

A microscopic image showing several spherical, blue, textured virus particles (likely coronaviruses) arranged in a diagonal line. The background is dark, and there is a large, bright, yellowish-green, textured area on the left side of the image.

COVID-19

Novel Coronavirus: Guidance for Health-care Providers

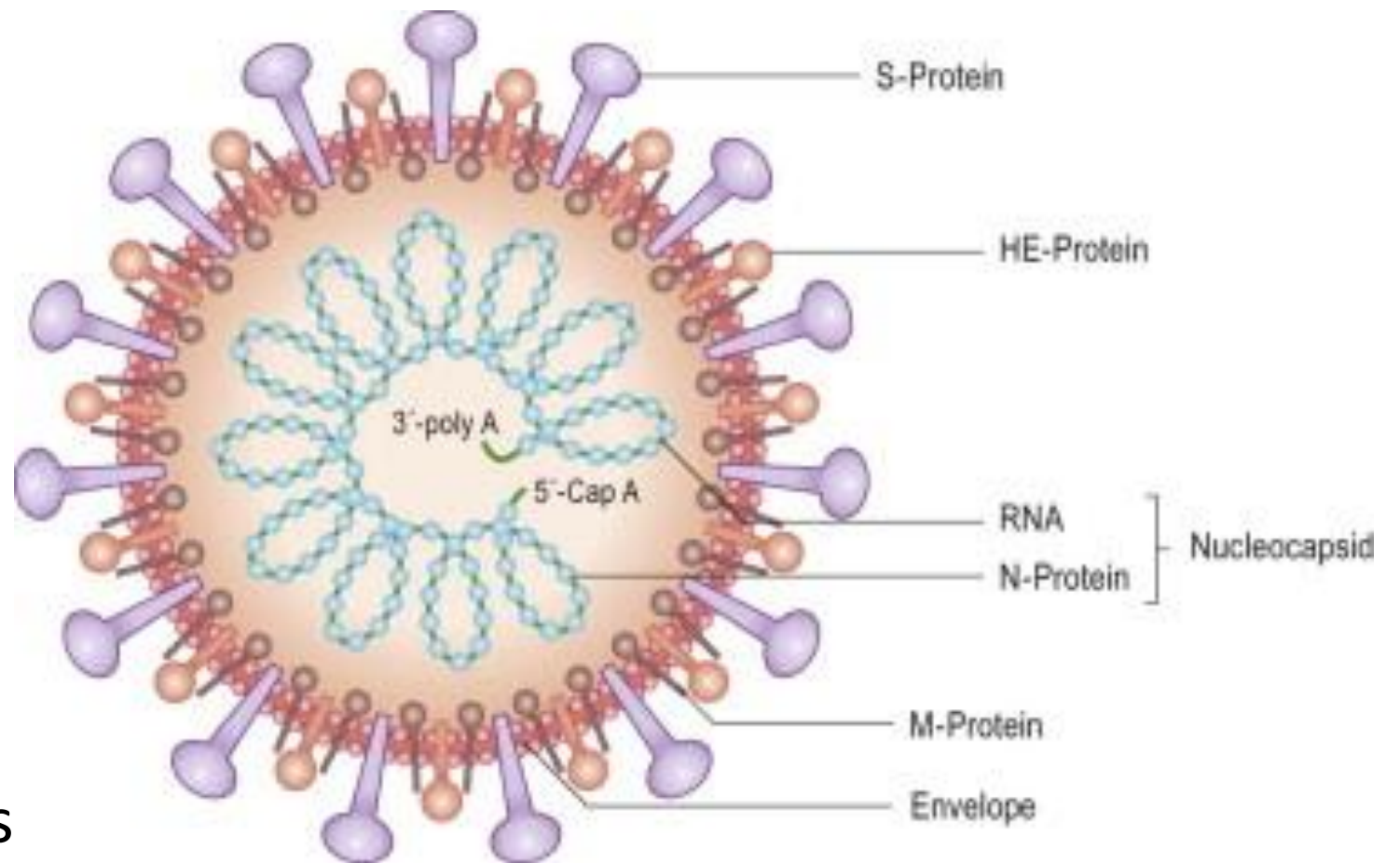
April 21, 2020

Disclosure

Stephen Munday, MD, Occupational Medicine, Sharp Rees-Stealy Medical Group, has no relevant financial relationships to disclose.

Coronaviruses

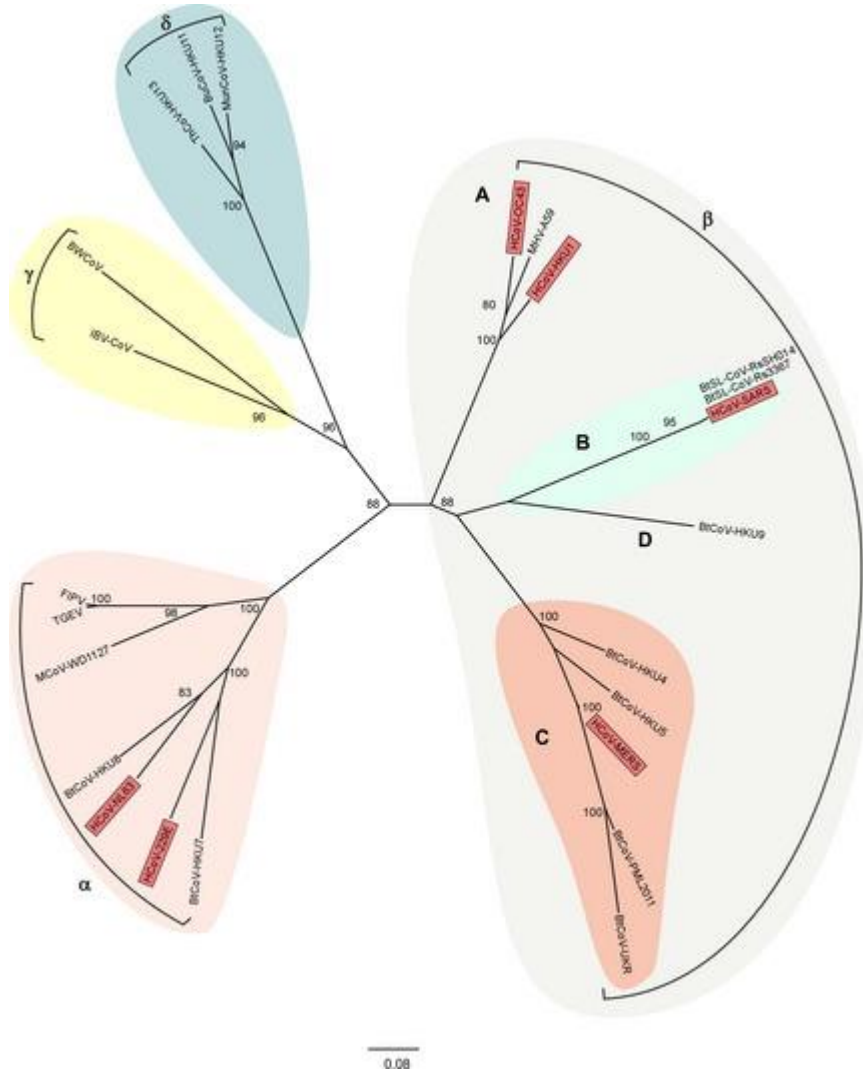
- RNA virus that mutates easily
- Largest genome of RNA viruses
- Infect wide range of hosts including mammals & birds
- 7 have known to infect humans
 - 4 of these circulate regularly and cause common cold



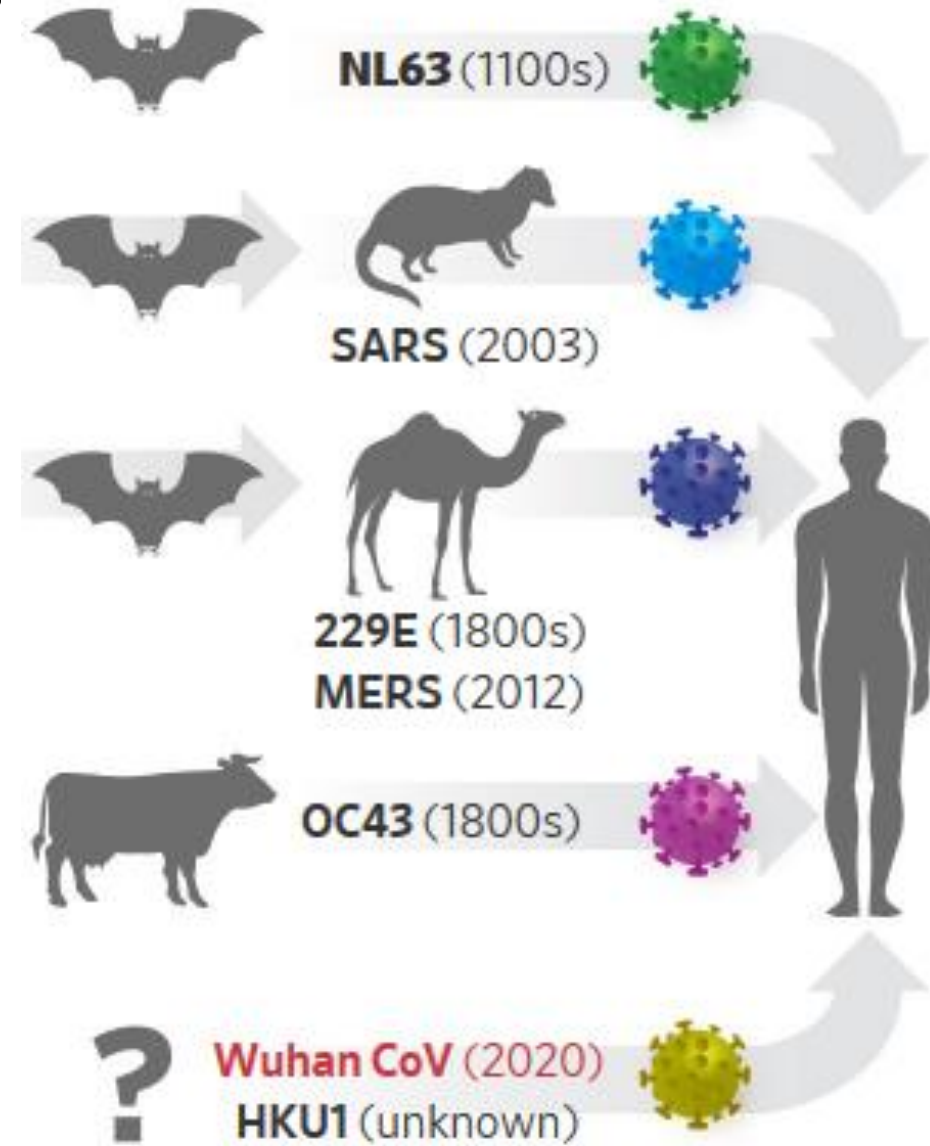
Coronaviruses of Importance

- **MERS CoV** in 2012 (and ongoing)
 - Arabian Peninsula
 - WHO: 2,499 lab-confirmed cases in 27 countries w/ 861 deaths
 - Case-fatality rate ~34%
 - In Saudi Arabia alone: 1831 cases and 787 deaths
- **SARS CoV** in 2002-2003
 - Infected >8,000 people w/ 774 deaths in 32 countries in 2002-2003
 - Case fatality rate ~9-10%
 - HCWs accounted for 20% of all cases
 - Many “Super Spreading” events
 - Outbreak ended through use of containment and mitigation strategies

Zoonotic Disease



- Can jump between animals and humans
- **Animal reservoir for COVID-19 is likely a bat but intermediate host is unknown**



Pathog Dis. 2014 Jul;71(2):121-36. doi: 10.1111/2049-632X.12166.

Epub 2014 Apr 9.

The emergence of the Middle East respiratory syndrome coronavirus.
Milne-Price S1, Miazgowicz KL, Munster VJ.

Source: Timothy Sheahan, University of North Carolina

<https://www.wsj.com/articles/what-we-know-about-the-wuhan-virus-11579716128>

COVID Worldwide Cases



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

Total Confirmed

2,463,357

Confirmed Cases by
Country/Region/Sovereignty

778,176	US
200,210	Spain
181,228	Italy
156,479	France
146,653	Germany
125,851	United Kingdom
90,980	Turkey
83,817	China
83,505	Iran
47,121	Russia
40,581	Brazil
39,983	Belgium
37,354	Canada
33,588	Netherlands
27,944	Switzerland

Admin0 Admin1 Admin2

Last Updated at (M/D/YYYY)

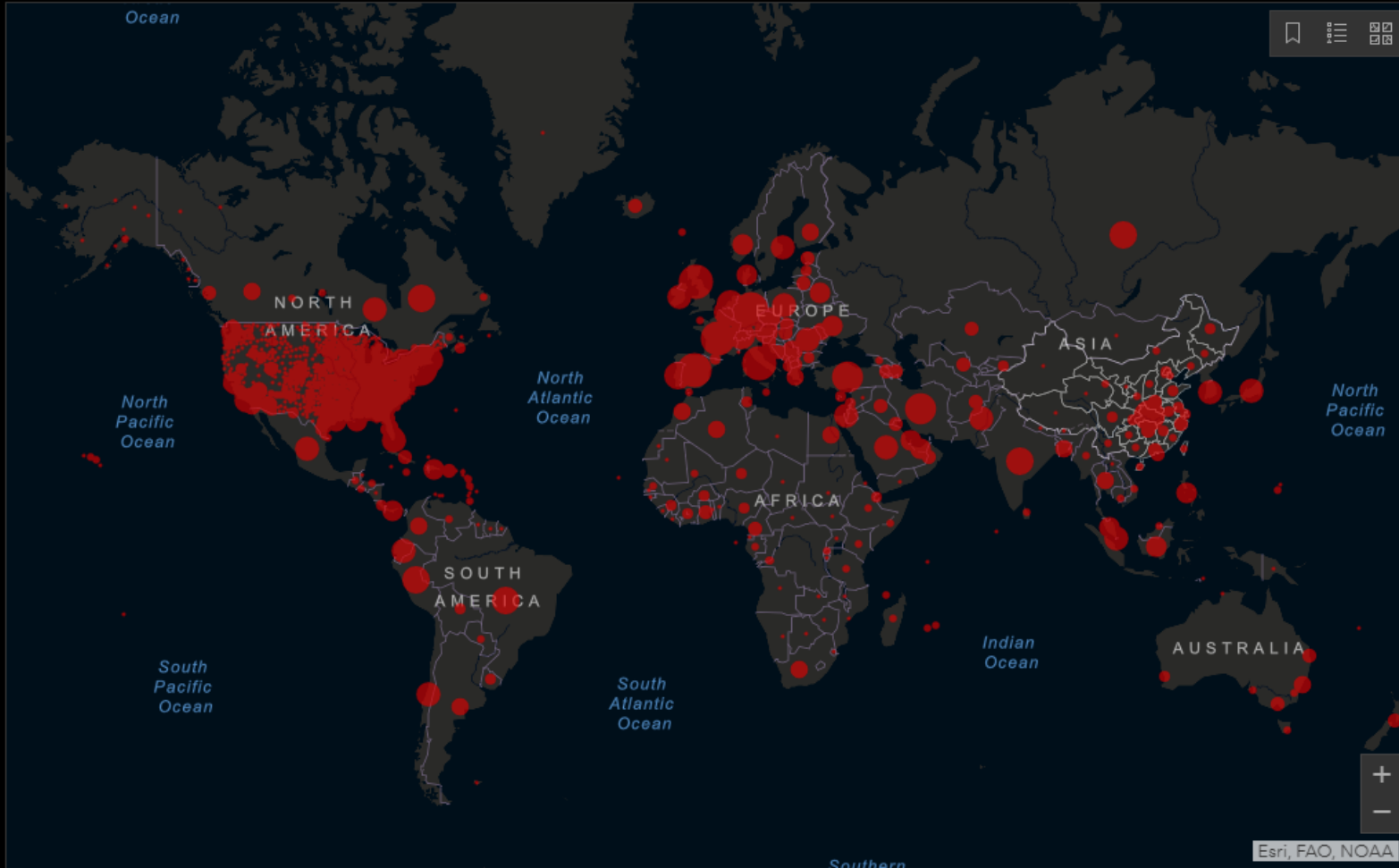
4/20/2020. 1:38:41 PM

185

countries/regions

Lancet Inf Dis Article: [Here](#). Mobile Version: [Here](#).
Lead by JHU CSSE. Automation Support: [Esri Living Atlas team](#) and [JHU APL](#). [Contact US](#). [FAQ](#).

Data sources: [WHO](#), [CDC](#), [ECDC](#), [NHC](#), [DXY](#), [1point3acres](#), [Worldometers.info](#), [BNO](#), the [COVID Tracking Project](#) (testing and

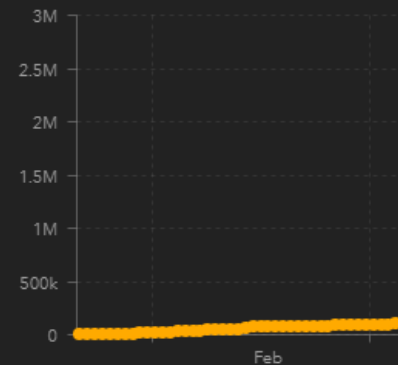


Total Deaths

169,502

24,114 deaths	Italy
20,852 deaths	Spain
20,265 deaths	France
16,509 deaths	United Kingdom
14,451 deaths	New York City New York US
5,828 deaths	Belgium
5,209 deaths	Iran

Deaths Recovered



Confirmed Logarithmic Daily Cases

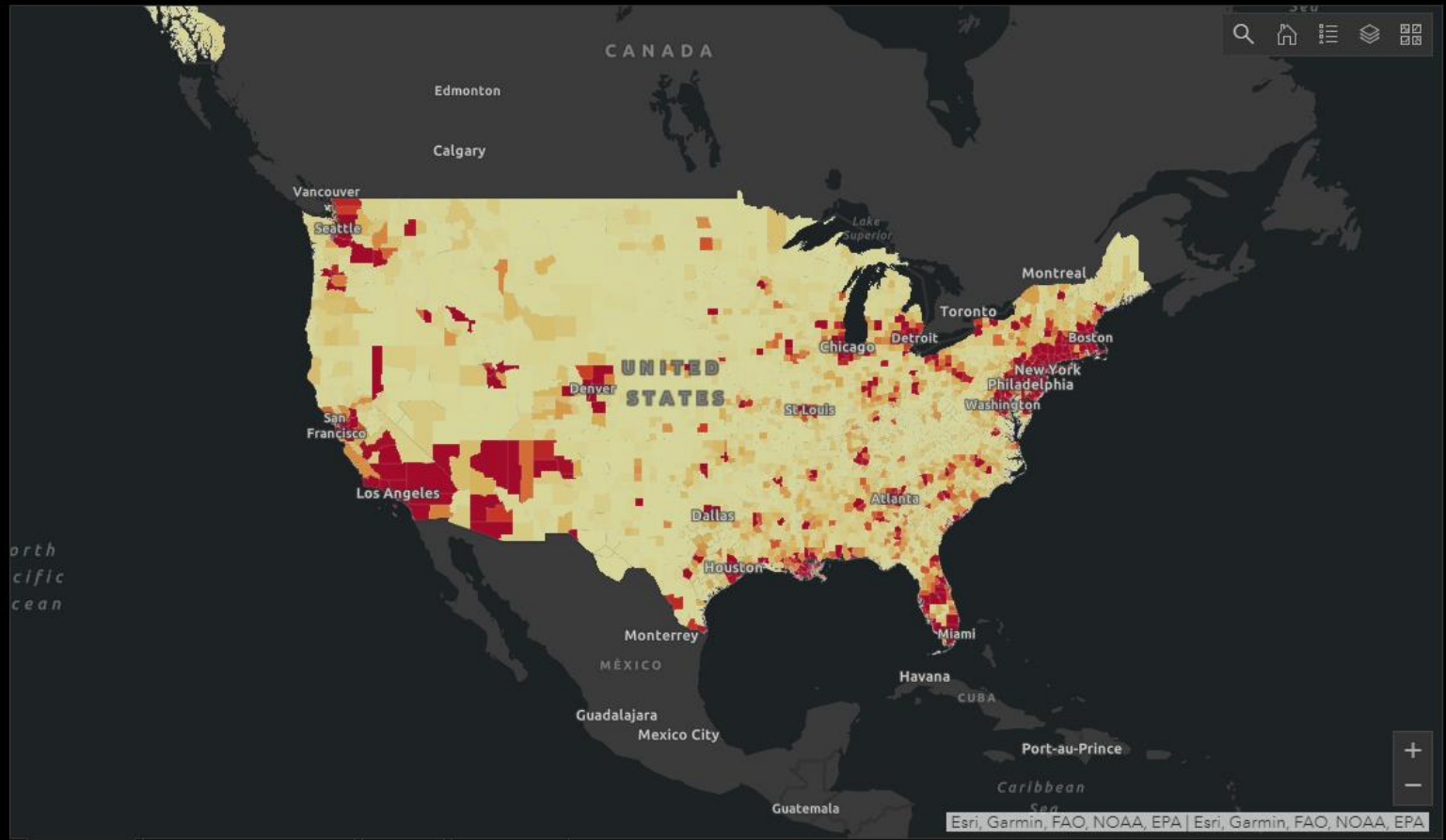
COVID US Cases

Total Confirmed

749,666

Top 50 Confirmed Cases by County

19,856 confirmed	Queens
14,476 confirmed	Kings
10,913 confirmed	Nassau
28,875 confirmed	Bronx
24,888 confirmed	Suffolk
23,803 confirmed	Westchester
21,272 confirmed	Cook
14,754 confirmed	New York
13,692 confirmed	Wayne
12,679 confirmed	Bergen
12,341 confirmed	Los Angeles



Confirmed
 Confirmed by Population
 Deaths
 Fatality Rate

Total Deaths

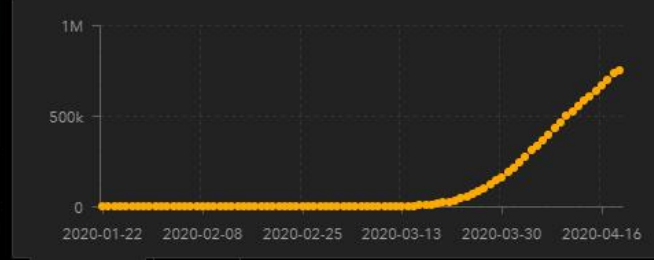
35,012

Total Recovered

70,337

Top 20 Counties by Number of Deaths

2,646 deaths	Queens
2,606 deaths	Kings
1,975 deaths	Bronx
1,148 deaths	New York
1,119 deaths	Wayne
1,109 deaths	Nassau
877 deaths	Cook
767 deaths	



Confirmed
 Deaths

Map Data Sources (for the section under the U.S. Map)
 Data is updated daily after 8 p.m. Eastern.
 Map Visualization: [Centers for Civic Impact](#), Automation Support: [DataCamp](#), [Johns Hopkins](#), [JHU](#), and [JHU Sheridan Libraries](#). [Contact Us](#), [FAQ](#).
 Data sources: [Coronavirus COVID-19 Global Cases by the Center for Systems Science and Engineering \(CSSE\) at Johns Hopkins University](#); [the Red Cross](#); [the Census American Community Survey](#); the

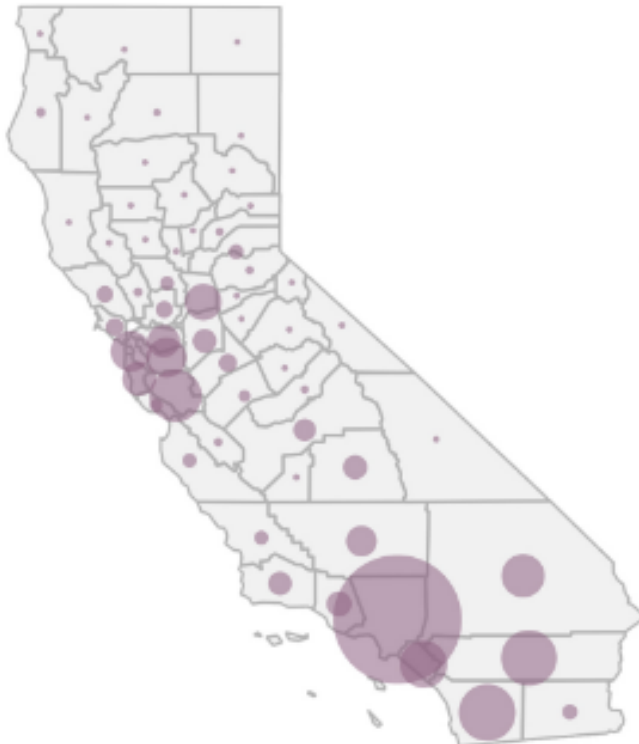
Last Updated on: 2020-04-19

COVID California Cases

California COVID-19 By The Numbers

April 18, 2020

Numbers as of April 17, 2020



For county-level data:
data.chhs.ca.gov

CALIFORNIA COVID-19 SPREAD

28,963

Total Cases

Ages of Confirmed Cases

- 0-17: **507**
- 18-49: **13,798**
- 50-64: **7,862**
- 65+: **6,729**
- Unknown/Missing: **67**

Gender of Confirmed Cases

- Female: **14,185**
- Male: **14,535**
- Unknown/Missing: **243**

Hospitalizations

Confirmed COVID-19
3,221/1,173
Hospitalized/in ICU

Suspected COVID-19
1,715/316
Hospitalized/in ICU

1,072

Fatalities

California COVID Deaths by Race/Ethnicity

California COVID-19 Cases and Deaths by Race/Ethnicity

April 18, 2020

Numbers as of April 17, 2020

Race/Ethnicity	Percent Cases	Percent Deaths	Percent of CA Population
Latino	39	31	39
White	30	36	37
Asian	13	16	15
African Americans/ Blacks	7	12	6
Multiracial	2	1	2
American Indian or Alaska Native	0.2	0.5	0.5
Native Hawaiian or Pacific Islander	2	1	0.3
Other	8	2	N/A

COVID San Diego Cases

Positive Cases in San Diego County Since February 14, 2020	
Coronavirus Disease 2019 (COVID-19)	
Table updated April 19, 2020, with data through April 18, 2020.	
COVID-19 Case Summary	San Diego County Residents
Total Positives	2,268
Age Groups	
0-9 years	17
10-19 years	39
20-29 years	344
30-39 years	423
40-49 years	389
50-59 years	429
60-69 years	312
70-79 years	173
80+ years	138
Age Unknown	4
Gender	
Female	1,124
Male	1,140
Unknown	4
Hospitalizations	552
Intensive Care	188
Deaths	71

Current data on COVID-19: Infectiousness

- Probably about as infectious as **SARS**
 - R_0 estimates: **2.2-4.2**
 - Lipsitch et al. Science. 2003; Riely et al. Science 2003; Wallinga & Teunis. AJE. 2004
- More infectious than **influenza**
 - R_0 estimates **pandemic flu: 1.46-1.8**
 - R_0 estimate for **seasonal flu: 1.28**
 - Biggerstaff et al. BMC ID. 2014
- R_0 estimates for **COVID-19:**
- **2-2.5 WHO**
- https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200306-sitrep-46-covid-19.pdf?sfvrsn=96b04adf_2
 - **2.2** (95% CI: 1.4-3.9)
 - Early disease reporting data (Li et al. NEJM. 2020)
 - **2.24** (95% CI: 1.96-2.55)
 - When assuming 8-fold increase in reporting rate
 - **3.58** (95% CI: 2.89-4.39)
 - When assuming 2-fold increase in reporting rate
 - Modeling paper using data from Jan 10-24th in China (Zhao et al. International Journal of Infectious Diseases, 2020)
 - **2.8-3.9**
 - Modeling paper using data before 1/26 in China (Zhou et al. Journal of Evidenced Based Medicine. 2020)
- **Ro 14 estimate for Diamond Princess**
 - **Quarantined in Yokohama; 3,700 passengers; >700 tested + for COVID-19, including 6 deaths**



Asymptomatic/Pre-Symptomatic Transmission

Singapore-Seven Clusters of COVID-19 Cases Suggesting Presymptomatic Transmission

Among the 243 cases of COVID-19 reported in Singapore as of March 16, 157 were locally acquired; 10 of the 157 (6.4%) locally acquired cases are included in these clusters and were attributed to presymptomatic transmission.

https://www.cdc.gov/mmwr/volumes/69/wr/mm6914e1.htm?s_cid=mm6914e1_w

Asymptomatic and Presymptomatic SARS-CoV-2 Infections in Residents of a Long-Term Care Skilled Nursing Facility — King County, Washington, March 2020

Following identification of a case of coronavirus disease 2019 (COVID-19) in a health care worker, 76 of 82 residents of an SNF were tested for SARS-CoV-2; 23 (30.3%) had positive test results, 13 (57%), of whom, were asymptomatic (3 or 13%) or presymptomatic (10 or 43%) on the day of testing

https://www.cdc.gov/mmwr/volumes/69/wr/mm6913e1.htm?s_cid=mm6913e1_w

Estimation in China as of Feb 8th:

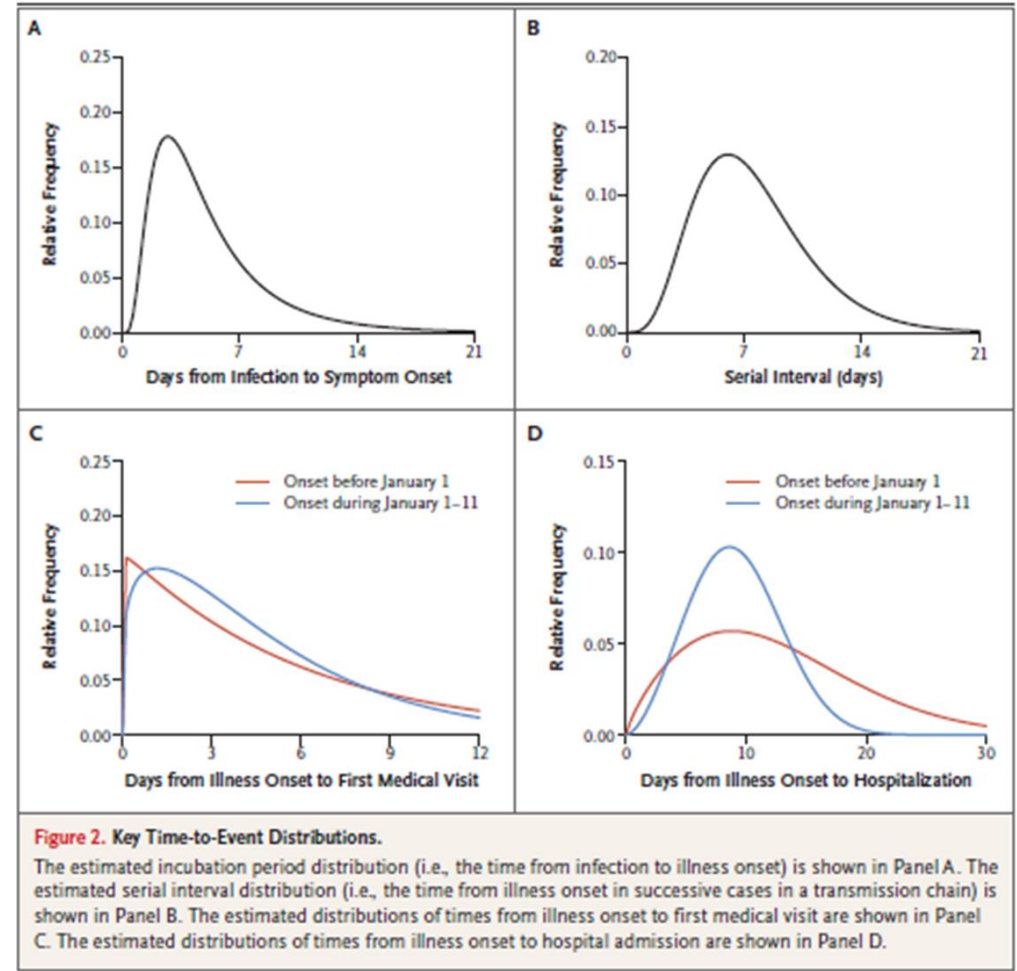
12.6% of case reports indicated presymptomatic transmission.

https://wwwnc.cdc.gov/eid/article/26/6/20-0357_article

Based on these data, infectious period is now considered to begin 48 hours before symptom onset

Current data on COVID-19: Incubation Period

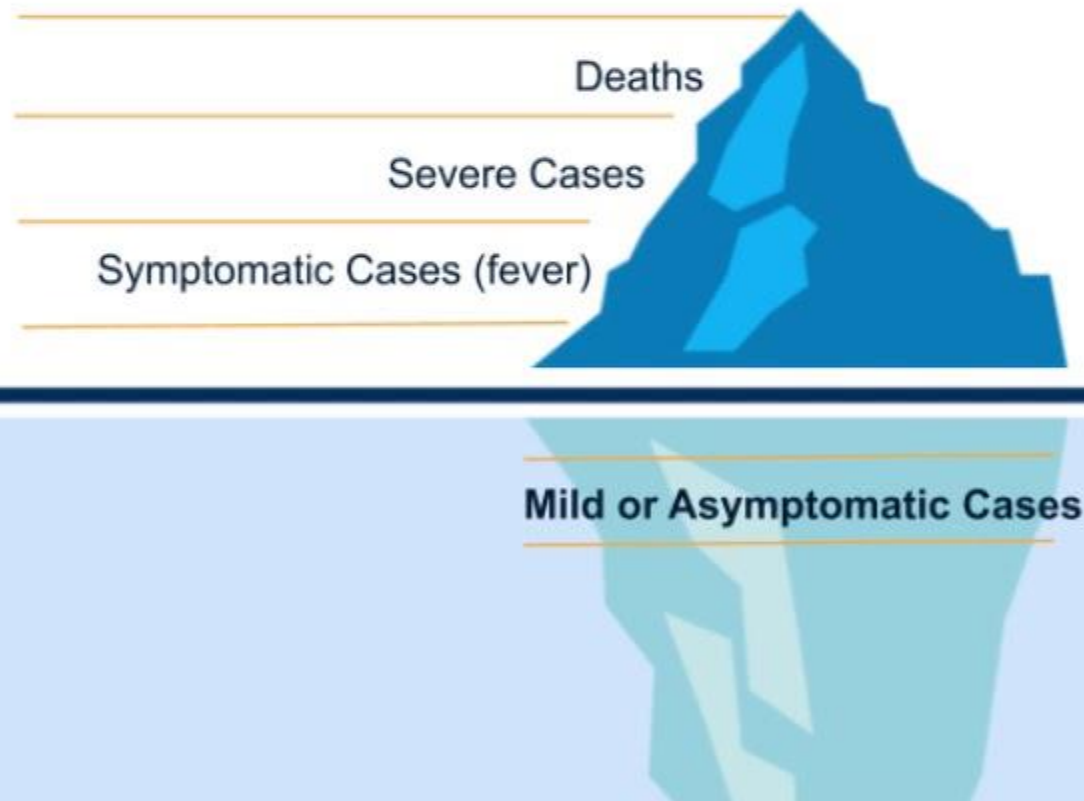
- Most likely 2-14 days (CDC)
 - 5.1 days
 - Chan et al. Lancet. 2020
 - 5.2 days (95% CI: 4.1-7.0)
 - Li et al. NEJM. 2020
- Similar to SARS, which was 6.4 days (5.2-7.7 days)
 - Donnelly et al. Lancet. 2003



There is a continuum of infection in a population

DIAGNOSED INFECTIONS: TIP OF THE ICEBERG

Spectrum of Coronavirus Cases, Diagnosed and Undiagnosed

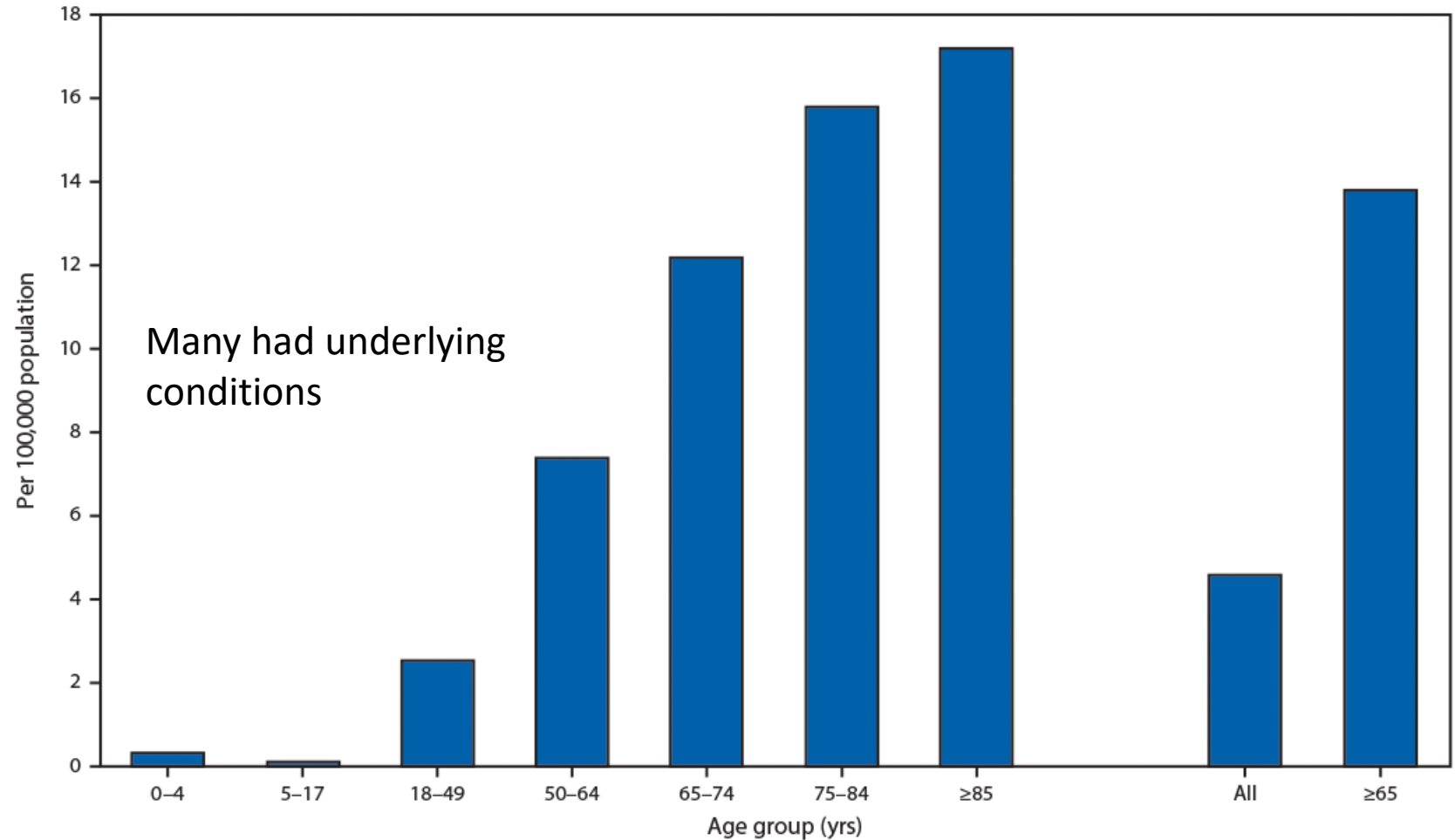


Current Data on COVID-19: Severity

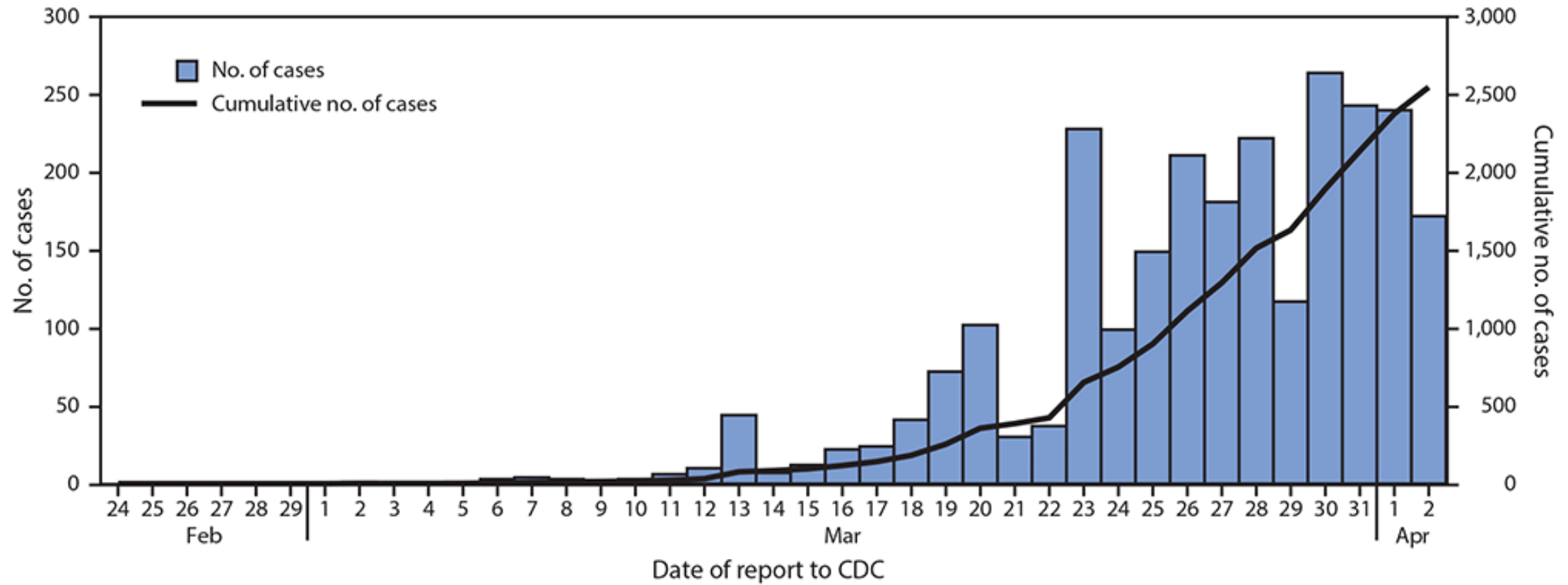
- Case Fatality Rate: varies between 0 and 17% depending on country and age group
- USA current **crude** CFR is about 5%
- <https://www.cebm.net/covid-19/global-covid-19-case-fatality-rates/>
- Most models anticipate that the global case fatality rate will ultimately be determined to be to near or just below 1%
- Case Fatality Rate: **between 2-4% in Hubei province**
 - Lower than SARS (9-10%) or MERS (~34%)
 - Higher than seasonal influenza (0.1%-0.2% among symptomatic cases)
 - <https://www.cdc.gov/flu/about/burden/past-seasons.html>
 - Possibly similar to 1918 pandemic influenza (2-3%)
 - Taubenberger et al. EID. 2006
- Study of 72,000 COVID-19 cases in China; of ~45K (62%) lab-confirmed:
 - **2.3% fatal** (Severity: 81% mild disease; 14% severe disease; 5% critically ill)
 - Fatality higher among those with preexisting conditions: 10.5% CVD; 7.3% DM; 6.3% chronic respiratory disease; 6% HTN; 5.6% cancer
 - Fatality higher among elderly: 14.8% among ≥80y; 8% among 70-79y
 - Wu et al. JAMA 2020
 - Age: Only 2% of cases were <20 years of age
 - HCW: 3.8% of confirmed cases, including 5 deaths

Hospitalization Rates and Characteristics

Patients Hospitalized with
Laboratory-Confirmed
Coronavirus Disease 2019
— COVID-NET, 14 States,
March 1–30, 2020



Cases in Children



Severity in Children

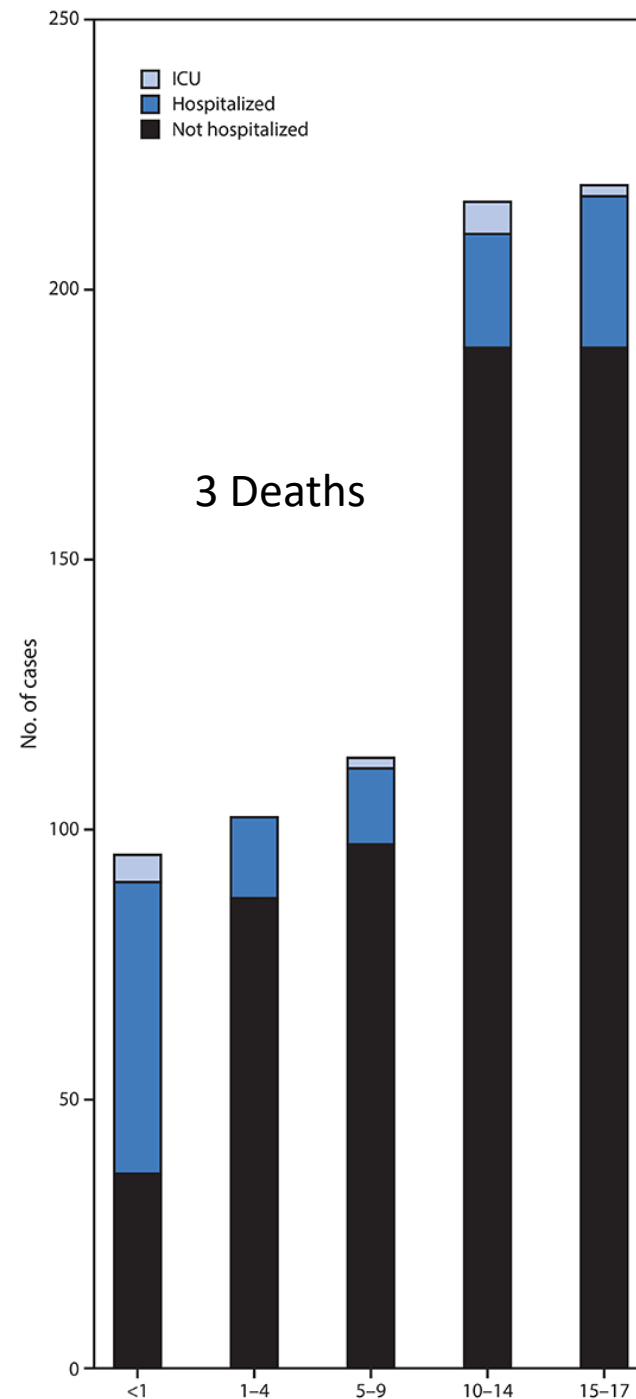


TABLE. Signs and symptoms among 291 pediatric (age <18 years) and 10,944 adult (age 18–64 years) patients* with laboratory-confirmed COVID-19 — United States, February 12–April 2, 2020



Sign/Symptom	No. (%) with sign/symptom	
	Pediatric	Adult
Fever, cough, or shortness of breath [†]	213 (73)	10,167 (93)
Fever [§]	163 (56)	7,794 (71)
Cough	158 (54)	8,775 (80)
Shortness of breath	39 (13)	4,674 (43)
Myalgia	66 (23)	6,713 (61)
Runny nose [¶]	21 (7.2)	757 (6.9)
Sore throat	71 (24)	3,795 (35)
Headache	81 (28)	6,335 (58)
Nausea/Vomiting	31 (11)	1,746 (16)
Abdominal pain [¶]	17 (5.8)	1,329 (12)
Diarrhea	37 (13)	3,353 (31)

Healthcare Workers

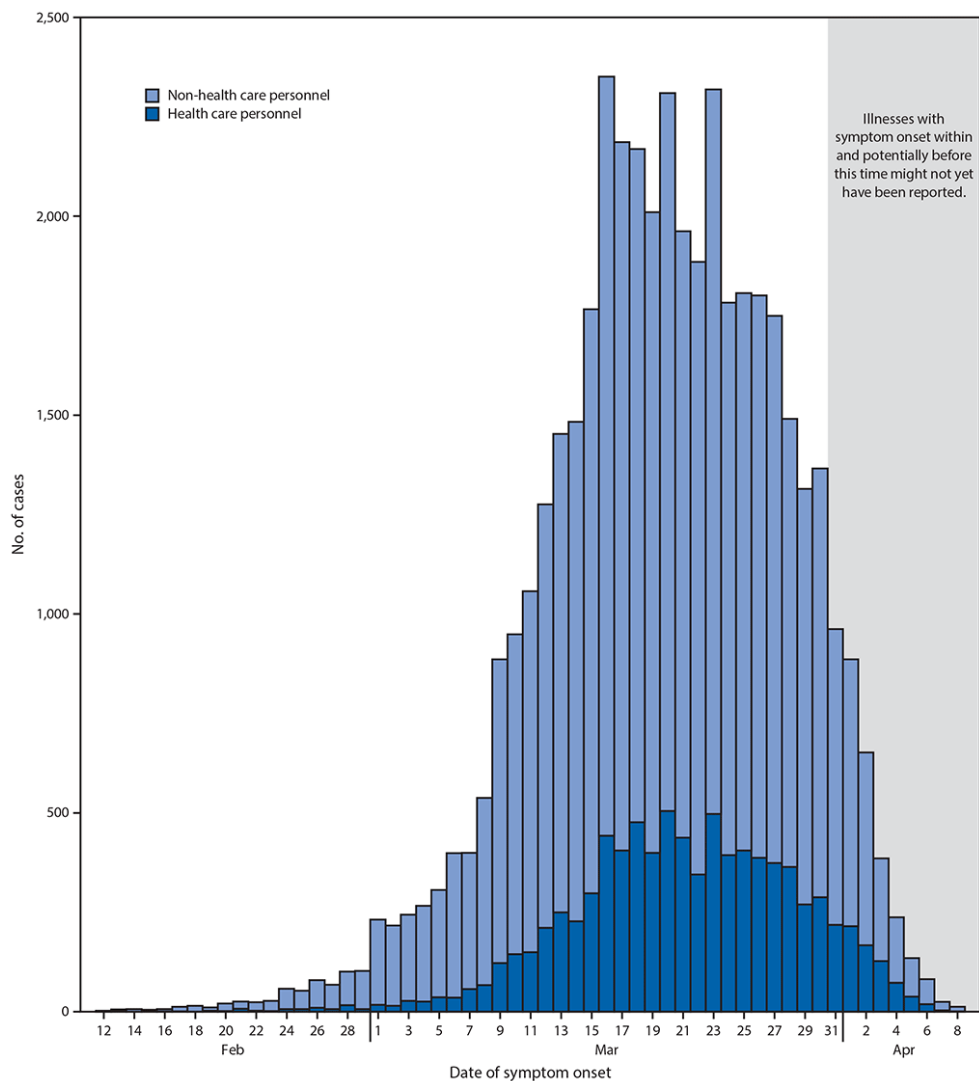


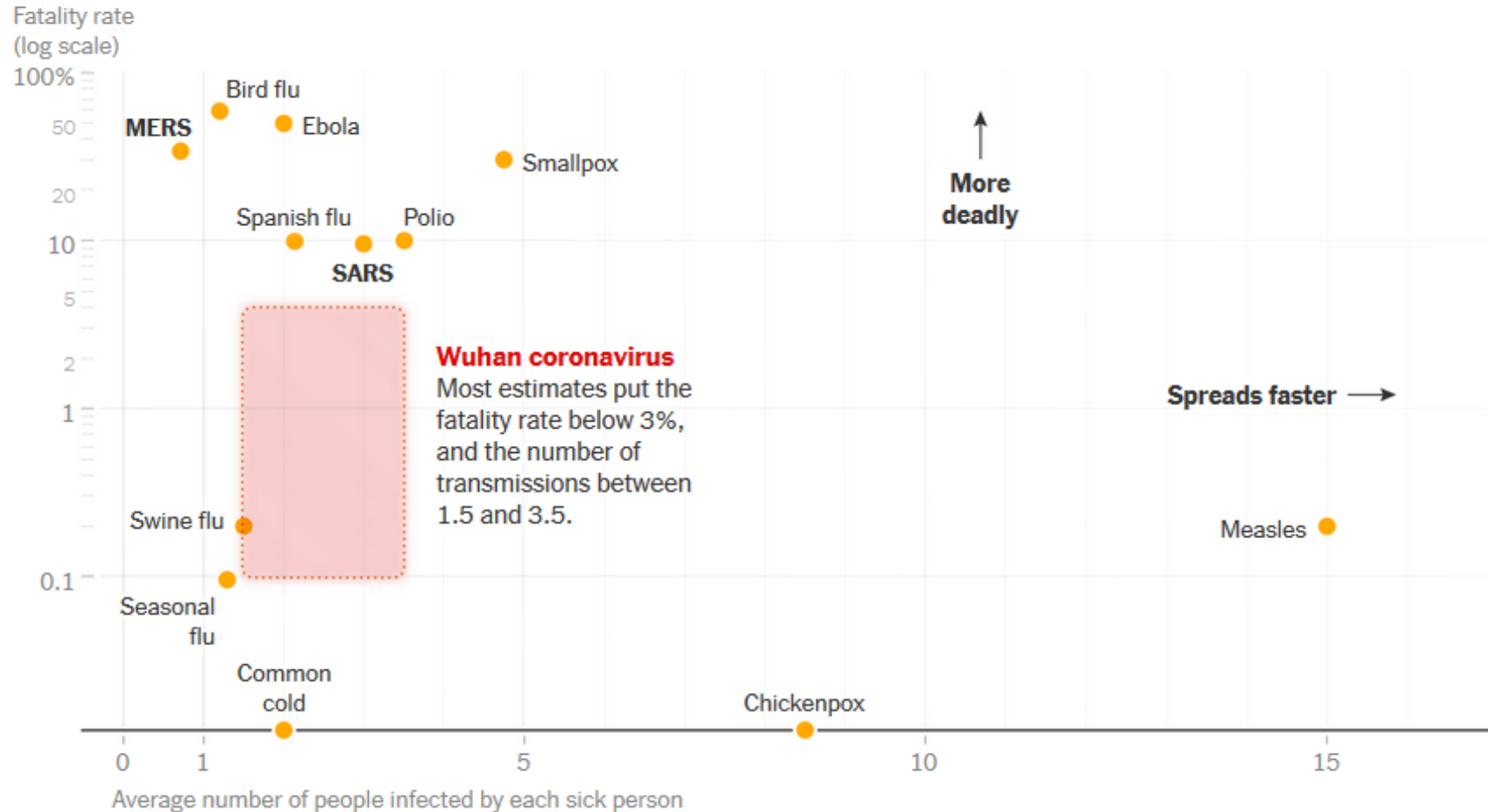
TABLE 2. Hospitalizations,* intensive care unit (ICU) admissions,† and deaths,‡ by age group among health care personnel with COVID-19 — United States, February 12–April 9, 2020



Age group [¶] (yrs) (no. of cases)	Outcome, no. (%)**		
	Hospitalization ^{††}	ICU admission	Death
16–44 (4,898)	260 (5.3–6.4)	44 (0.9–2.2)	6 (0.1–0.3)
45–54 (1,919)	178 (9.3–11.1)	51 (2.7–6.3)	3 (0.2–0.3)
55–64 (1,620)	188 (11.6–13.8)	54 (3.3–7.5)	8 (0.5–1.0)
≥65 (508)	97 (19.1–22.3)	35 (6.9–16.0)	10 (2.0–4.2)
Total (8,945)	723 (8.1–9.7)	184 (2.1–4.9)	27 (0.3–0.6)

https://www.cdc.gov/mmwr/volumes/69/wr/mm6915e6.htm?s_cid=mm6915e6_w

Fatality Rates and Transmission



Note: Average case-fatality rates and transmission numbers are shown. Estimates of case-fatality rates can vary, and numbers for the new coronavirus are preliminary estimates.

Current Data on COVID-19: Symptoms

- Fever, cough, shortness of breath (ILI)
- GI symptoms occasionally reported
- Some confirmed cases have not had any symptoms
 - 10 yo child from early family cluster (Chan et al. Lancet. 2020)
 - Infant from Wuhan
 - Many news reports
 - <https://www.gpbnews.org/post/atlanta-couple-tests-positive-coronavirus-aboard-cruise-ship>



Current data on COVID-19: Viremia

- Specimens for diagnosis include NP, OP, BAL, aspirate,
- NP PCR may remain positive for at least 12 days (Holshu et al. NEJM. 2020)
- Virus can be shed in feces; may be more prevalent later in course of illness (Zhang et al. EMI. 2020)

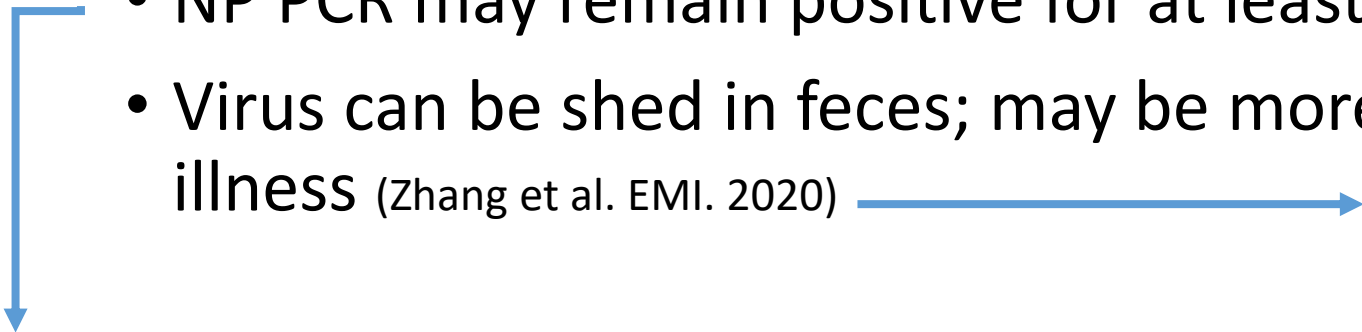


Table 2. Results of Real-Time Reverse-Transcriptase–Polymerase-Chain-Reaction Testing for the 2019 Novel Coronavirus (2019-nCoV).*

Specimen	Illness Day 4	Illness Day 7	Illness Day 11	Illness Day 12
Nasopharyngeal swab	Positive (Ct, 18–20)	Positive (Ct, 23–24)	Positive (Ct, 33–34)	Positive (Ct, 37–40)
Oropharyngeal swab	Positive (Ct, 21–22)	Positive (Ct, 32–33)	Positive (Ct, 36–40)	Negative
Serum	Negative	Negative	Pending	Pending
Urine	NT	Negative	NT	NT
Stool	NT	Positive (Ct, 36–38)	NT	NT

* Lower cycle threshold (Ct) values indicate higher viral loads. NT denotes not tested.

Table 2. Molecular detection of 2019-nCoV in swabs from two investigations. Samples were from oral swabs (OS), anal swabs (AS) and blood. Data were shown as qPCR Ct values.

	Date 0-OS	Date 0-AS	Date 5-OS	Date 5-AS
Patient 1			23.2	
Patient 2	30.3			
Patient 3		19.5		
Patient 4	32.7	30.2		
Patient 5		33.1		
Patient 6	31.1		30.0	31.4
Patient 7	27.3			
Patient 8			27.0	
Patient 9	32.9	33.6		
Patient 10				23.8
Patient 11	31.9			
Patient 12	32.3			
Patient 13				17.8
Patient 14				25.5
Patient 15				30.0
Patient 16	33.8		26.9	27.5

Who is Getting Tested for COVID-19 in the US?

PRIORITY 1

Ensure optimal care options for all hospitalized patients, lessen the risk of nosocomial infections, and maintain the integrity of the healthcare system

- Hospitalized patients
- Symptomatic healthcare workers

PRIORITY 2

Ensure that those who are at highest risk of complication of infection are rapidly identified and appropriately triaged

- Patients in long-term care facilities with symptoms
- Patients 65 years of age and older with symptoms
- Patients with underlying conditions with symptoms
- First responders with symptoms

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-criteria.html>



Who is Getting Tested for COVID-19 in the US?

PRIORITY 3

As resources allow, test individuals in the surrounding community of rapidly increasing hospital cases to decrease community spread, and ensure health of essential workers

- Critical infrastructure workers with symptoms
- Individuals who do not meet any of the above categories with symptoms
- Health care workers and first responders
- Individuals with mild symptoms in communities experiencing high COVID-19 hospitalizations

NON-PRIORITY

- Individuals without symptoms

<https://www.cdc.gov/coronavirus/2019-ncov/hcp/clinical-criteria.html>



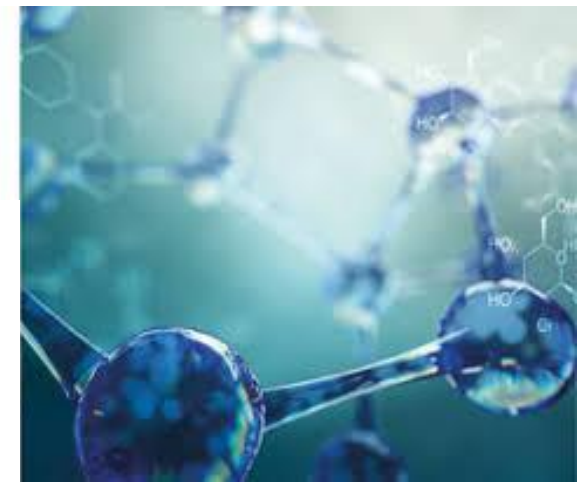
Lab Testing



- Viral culture is discouraged for safety reasons
- There are no FDA-approved tests for COVID-19
- FDA is allowing tests to be performed under an EUA
- They must include a disclaimer with all of their results
- The CDC molecular test was the first EUA available; other reputable labs, such as large commercial labs and universities, have also applied for an EUA
- The FDA has now issued EUAs for both molecular tests and antibody tests; all EUA assays must be performed in a CLIA-certified lab unless CLIA waived (Abbott ID NOW and two others are waived)
- Pixel by LabCorp just received EUA for home collection by nasal swab, including asymptomatic exposed!! <https://www.pixel.labcorp.com/>

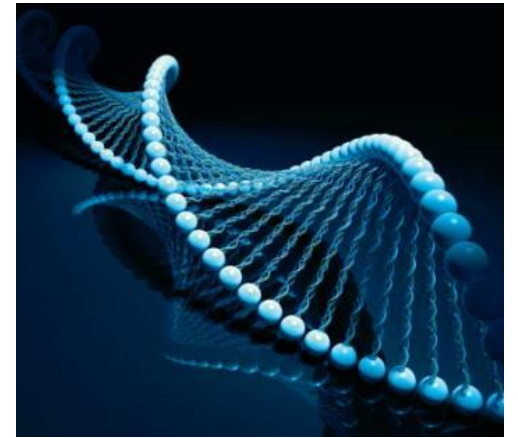
<https://www.fda.gov/medical-devices/emergency-situations-medical-devices/emergency-use-authorizations#covid19ivd>

Lab Testing-Molecular Tests



- Molecular testing measures viral RNA- it does not directly measure infectious virus
- The CDC PCR test was the first in the US, but similar tests were developed before in China, and other countries
- Other very sensitive and accurate technologies that also use nucleic acid analysis, and are being investigated for high-throughput utility, include whole-genome sequencing and CRISPR (clustered regularly interspaced short palindromic repeats)

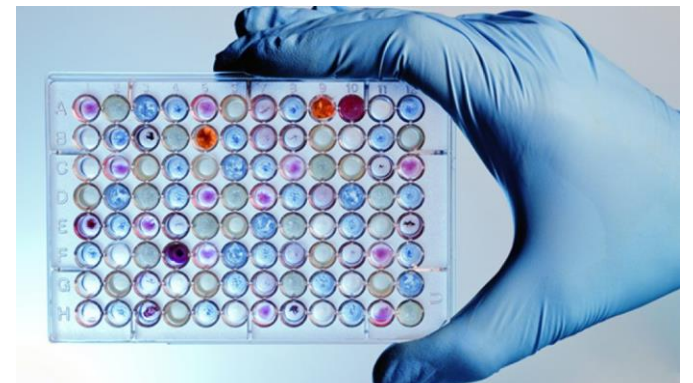
Lab Testing-Molecular Tests



- Nucleic acid amplification testing (NAAT) is now widespread as equipment and supplies have become more readily available
- Analytical sensitivity is excellent- if you collect the specimen using the proper tools and have virus on the swab, it will be detected
- NAAT testing has been validated for collection from both the upper and lower respiratory tracts (including nasal specimens in symptomatic patients)
- Validation is being investigated for other specimens such as saliva

Lab Testing-Molecular Tests

- Clinical sensitivity has been more problematic and has varied somewhat by sample type
- Early studies from China, suggested that the sensitivity in a symptomatic person on a given day was about 70%
- Unpublished reports from high-complexity labs in the US, have suggested that the tests here are faring better.
(>90% sen. and >99% spec)



Lab Testing- Antibody Tests



- Measures binding of total or specific classes of antibodies such as IgM, IgG or IgA by common, well-known technologies.
- Importantly, binding and neutralization are not always congruent. (e.g., RFFIT for rabies)
- Analogous to assays used for antibodies to measles, HSV, varicella, hepatitis b, rabies, and others.
- However, the timing of antibody development, relationship to infectiousness, ability to distinguish COVID-19 from other coronaviruses, and whether or not the antibodies are temporarily or permanently associated with immunity are all unknown.
- Studies are underway, and antibody testing will soon be widely available to investigate its epidemiologic and clinical utility. Our lab experts are actively researching this technology for use in our patients.
- "FDA is not aware of an antibody test that has been validated for diagnosis of SARS-CoV-2 infection"

<https://www.fda.gov/medical-devices/letters-health-care-providers/important-information-use-serological-antibody-tests-covid-19-letter-health-care-providers>

Discontinuation of Transmission-based Precautions for Hospitalized Patients with COVID-19

For Persons with COVID-19 Under Isolation

Test-based strategy :

- Persons who have COVID-19 who have symptoms and were directed to care for themselves at home may discontinue isolation under the following conditions:
- Resolution of fever without the use of fever-reducing medications **and**
- Improvement in respiratory symptoms (e.g., cough, shortness of breath) **and**
- Negative results of an FDA Emergency Use Authorized molecular assay for COVID-19 from at least two consecutive nasopharyngeal swab specimens collected ≥ 24 hours apart*** (total of two negative specimens). See Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons Under Investigation (PUIs) for 2019 Novel Coronavirus (2019-nCoV) for specimen collection guidance

Discontinuation of Transmission-based Precautions for Hospitalized Patients with COVID-19

When a Testing-Based Strategy is Preferred

Hospitalized patients may have longer periods of SARS-CoV-2 RNA detection compared to patients with mild or moderate disease. Severely immunocompromised patients (e.g., medical treatment with immunosuppressive drugs, bone marrow or solid organ transplant recipients, inherited immunodeficiency, poorly controlled HIV) may also have longer periods of SARS-CoV-2 RNA detection and prolonged shedding of infectious recovery. These groups may be contagious for longer than others. In addition, placing a patient in a setting where they will have close contact with individuals at risk for severe disease warrants a conservative approach.

Hence, a test-based strategy is preferred for discontinuation of transmission-based precautions for patients who are

- Hospitalized or
- Severely immunocompromised or
- Being transferred to a long-term care or assisted living facility

If testing is not readily available, facilities should use the non-test-based strategy for discontinuation of Transmission-Based Precautions or extend the period of isolation beyond the non-test-based-strategy duration, on a case by case basis in consultation with local and state public health authorities

Discontinuation of Transmission-based Precautions for Hospitalized Patients with COVID-19

Time-since-illness-onset and time-since-recovery strategy (non-test-based strategy)**

Persons with COVID-19 who have symptoms and were directed to care for themselves at home may discontinue isolation under the following conditions:

- At least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications **and**
- Improvement in respiratory symptoms (e.g., cough, shortness of breath); **and**,
- At least 7 days have passed since symptoms first appeared. (WHO uses 14 days)

****This recommendation will prevent most but not all instances of secondary spread.** The risk of transmission after recovery, is likely substantially less than that during illness; recovered persons will not be shedding large amounts of virus by this point if they are shedding at all. Certain employers can choose to apply more stringent criteria for certain returning workers where a higher threshold to prevent transmission is warranted. These criteria can include requiring a longer time after recovery or requiring they get tested to show they are not shedding virus. Such persons include healthcare workers in close contact with vulnerable persons at high-risk for illness and death if those persons get COVID-19. It also includes persons who work in critical infrastructure or with high-value human assets where introduction of COVID-19 could cause major disruptions.

Discontinuation of Transmission-based Precautions for Non-Hospitalized Patients with COVID-19

For Persons with COVID-19 Under Isolation:

- <https://www.cdc.gov/coronavirus/2019-ncov/hcp/disposition-in-home-patients.html>
- **Time-since-illness-onset and time-since-recovery strategy (non-test-based strategy)****
- Persons with COVID-19 who have symptoms and were directed to care for themselves at home may discontinue isolation under the following conditions:
- At least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications **and**
- Improvement in respiratory symptoms (e.g., cough, shortness of breath); **and**,
- At least 7 days have passed since symptoms first appeared. (WHO uses 14)

Test-based strategy:

- Persons who have COVID-19 who have symptoms and were directed to care for themselves at home may discontinue isolation under the following conditions:
- Resolution of fever without the use of fever-reducing medications **and**
- Improvement in respiratory symptoms (e.g., cough, shortness of breath) **and**
- Negative results of an FDA Emergency Use Authorized molecular assay for COVID-19 from at least two consecutive nasopharyngeal swab specimens collected ≥ 24 hours apart*** (total of two negative specimens). See Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens from Persons Under Investigation (PUIs) for 2019 Novel Coronavirus (2019-nCoV) for specimen collection guidance.

Discontinuation of Transmission-based Precautions for Non-Hospitalized Patients with COVID-19 Asymptomatic Positives

Persons with laboratory-confirmed COVID-19 who have not had any symptoms may discontinue isolation when at least 7 days have passed since the date of their first positive COVID-19 diagnostic test and have had no subsequent illness provided they remain asymptomatic. For 3 days following discontinuation of isolation, these persons should continue to limit contact (stay 6 feet away from others) and limit potential of dispersal of respiratory secretions by wearing a covering for their nose and mouth whenever they are in settings where other persons are present. In community settings, this covering may be a barrier mask, such as a bandana, scarf, or cloth mask. The covering does not refer to a medical mask or respirator.

Criteria to Return to Work Healthcare Workers

Return to Work Criteria for HCP with Confirmed or Suspected COVID-19

Use the Test-based strategy as the preferred method for determining when HCP may return to work in healthcare settings:

- Test-based strategy. Exclude from work until
- Resolution of fever without the use of fever-reducing medications **and**
- Improvement in respiratory symptoms (e.g., cough, shortness of breath), **and**
- Negative results of an FDA Emergency Use Authorized molecular assay for COVID-19 from at least two consecutive nasopharyngeal swab specimens collected ≥ 24 hours apart (total of two negative specimens) [1]. See Interim Guidelines for Collecting, Handling, and Testing Clinical Specimens for 2019 Novel Coronavirus (2019-nCoV)

If the Test-based strategy cannot be used, the Non-test-based strategy may be used for determining when HCP may return to work in healthcare settings:

- Non-test-based strategy. Exclude from work until
- At least 3 days (72 hours) have passed since recovery defined as resolution of fever without the use of fever-reducing medications and improvement in respiratory symptoms (e.g., cough, shortness of breath); **and**,
- At least 7 days have passed since symptoms first appeared
- Return to Work Practices and Work Restrictions(next slide)

Criteria to Return to Work Healthcare Workers

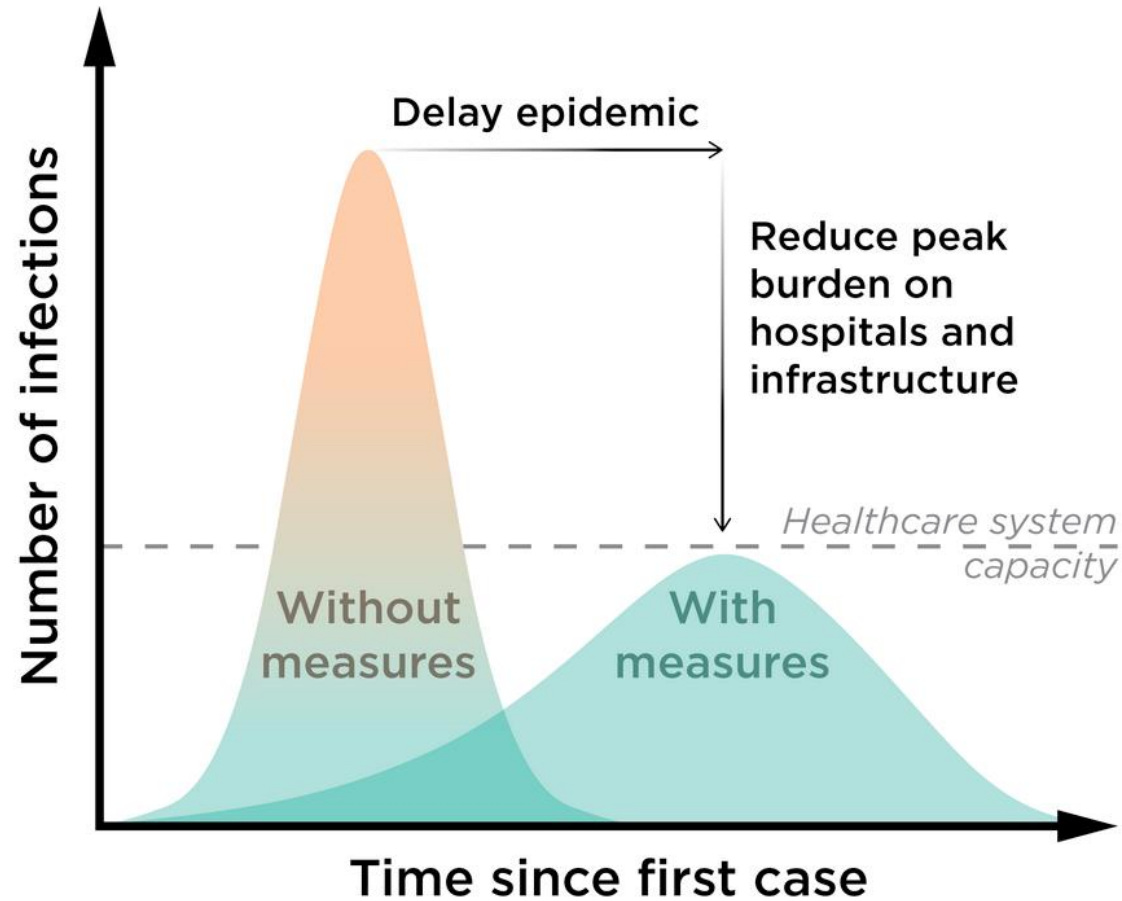
After returning to work, HCP should:

- **Wear a facemask for source control at all times while in the healthcare facility until all symptoms are completely resolved or until 14 days after illness onset, whichever is longer.** A facemask instead of a cloth face covering should be used by these HCP for source control during this time period while in the facility. After this time period, these HCP should revert to their facility policy regarding universal source control during the pandemic. ◦A facemask for source control does not replace the need to wear an N95 or higher-level respirator (or other recommended PPE) when indicated, including when caring for patients with suspected or confirmed COVID-19
- Of note, N95 or other respirators with an exhaust valve might not provide source control
- Be restricted from contact with severely immunocompromised patients (e.g., transplant, hematology-oncology) until 14 days after illness onset
- Self-monitor for symptoms, and seek re-evaluation from occupational health if respiratory symptoms recur or worsen

HCP with laboratory-confirmed COVID-19 who have not had any symptoms should be excluded from work until 10 days have passed since the date of their first positive COVID-19 diagnostic test assuming they have not subsequently developed symptoms since their positive test

Flatten the Curve!! But How??

Impact of protective measures



Adapted from CDC

NPIs (Non-pharmacologic Interventions)

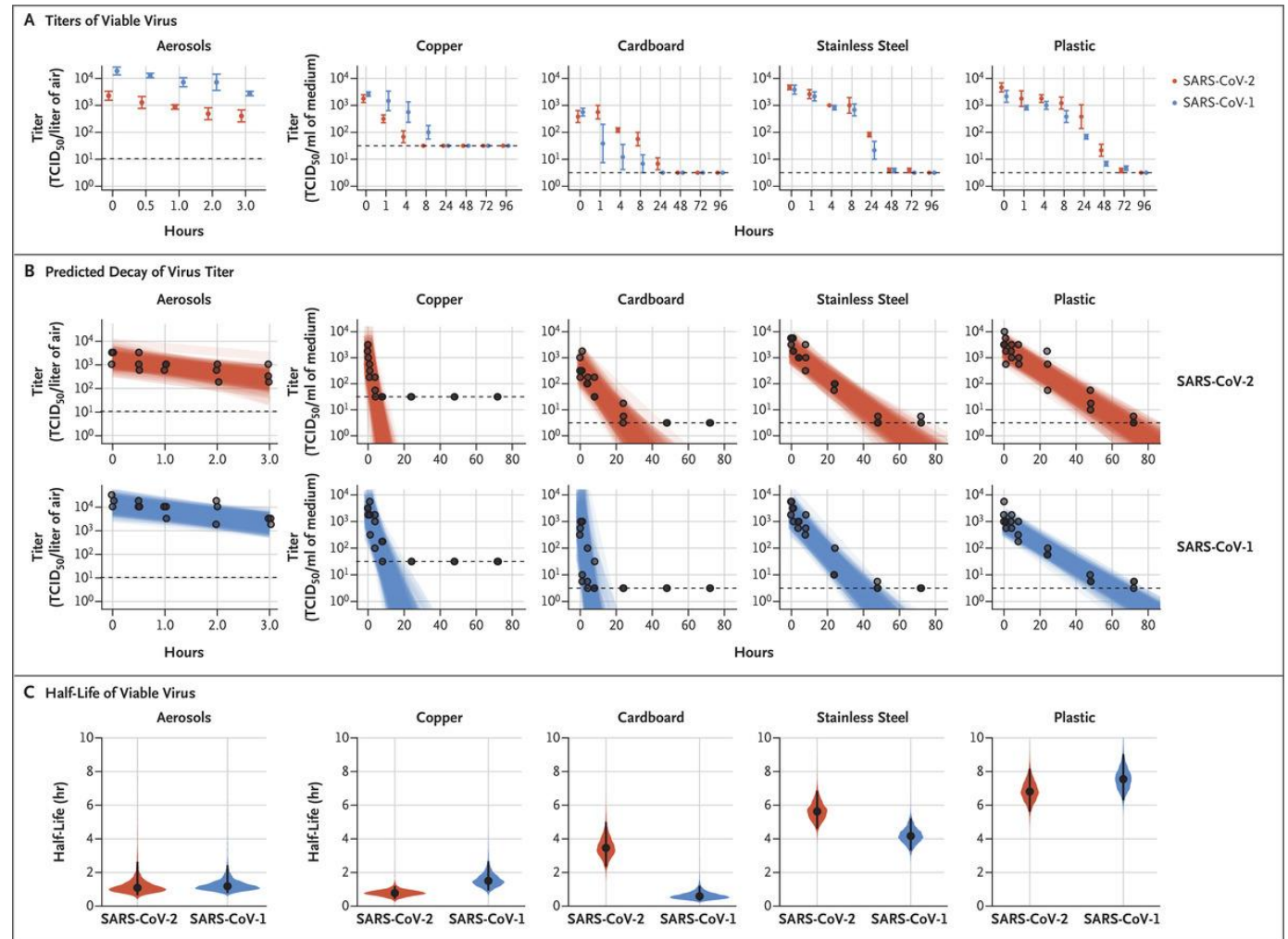
- Hand hygiene!!!!
- Cough etiquette
- Social distancing: (6 feet vs 3 feet?)
- Cancel mass gatherings (size?)
- Stay at home orders/close non-essential businesses
- Environmental cleaning
- Source control, i.e. masking/face covers

[https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-\(2019-ncov\)-out](https://www.who.int/publications-detail/advice-on-the-use-of-masks-in-the-community-during-home-care-and-in-healthcare-settings-in-the-context-of-the-novel-coronavirus-(2019-ncov)-out)



Viability-Environmental cleaning

SARS-CoV-2 was more stable on plastic and stainless steel than on copper and cardboard, and viable virus was detected up to 72 hours after application to these surfaces. On copper, no viable SARS-CoV-2 was measured after 4 hours. On cardboard, no viable SARS-CoV-2 was measured after 24 hours (Figure 1).



N van Doremalen et al. N Engl J Med 2020;382:1564-1567

<https://www.epa.gov/pesticide-registration/list-n-disinfectants-use-against-sars-cov-2>

Personal Protective Equipment

- PPE for medical and 1st responders:
- Aerosol vs droplet precautions(N-95 v mask)
- Contact precautions (gown and goggles/face shield)
- Lab testing with case finding/contact investigation

We Don't Have Enough Masks

Pandemics will require deciding who needs respirators and surgical masks, and who doesn't.

JAMES HAMBLIN JANUARY 30, 2020



Surgical Mask



N95 Respirator

PPE Optimization

Current examples:
 N-95 extended use in the ORCs
 UV and hydrogen peroxide treatment of N-95s
 Switch to nares self-collection for COVID-19 specimens since N-95 needed for NP swab

	Conventional Capacity	Contingency Capacity	Crisis Capacity	Exhausted Healthcare Supply
N95 Respirators	<ul style="list-style-type: none"> N95 respirators are recommended only for use by HCP¹ who need protection from airborne microorganisms. 	<ul style="list-style-type: none"> Extended use of N95 respirators for COVID-19 patients.² Limited re-use of N95 respirators for tuberculosis.² Use of N95 respirators beyond the manufacturer-designated shelf life (past expiration date) for training and fit testing. 	<ul style="list-style-type: none"> Limited re-use of N95 respirators for COVID-19 patients² after decontamination process Use of respirators past expiration date for healthcare delivery. Use of respirators approved under standards used in other countries that are similar to NIOSH-approved N95 Respirators (ie KN95) Lastly, consider prioritizing the use of N95 respirators by activity type.² 	<ul style="list-style-type: none"> If no N95 masks available, wear regular facemask. HCP use of non-NIOSH³ approved mask/face covering alternative that provides a barrier that has not been evaluated as effective.
Facemasks	<ul style="list-style-type: none"> Use facemasks according to product labeling and local, state, and federal Requirements, including patient's who have communicable diseases transmitted via respiratory droplets 	<ul style="list-style-type: none"> Remove facemasks for visitors in public areas Restrict facemasks to use by HCP providing direct patient care 	<ul style="list-style-type: none"> Use facemasks beyond manufacturer-designated shelf life during patient care activities. Use non-fit tested N95 masks as standard facemask Implement extended use of facemasks² for any of above facemasks If decontaminated, implement limited re-use of facemasks.² Lastly, prioritize facemasks for selected activities.² 	<ul style="list-style-type: none"> If no facemask available, use a face shield that covers the entire front and sides of the face (that extends to the chin or below) with alternative facemask If no face shield is available, use a mask/face covering alternative that provides a barrier that has not been evaluated as effective.
Isolation Gowns	<ul style="list-style-type: none"> Use isolation gowns that offer equivalent or higher protection to potential communicable diseases transmitted through direct contact 	<ul style="list-style-type: none"> Shift gown use from disposable towards cloth isolation gowns. Use of expired disposable gowns beyond the manufacturer-designated shelf life for training. Use gowns or coveralls conforming to international standards. 	<ul style="list-style-type: none"> Extended use of isolation gowns.² Extended use and Re-use of cloth isolation gowns.² Lastly, prioritize gowns for selected activities.² 	<ul style="list-style-type: none"> If no hospital gowns are available, consider using gown alternatives that have not been evaluated as effective.
Eye protection	<ul style="list-style-type: none"> Use eye protection according to product labeling and local, state, and federal requirements. 	<ul style="list-style-type: none"> Shift eye protection supplies from disposable to re-usable devices (i.e., goggles and reusable face shields). Implement extended use of eye protection.² 	<ul style="list-style-type: none"> Use eye protection beyond the manufacturer-designated shelf life during patient care activities. Consider using safety glasses that have extensions to cover the side of the eyes. 	<ul style="list-style-type: none"> If no eye protection is available, consider using alternatives that provide any eye protection that have not been evaluated as effective.

Vaccine and Pharmaceutical Development

- NIH working closely with researchers to fast-track vaccine development
- First Phase I trials have begun

- Pharmaceuticals

- Remdesivir
- HIV meds
- (Hydroxy)chloroquine/+/- azithromycin
- Chloroquine Study in Brazil Halted After 11 Patients Died

https://www.democracynow.org/2020/4/13/headlines/chloroquine_study_in_brazil_halted_after_patients_develop_irregular_heart_rate

- Convalescent plasma
- IDSA Guidance

<https://www.idsociety.org/practice-guideline/covid-19-guideline-treatment-and-management/>



How Do We Reverse Course?

Governor Newsom's 6 Criteria

1. The ability to monitor and protect our communities through testing, contact tracing, isolating, and supporting those who are positive or exposed;
2. The ability to prevent infection in people who are at risk for more severe COVID-19;
3. The ability of the hospital and health systems to handle surges;
4. The ability to develop therapeutics to meet the demand;
5. The ability for businesses, schools, and child care facilities to support physical distancing; and
6. The ability to determine when to reinstitute certain measures, such as the stay-at-home orders, if necessary



<https://www.gov.ca.gov/wp-content/uploads/2020/04/California-Roadmap-to-Modify-the-Stay-at-Home-Order.pdf>

Whitehouse roadmap

<https://www.whitehouse.gov/openingamerica/>

In Conclusion

- This pandemic is unprecedented in modern history
- No one knows what future spread will be
- No one knows how severe it will be

PANDEMIC