

COVID-19 Key metrics based on the latest available science – as of 3 August 2020

Projections using [RTSL calculator](#) (3 August July 2020)

These projections come from our calculator, which provides a quick rough estimate of total COVID-19 cases in a population based on the number of COVID-19-related deaths. Since case counts are highly related to the amount of testing completed, deaths (which tend to be more easily detected) can be used to estimate the total number of cases. Assumptions include:

- The number of COVID-19-related deaths is easier to ascertain than the number of cases.
- Total COVID-19 infections include asymptomatic, presymptomatic and symptomatic cases, deaths and recovered patients.
- The Infection Fatality Rate or Ratio (IFR) is the number of deaths over the total number of infections, and is influenced by many factors including age distribution of a population and case management.
- There is a lag of approximately 2 weeks (or 14 days) on average between illness onset and deaths.
- Cases in the past 14 days have a similar case fatality rate as those prior to 14 days ago (Global and Africa) or since May 1 (US)

The calculator provides a rough estimate and does not consider all of the important factors that affect cases and deaths.

It will be inaccurate if deaths are highly clustered in a population (heterogenous), so that the number of deaths would not necessarily imply a certain amount of cases in the population.

Global

Inputs	
	Inputs
Total number of COVID-19 deaths	689,219
Total cumulative cases	18,056,310
Total cumulative cases as of 14 days ago	14,482,844
Total population	7,800,000,000
Proportion of population over 65	9%
Presumed Infection Fatality Rate	0.34%

[World bank data](#)
optional override [resource on IFR](#)

Outputs (calculations)			
	Outputs		
Presumed Infection Fatality Rate	0.34%		
Current attack rate	0.2%		
Total deaths among existing infections	689,219		
Deaths yet to occur among current cases	170,056		
Estimated total deaths in all identified cases	859,275		
Current death rate	0.0%		
Observed CFR	3.8%		

	Lower estimate	Mid-point estimate	Higher estimate
Estimated total cases	212,166,771	254,600,126	318,250,157
Estimated true attack rate	2.7%	3.3%	4.1%
Estimated cases missing	194,110,461	236,543,816	300,193,847
Estimated percentage of true cases detected	8.5%	7.1%	5.7%

Africa

Inputs	
	Inputs
Total number of COVID-19 deaths	20,305
Total cumulative cases	957,835
Total cumulative cases as of 14 days ago	721,419
Total population	1,216,000,000
Proportion of population over 65	4%
Presumed Infection Fatality Rate	0.17%

[World bank data](#)
optional override [resource on IFR](#)

Outputs (calculations)			
	Outputs		
Presumed Infection Fatality Rate	0.17%		
Current attack rate	0.1%		
Total deaths among existing infections	20,305		
Deaths yet to occur among current cases	6,654		
Estimated total deaths in all identified cases	26,959		
Current death rate	0.0%		
Observed CFR	2.1%		

	Lower estimate	Mid-point estimate	Higher estimate
Estimated total cases	13,023,742	15,628,490	19,535,613
Estimated true attack rate	1.1%	1.3%	1.6%
Estimated cases missing	12,065,907	14,670,655	18,577,778
Estimated percentage of true cases detected	7.4%	6.1%	4.9%

US

Inputs	
	Inputs
Total number of COVID-19 deaths	154,860
Total cumulative cases	4,667,955
Total cumulative cases as of 14 days ago	3,773,260
Total population	327,000,000
Proportion of population over 65	16%
Presumed Infection Fatality Rate	0.57%

[World bank data](#)
optional override [resource on IFR](#)

Outputs (calculations)			
	Outputs		
Presumed Infection Fatality Rate	0.57%		
Current attack rate	1.4%		
Total deaths among existing infections	154,860		
Deaths yet to occur among current cases	25,082		
Estimated total deaths in all identified cases	179,942		
Current death rate	0.0%		
Observed CFR	3.3%		

	Lower estimate	Mid-point estimate	Higher estimate
Estimated total cases	26,307,302	31,568,763	39,460,953
Estimated true attack rate	8.0%	9.7%	12.1%
Estimated cases missing	21,639,347	26,900,808	34,792,998
Estimated percentage of true cases detected	17.7%	14.8%	11.8%

PANDEMIC SEVERITY ASSESSMENT FRAMEWORK UPDATE: JULY 21

Figure: Global COVID-19 PSAF – All ages

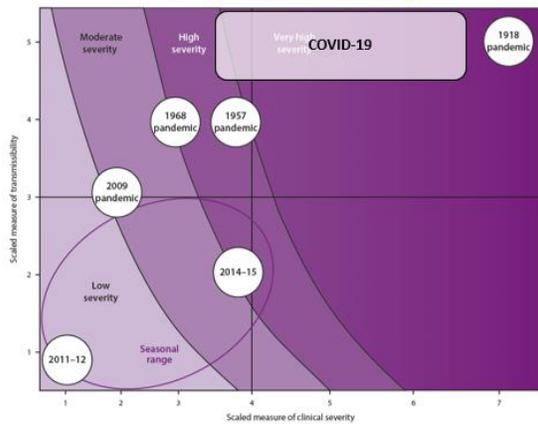
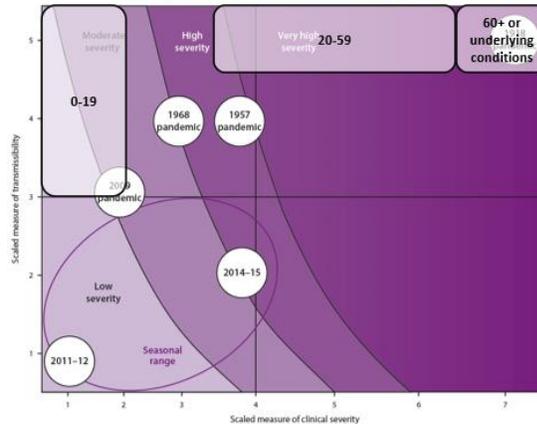


Figure: Global COVID-19 PSAF – Age-specific



Changes this week: None

SURVEILLANCE CASE DEFINITIONS

Source/last updated	Criteria	Probable case	Confirmed Case
WHO Updated March 20	<p><u>Suspected Case</u> A patient with acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath), AND a history of travel to or residence in a location reporting community transmission of COVID-19 disease during the 14 days prior to symptom onset; OR a patient with any acute respiratory illness AND having been in contact with a confirmed or probable COVID-19 case (see definition of contact) in the last 14 days prior to symptom onset; OR a patient with severe acute respiratory illness (fever and at least one sign/symptom of respiratory disease, e.g., cough, shortness of breath; AND requiring hospitalization) AND in the absence of an alternative diagnosis that fully explains the clinical presentation.</p>	A suspect case for whom testing for the COVID-19 virus is inconclusive OR A suspect case for whom testing could not be performed for any reason.	A person with laboratory confirmation of COVID-19 infection, irrespective of clinical signs and symptoms.
U.S. CDC Updated April 5	<p><u>Clinical Criteria</u> At least two of the following symptoms: fever (measured or subjective), chills, rigors, myalgia, headache, sore throat, new olfactory and taste disorder(s) OR at least one of the following symptoms: cough, shortness of breath, or difficulty breathing OR severe respiratory illness with at least one of the following: clinical or radiographic evidence of pneumonia, OR acute respiratory distress syndrome (ARDS) AND no alternative more likely diagnosis.</p> <p><u>Laboratory Criteria</u> Laboratory evidence using a method approved or authorized by the U.S. FDA or designated authority: <i>Confirmatory laboratory evidence:</i> Detection of severe acute respiratory syndrome coronavirus 2 ribonucleic acid (SARS-CoV-2 RNA) in a clinical specimen using a molecular amplification detection test <i>Presumptive laboratory evidence:</i> Detection of specific antigen in a clinical specimen or detection of specific antibody in serum, plasma, or whole blood indicative of a new or recent infection* *Serologic methods for diagnosis are currently being defined</p> <p><u>Epidemiologic Linkage</u> One or more of the following exposures in the 14 days before onset of symptoms: 1) Close contact** with a confirmed or probable case of COVID-19 disease; OR 2) Close contact** with a person with: clinically compatible illness AND linkage to a confirmed case of COVID-19 disease. 3) Travel to or residence in an area with sustained, ongoing community transmission of SARS-CoV-2. 4) Member of a risk cohort as defined by public health authorities during an outbreak. **Close contact is defined as being within 6 feet for at least a period of 10 minutes to 30 minutes or more depending upon the exposure. In healthcare settings, this may be defined as exposures of greater than a few minutes or more. Data are insufficient to precisely define the duration of exposure that constitutes prolonged exposure and thus a close contact.</p>	<p>Meets clinical criteria AND epidemiologic evidence with no confirmatory laboratory testing performed for COVID-19.</p> <p>Meets presumptive laboratory evidence AND either clinical criteria OR epidemiologic evidence.</p> <p>Meets vital records criteria with no confirmatory laboratory testing performed for COVID-19.</p>	Meets confirmatory laboratory evidence.

EPIDEMIOLOGY (BEST ESTIMATES BASED ON MULTIPLE SOURCES, AVAILABLE UPON REQUEST IF NOT LISTED)

Glossary of epidemiologic terms ([IDM](#))

Transmission

- **Basic Reproduction Number:** R_0 estimate: 2-3 (1.4-5.7) (multiple), 2.5 ([CDC best estimate](#))
 - **Effective Reproduction Number:** R_t estimates: [LSHTM](#), [Rtlive](#) (US-focused), [Hong Kong, Covid-19 projections](#)
- Doubling time without intervention: 6-9 days ([IDM](#))
- Secondary attack rate (household/close contact): 3-38% (multiple)
- Risk of transmission is potentially greatest two days before symptom onset ([He et al.](#)) and high early in development of symptoms and declines over the course of several days to weeks ([US CDC](#))
- Odds of transmitting disease in a closed environment was 19 times higher than in an open-air environment ([Preprint](#))
- Viral loads from 14 patients peaked between days 0-3 after symptom onset ([Zou et al.](#))
- Viral clearance in asymptomatic is faster than symptomatic ([Chau et al.](#))
- Median duration of viral shedding (the number of days from symptoms onset till the successive negative detection of SARS-CoV-2 RNA) was 17 days (12-21 IQR) ([Qi et al.](#))
- Proportion of SARS-CoV-2 transmission due to asymptomatic or pre-symptomatic infection compared to symptomatic infection is unclear ([US CDC](#))
- Percentage of transmission occurring prior to symptom onset: 50% ([CDC best estimate](#)) – **updated 7/17/2020 (up from 40%)**
- Infectiousness of asymptomatic individuals relative to symptomatic individuals: 75% ([CDC best estimate](#)) – **updated 7/17/2020 – down from 100%**
- Precautions: WHO continues to recommend droplet and contact precautions for those people caring for COVID-19 patients. WHO continues to recommend airborne precautions for circumstances and settings in which aerosol generating procedures and support treatment are performed ([WHO](#))
- Time between symptom onset in an individual and symptom onset of a second person infected by that individual: 6 days ([CDC best estimate](#))
- SARS-CoV-2 RNA can be detected in people 1-3 days before their symptom onset, with the highest viral loads, as measured by RT-PCR, observed around the day of symptom onset, followed by a gradual decline over time.
- The duration of RT-PCR positivity generally appears to be 1-2 weeks for asymptomatic persons, and up to 3 weeks or more for patients with mild to moderate disease. In patients with severe COVID-19 disease, it can be much longer. ([WHO](#))
- Detection of viral RNA does not necessarily mean that a person is infectious and able to transmit the virus to another person. Briefly, viable virus has been isolated from an asymptomatic case, from patients with mild to moderate disease up to 8-9 days after symptom onset, and for longer from severely ill patients. ([WHO](#))

Table 2: Severity of illness and viral dynamics

Study	Classification of severity	Median duration - days (IQR)	Viral dynamics in severe patients compared to non-severe patients	P-value
Chen et al.²⁷	ICU vs. non-ICU patients	11	Median time to viral clearance significantly longer in ICU vs. non-ICU patients (HR=3.17, 95% CI, 2.29-4.37)	Only HR provided
Chen et al.²⁸	China CDC guideline (version 7)	12 (8-16)	Shedding duration varies by severity: asymptomatic 6 days; mild 10 days; moderate 12 days; serious 14 days; critical 32 days	<0.0001
Tan et al.¹⁸	China CDC guideline (version 6)	NP: 12 Any sample: 22	Viral shedding significantly longer in severe patients: any sample 23 vs. 20 days (note NP: 14 vs. 11 days – non-significant)	p=0.023 (any sample)
Xu et al.³⁸	WHO criteria	17 (13-32)	Higher proportion of severe patients had shedding >21 days (34.2% vs. 16.2%)	0.49
Yan et al.³⁹	China CDC guideline (version 6)	23 (18-32)	No difference in shedding duration (general 23 days vs. severe 26 days vs. critical 28 days)	0.51
Zheng et al.²⁵	China CDC guideline (version 6)	Resp: 18 (13-29)	Shedding duration significantly longer in severe patients (21 vs 14 days) in respiratory samples. No difference in shedding duration in stool/serum	p=0.04

Abbreviations: IQR, interquartile range; ICU, intensive care unit; HR, hazard ratio; CDC, Centers for Disease Control and Prevention; WHO, World Health Organization.

Figure: SARS-CoV-2, SARS-CoV-1 and MERS-CoV viral load dynamics, duration of viral shedding 2 and infectiousness – a living systematic review and meta-analysis ([preprint](#))

Incubation period

- Estimates of median incubation period are 4-5 days with a range from 0-14 days ([CDC](#))
- 97.5% of persons with COVID-19 who develop symptoms will do so within 11.5 days of SARS-CoV-2 infection ([Lauer et al.](#))

Clinical presentation

- Signs and symptoms of COVID-19 present at illness onset vary, but over the course of the disease, most persons with COVID-19 will experience the following ([US CDC](#)):
 - Fever (83–99%); Cough (59–82%); Fatigue (44–70%); Anorexia (40–84%); Shortness of breath (31–40%); Sputum production (28–33%); and Myalgia (11–35%).
- 81% of cases are mild or moderate (including outpatient pneumonia); 14% are severe and 5% are critical ([China CDC Weekly](#))
- Proportion of asymptomatic infection (5-80%) ([CEBM – combined estimate from 21 reports](#))
- Percent of infections that are asymptomatic 40% ([CDC best estimate](#)) – updated 7/17/2020 (up from 35%)
 - Varies by setting:
 - [Diamond Princess](#) (18%)
 - [Vo, Italy](#) (50-75%)
 - [Japanese nationals evacuated from Wuhan](#) (31%)
 - [Residents of a Long-Term Care Nursing Facility King County, Washington](#) (57% includes pre-symptomatic, total 13% asymptomatic throughout);
 - [Children in China](#) (28%, 10/36 children)
 - Cruise Ship to Argentina ([81%](#))
 - Pregnant women presenting for childbirth in Connecticut ([73%](#))
- Case hospitalization ratio 3.4% ([CDC best estimate](#))
 - 0-49 1.7% | 50-64 4.5% | 65+ 7.4%
- Health Alert Network on Multisystem Inflammatory Syndrome in Children (MIS-C) with COVID-19 ([CDC](#))

Clinical course

- Among patients who developed severe disease ([US CDC](#)):
 - the median time to dyspnea ranged from 5 to 8 days,
 - the median time to acute respiratory distress syndrome (ARDS) ranged from 8 to 12 days, and
 - the median time to ICU admission ranged from 10 to 12 days.
- 17.8 days (95% CI 16.9-19.2) mean duration from onset of symptoms to death ([Verity et al.](#))
- 24.7 day (95% CI 22.9-28.1) mean duration from symptoms to hospital discharge ([Verity et al.](#))
- Median duration from ICU admission to death was seven days for non-survivors ([Yang et al.](#))
- U.S. ([CDC best estimate](#)) for additional indicators by age – UPDATED 7/17/2020

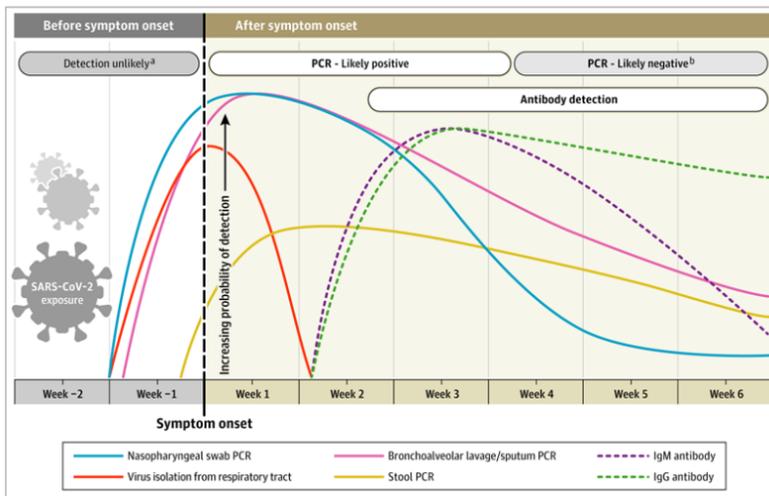
	18-49	50-64	>65
Mean number of days from symptom onset to hospitalization (standard deviation)	6	6	3
Mean number of days of hospitalization among those not admitted to ICU	3	4	6
Mean number of days of hospitalization among those admitted to ICU	10	14	12
Percent admitted to ICU among those hospitalized	23.6	36.2	35.1
Percent on mechanical ventilation among those in ICU	11.7	21.8	21.3
Percent that die among hospitalized	2	9.8	28.1
Mean number of days of mechanical ventilation		6	
Mean number of days from symptom onset to death	15	15	12
Mean number of days from death to reporting	7	7	6

Diagnostic testing

- Detection of SARS-CoV-2 viral RNA is better in nasopharynx samples compared to throat samples ([US CDC](#))
- Lower respiratory samples may have better yield than upper respiratory samples ([US CDC](#))
- SARS-CoV-2 RNA has also been detected in stool and blood. Detection of SARS-CoV-2 RNA in blood may be a marker of severe illness ([US CDC](#))
- Viral RNA shedding may persist over longer periods among older persons and those who had severe illness requiring hospitalization (median range of viral shedding among hospitalized patients is 12–20 days) ([US CDC](#))
- Viral shedding appears before symptom onset and is highest in the first week of symptom onset then declines with time ([To et al.](#), [He et al.](#), [ECDC](#))

- Infection with both SARS-CoV-2 and with other respiratory viruses has been reported, and detection of another respiratory pathogen does not rule out COVID-19 ([US CDC](#))

Figure. Estimated Variation Over Time in Diagnostic Tests for Detection of SARS-CoV-2 Infection Relative to Symptom Onset



Estimated time intervals and rates of viral detection are based on data from several published reports. Because of variability in values among studies, estimated time intervals should be considered approximations and the probability of detection of SARS-CoV-2 infection is presented qualitatively. SARS-CoV-2 indicates severe acute respiratory syndrome coronavirus 2; PCR, polymerase chain reaction.

^aDetection only occurs if patients are followed up proactively from the time of exposure.

^bMore likely to register a negative than a positive result by PCR of a nasopharyngeal swab.

Source: <https://jamanetwork.com/journals/jama/fullarticle/2765837>

Case fatality rate (CFR) / Infection fatality rate (IFR)

- Global observed CFR of 5.6% as of 12 June 2020 ([ECDC](#)) is an overestimate due to undetected cases (mild, presymptomatic, asymptomatic)
- In China, the CFR was higher in the early stages of the outbreak (17% for cases from 1 to 10 January) and reduced to 0.7% for patients with symptom onset after 1 February ([WHO](#))
- Estimate true infection fatality rate (IFR) (accounts for undetected cases): 0.1-1.1% (multiple, most recent [Oxford, Nature](#))
- Updated CDC Pandemic Planning Scenario indicators – best estimate IFR 0.65% (0.5-0.8%) ([CDC](#))
- **Age-specific CFR/IFR**

Age	CFR	Consensus	IFR	Consensus
	https://ourworldindata.org/coronavirus			
0-9	CFR Korea = 0/32 = 0% CFR China = 0/416 = 0% Italy = 0% Spain = 0% US 0.1%	0-0.1%	China - 0.00161% Switzerland (5-9) – 0.0016% Stockholm (0-49) – 0.01% Italy (0-59) – 0.05%	0.001-0.002%
10-19	CFR Korea = 0/169 = 0% CFR China = 1/549 = 0.2% Italy = 0% Spain = 0% US=0.1	0-0.1%	China - 0.00695% Switzerland (10-19) –0.00032 Stockholm (0-49) – 0.01% Italy (0-59) – 0.05%	0.0003-0.007%
20-29	CFR Korea = 0/1235 = 0% CFR China = 7 / 3619 = 0.2% Italy =0% Spain = 0.22% US =0.1%	0.1-0.2%	China - 0.0309% Switzerland (20-49) –0.0092 Stockholm (0-49) – 0.01% Italy (0-59) – 0.05%	0.01-0.03%

30-39	CFR Korea = $1/506 = 0.11\%$ CFR China = $18/7600 = 0.2\%$ Italy = 0.3% US (20-44) = 0.1-0.2% Spain = 0.14% US = 0.4%	0.2-0.4%	China - 0.0844% Switzerland (20-49) – 0.0092 Stockholm (0-49) – 0.01% Italy (0-59) – 0.05%	0.01-0.08%
40-49	CFR Korea = $1/633 = 0.08\%$ CFR China = $38/8571 = 0.4\%$ Italy = 0.4% US (45-54) = 0.5-0.8% Spain = 0.3% US = 1.0%	0.3-0.8%	China - 0.161% Switzerland (20-49) – 0.0092 Stockholm (0-49) – 0.01% Italy (0-59) – 0.05%	0.05-0.16%
50-59	CFR Korea = $5/834 = 0.5\%$ CFR China = $130/10008 = 1.3\%$ Italy = 1% US (55-65) = 1.4-2.6% Spain = 0.4% US = 2.4%	0.4%-2.4%	China - 0.595% Switzerland (50-64) – 0.14% Stockholm (50-59) – 0.27% Italy (0-59) – 0.05%	0.14-0.60%
60-69	CFR Korea = $6/530 = 1.8\%$ CFR China = $309/8583 = 3.6\%$ Italy = 3.5% US (65-75) = 2.7-4.9% Spain = 1.9% US = 6.7%	1.8%-6.7%	China - 1.93% Switzerland (65+) – 5.6% Stockholm (60-69) – 0.45% Italy (60+) – 4.16%	0.45-1.93%
70-79	CFR Korea = $6/192 = 6.3\%$ CFR China = $312 / 3918 = 8\%$ Italy = 12.8% US (75-85) = 4.3-10.5% Spain = 4.8% US = 16.6%	4.8%-16.6%	China - 4.28% Switzerland (65+) – 5.6% Stockholm (70-79) – 1.92% Italy (60+) – 4.16%	1.92-4.28%
80-89 or 80+	CFR Korea = $3/ 81 = 13\%$ CFR China = $208 / 1408 = 14.8\%$ Italy = 20.2% US 85+ = 10.4-27.3% Spain = 7.8% US = 28.7%	7.8%-28.7%	China (80+) – 7.8% Switzerland (65+) – 5.6% Stockholm (80-89) – 7.2% Italy (60+) – 4.16%	7.2%-7.8%
90+			China (80+) – 7.8% Stockholm (90+) – 16.21 Italy (60+) – 4.16%	16%

Table 1. Parameter Values that vary among the five COVID-19 Pandemic Planning Scenarios. The scenarios are intended to advance public health preparedness and planning. They are **not** predictions or estimates of the expected impact of COVID-19. The parameter values in each scenario will be updated and augmented over time, as we learn more about the epidemiology of COVID-19. Additional parameter values might be added in the future (e.g., population density, household transmission, and/or race and ethnicity).

Parameter	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5: Current Best Estimate
R_0^*	2.0	2.0	4.0	4.0	2.5
Infection Fatality Ratio, Overall [†]	0.005	0.005	0.008	0.008	0.0065
Percent of infections that are asymptomatic [‡]	10%	70%	10%	70%	40%
Infectiousness of asymptomatic individuals relative to symptomatic [§]	25%	100%	25%	100%	75%
Percentage of transmission occurring prior to symptom onset ^{**}	35%	70%	35%	70%	50%

* The best estimate representative of the point estimates of R_0 from the following sources: Chinazzi M, Davis JT, Ajelli M, et al. The effect

MEDICAL COUNTERMEASURES

Treatments

- Give supplemental oxygen therapy immediately to patients with severe acute respiratory infection (SARI) and respiratory distress, hypoxemia or shock and target > 94% ([WHO](#))
- Give empiric antimicrobials to treat all likely pathogens causing SARI and sepsis as soon as possible, within one hour of initial patient assessment for patients with sepsis ([WHO](#))
- Do not routinely give systemic corticosteroids for treatment of viral pneumonia outside of clinical trials ([WHO](#))
- Use of investigational anti-COVID-19 therapeutics should be done under ethically approved randomized control trials ([WHO](#))
- No U.S. Food and Drug Administration (FDA)-approved drugs have demonstrated safety and efficacy in randomized controlled trials when used to treat patients with COVID-19, although the FDA has granted an Emergency Use Authorization for the use of remdesivir to treat severe cases ([US CDC](#))
- Preliminary evidence suggests remdesivir is effective at reducing the duration of COVID-19 illness, more data is needed to confirm this result ([NIH](#))
- [Preprint](#) shows dexamethasone reduced deaths by one-third in ventilated patients (rate ratio 0.65 [95% confidence interval 0.48 to 0.88]; $p=0.0003$) and by one-fifth in other patients receiving oxygen only (0.80 [0.67 to 0.96]; $p=0.0021$). There was no benefit among those patients who did not require respiratory support (1.22 [0.86 to 1.75; $p=0.14$).
- Thromboembolic prophylaxis with subcutaneous low molecular weight heparin is recommended for all hospitalized patients with COVID-19 ([JAMA](#)).
- [NIH COVID-19 treatment guidelines](#)
- [WHO Clinical Management of COVID-19](#)
- [CDC Clinical guidance on management of patients with COVID-19](#)
- [NYT Coronavirus Drug and Treatment Tracker \(FIGURE\)](#)

Coronavirus Drug and Treatment Tracker

By Jonathan Corum, Katherine J. Wu and Carl Zimmer Updated July 22, 2020
[Leer en español](#)

The Covid-19 pandemic is one of the greatest challenges modern medicine has ever faced. Doctors and scientists are scrambling to find treatments and drugs that can save the lives of infected people and perhaps even prevent infection.

Below is an updated list of **19 of the most-talked-about treatments for the coronavirus**. While some are accumulating evidence that they're effective, most are still at early stages of research. We also included a warning about a few that are just bunk.

We are following **19 coronavirus treatments** for effectiveness and safety:

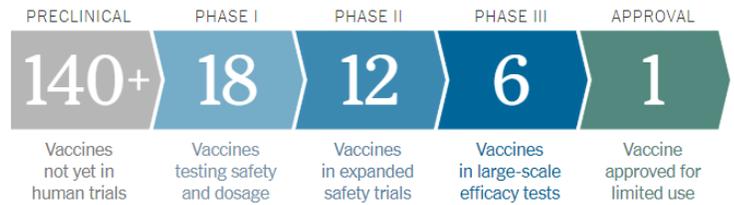


Vaccines

- [COVID-19 Vaccine Tracker](#)
- [NYT Vaccine Tracker](#)

Coronavirus Vaccine Tracker

By Jonathan Corum, Denise Grady, Sui-Lee Wee and Carl Zimmer Updated August 3, 2020



ENVIRONMENT

Temperature

- Emerging non-peer reviewed evidence appears to suggest that weather conditions may influence the transmission of the novel coronavirus (SARS-CoV-2), with cold and dry conditions appearing to boost the spread. This phenomenon may manifest itself through two mechanisms: the stability of the virus and the effect of the weather on the host. The weather effect is minimal, and all estimates are subject to significant biases ([Oxford](#))
- Epidemic peak could shift to winter in temperate countries. Seasonal changes in transmission rate could shift the timing of the peak into winter months, which will have important implications for healthcare capacity planning ([Danon](#))

Fomites

- Survival of SARS-CoV-2 in a controlled setting:
 - 72 hrs after application to plastic, 48 hrs on stainless steel, 24 hrs on cardboard and 4 hrs on copper ([NEJM](#)).
- Study of hospital wards in Wuhan, China tested air and surface samples. Virus was widely distributed on floors, computer mice, trash cans, and sickbed handrails and was detected in air ≈4 m from patients ([EID](#))
- See [WHO brief](#) on transmission (9 July 2020)