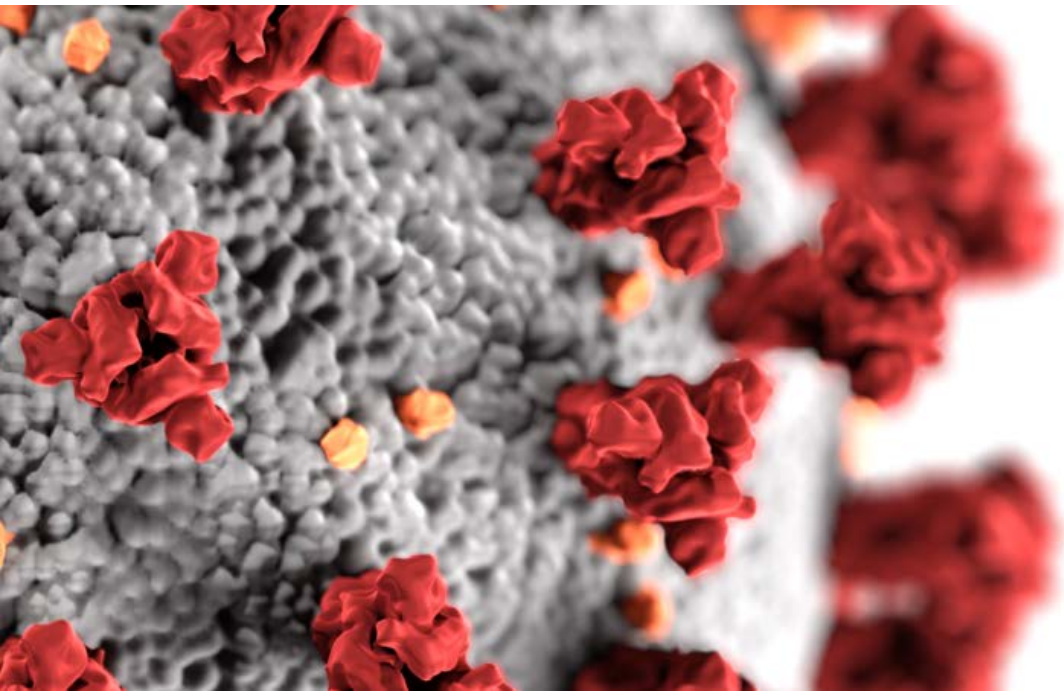
Therapeutic and Triage strategies



Zhang, Jinnong, Luqian Zhou, Yuqiong Yang, et al.
“Therapeutic and Triage Strategies for 2019 Novel Coronavirus Disease in Fever Clinics.” *The Lancet Respiratory Medicine* 8, no. 3 (March 1, 2020): PE11-E12.
DOI:[https://doi.org/10.1016/S2213-2600\(20\)30071-0](https://doi.org/10.1016/S2213-2600(20)30071-0).

Patient Care

Currently, there is no specific medicine to prevent or treat COVID-19.



- IV fluids, acetaminophen
- Remdesivir
- Chloroquine/hydroxychloroquine
- Ritonavir
- Tocilizumab
- Corticosteroids

- Mechanical ventilation (intubation)
- Inhaled prostacyclin
- Paralytics
- Prone positioning
- Extracorporeal membrane oxygenation (ECMO)

In search of a COVID-19 treatment, *WHO* launched a multinational trial on March 18. It will include drugs that *CDC* and *WHO* have approved for other uses plus drugs some countries have used in their COVID-19 response.



Countries with Imported Cases

Recommendations

- Immediately activate the highest level of national response management protocols to ensure all-of-government, all-of-society approaches to contain COVID-19 with nonpharmaceutical measures.
- Prioritize active, exhaustive case finding and immediate testing and isolation; painstaking contact tracing; rigorous quarantine of close contacts.
- Immediately expand surveillance to detect COVID-19 transmission chains:
 - Test all patients with atypical pneumonias.
 - Screen patients with upper respiratory illnesses or recent COVID-19 exposure.
 - Add testing for SARS-CoV-2 to existing surveillance systems (e.g., for influenza-like-illness and SARI).



- Conduct multisector scenario planning and simulations for deployment of even more stringent measures to interrupt transmission chains (e.g., suspension of large gatherings, school and workplace closures).
- Provide constant, clear public communications (e.g., president's daily message).
- Educate people on COVID-19's seriousness and citizens' role in preventing its spread (social distancing).



Countries without Infections

Recommendations

- Immediately activate the highest level of emergency response mechanisms to trigger all-of-government, all-of society approaches essential to early COVID-19 containment.
- Rapidly test national preparedness plans in light of the effectiveness of nonpharmaceutical measures against COVID-19.
 - Incorporate rapid detection, large-scale case isolation, respiratory support capacities, and rigorous contact tracing and management into national readiness and response plans and capacities.
- Enhance COVID-19 surveillance now:
 - Consider testing all patients with atypical pneumonia for COVID-19.
 - Add testing for SARS-CoV-2 to existing influenza surveillance systems.
- Begin now to enforce rigorous application of IPC measures in health facilities, especially in emergency departments and outpatient clinics (where COVID-19 will enter the health system).
- Rapidly assess general population understanding of COVID-19.
 - Adjust national health promotion materials and activities accordingly.
 - Engage clinical champions to communicate to the media.

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Thank You!



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