A Primer on COVID-19

The disease
Placing the disease in context
Information backing up present public health measures
Practical tips on staying safe
And much more

Updated periodically
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COVID-19

• Coronaviruses cause diseases in mammals and birds. Some cross species to humans causing zoonotic illness. *

• In humans they cause respiratory disease. About a quarter of common colds are caused by Coronaviruses. More serious coronavirus diseases include SARS and MERS.

Why are novel coronaviruses so dangerous?
• Our bodies form antibodies to foreign invaders, such as bacteria or viruses.
• If we have antibodies from a previous exposure, then we can rapidly ramp up the production of those antibodies if we are infected by that same virus at a later date.
• COVID-19 is a severe respiratory illness caused by the virus named SARS-CoV2.** It is a novel virus, which means that no one in the world has antibodies to it because no one has ever been infected by it before.
Facts about Covid-19

What we know at the moment
Subject to updates as the science progresses
Symptoms vary and mimic other common diseases until severe: Here is what we know from early studies in China.

The symptoms of coronavirus disease [COVID-19]

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever</td>
<td>87.9%</td>
</tr>
<tr>
<td>Dry cough</td>
<td>67.7%</td>
</tr>
<tr>
<td>Fatigue</td>
<td>38.1%</td>
</tr>
<tr>
<td>Sputum production</td>
<td>33.4%</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>18.6%</td>
</tr>
<tr>
<td>Muscle pain or joint pain</td>
<td>14.8%</td>
</tr>
<tr>
<td>Sore throat</td>
<td>13.9%</td>
</tr>
<tr>
<td>Headache</td>
<td>13.6%</td>
</tr>
<tr>
<td>Chills</td>
<td>11.4%</td>
</tr>
<tr>
<td>Nausea or vomiting</td>
<td>11.4%</td>
</tr>
<tr>
<td>Nasal congestion</td>
<td>4.8%</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>3.7%</td>
</tr>
</tbody>
</table>

Many of the most common symptoms are shared with those of the flu or cold. So it is also good to know which common symptoms of the flu or the common cold are not symptoms of COVID-19. COVID-19 infection seems to rarely cause a runny nose.

The same symptoms are signs of COVID-19 in Europe and the USA.
Signs of illness may precede actual symptoms
Pay attention to your senses

• Sudden loss of smell and taste have been documented in approximately 30% of confirmed cases before notable symptoms occurred

• Reported in South Korea, China, and Italy as well as UK and France

• Self isolate as soon as you notice this whether you have other symptoms or not

• Younger patients in particular may demonstrate only a loss of smell or taste, without demonstrating the more commonly recognized coronavirus symptoms of high fever and persistent coughs
What are the symptoms and how does it affect my body?

This video provides a thorough overview of mild-moderate-severe symptoms, and what is happening to the body during this time:

https://www.businessinsider.com/novel-coronavirus-covid-19-symptoms-day-by-day-2020-3 (covers severity and day to day progression)

• More information on the difference between severity of illness and effects of infection on the body can be found here:
  • Here’s what coronavirus does to the body: nationalgeographic.com/science/2020/02/heres-what-coronavirus-does-to-the-body
  CDC: https://www.youtube.com/watch?v=l-Yd-_XIWJg&feature=share&fbclid=lwAR1gBOJPSlnsSmPGdzAe6G8CIRJtLQgUcVujJZkzbdPE8PQ9502QTtRo4 (good knowledge and recommended practice summary)****
How long does it take to recover from COVID-19

- Preliminary data from China shows that the period from disease onset to recovery ranges according to severity of disease
  - For **mild cases**, recovery is approximately **2 weeks**
  - For **severe/critical cases**, recovery is approximately **3-6 weeks**
CoVid-19 severity: One factor is an uncontrolled inflammatory response

- COVID-19 severity is associated with a Cytokine Storm: Cytokine release syndrome (CRS)
- A cytokine storm occurs when a patient’s immune system overreacts to the virus and inflicts collateral damage on its own organs
  - CRS is an acute systemic inflammatory syndrome caused by excessive or uncontrolled release of proinflammatory cytokines
  - When the immune system is fighting pathogens, cytokines signal immune cells such as T-cells and macrophages to travel to the site of infection.
  - Cytokines activate these cells, stimulating them to produce more cytokines.
  - Normally, this feedback loop is kept in check by the body.
  - However, in some instances, the reaction becomes uncontrolled, and too many immune cells are activated in one location
- Cytokine dysregulation occurs in some virulent influenza infections such as H5N1 (avian flu) and COVID-19
Long-term effects of COVID-19 have been documented

- Some people recovering from COVID-19 have reported **prolonged symptoms for 60 days or longer**
  - Symptoms range from chronic fatigue, muscle aches, and rashes to kidney problems
- Similar long-term effects were observed following the severe acute respiratory syndrome (SARS) pandemic in 2003. In one Hong Kong study, **27% of SARS survivors were found to meet chronic fatigue syndrome criteria** several years after developing SARS
How does Covid-19 compare to seasonal flu

And other epidemics and pandemics
How serious is COVID-19 compared to the “flu”

While COVID-19 has many of the same symptoms as the flu, there are some very important differences that make our current COVID-19 pandemic more serious.

Each person with COVID-19 infects 2-3 people on average, and the number of days that a person is contagious before feeling sick is much greater in COVID-19 compared to the flu.

Flu vs. COVID mortality

- Confirmed influenza deaths
- Confirmed COVID deaths

Source: CDC FluView, Washington Post COVID tracking
Any suggestion of COVID-19 being just like influenza is false. For those aged 20–29 years, the case fatality ratio is around three times higher than that of seasonal influenza in people aged 18–49 years.

COVID-19 infections are 10 times greater than the “flu” even in the least affected group of individuals > 10 and < 40.
How serious is COVID-19 compared to other causes of mortality

04/14/2020
How does COVID-19 compare to other Epidemics
Selected Global Causes of Deaths Due to Various Causes and COVID-19, Jan-May 2020

1. **COVID-19**: 345,059
2. **Malaria**: 256,795
3. **Malnutrition**: 209,815
4. **Homicide**: 161,965
5. **Parkinson’s**: 136,445
6. **Drowning**: 124,410
7. **Meningitis**: 121,366
8. **Influenza**: 82,070
9. **Maternal**: 80,475
10. **Alcohol**: 74,530
11. **Drugs**: 65,540
12. **Conflict**: 64,960
13. **GI Inf Dz**: 63,800
14. **Hepatitis**: 52,055
15. **Fire**: 49,735
16. **Poisonings**: 30,160

Total: 1,007,303
**Broader historical perspective**

<table>
<thead>
<tr>
<th>Event</th>
<th>Total Deaths</th>
<th>Time Length</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPANISH FLU</strong></td>
<td>675,000–</td>
<td>1 YEAR</td>
</tr>
<tr>
<td><strong>CIVIL WAR</strong></td>
<td>655,000–</td>
<td>4 YEARS</td>
</tr>
<tr>
<td><strong>WORLD WAR II</strong></td>
<td>405,399</td>
<td>4 YEARS</td>
</tr>
<tr>
<td><strong>WORLD WAR I</strong></td>
<td>116,516</td>
<td>1 YEAR</td>
</tr>
<tr>
<td><strong>CORONAVIRUS</strong></td>
<td>97,414+</td>
<td>4 MONTHS</td>
</tr>
<tr>
<td><strong>VIETNAM WAR</strong></td>
<td>58,209</td>
<td>11 YEARS</td>
</tr>
<tr>
<td><strong>DEATH BY VEHICLE 2019</strong></td>
<td>38,800</td>
<td>1 YEAR</td>
</tr>
<tr>
<td><strong>KOREAN WAR</strong></td>
<td>36,516</td>
<td>3 YEARS</td>
</tr>
<tr>
<td><strong>FLU DEATHS 2018-2019</strong></td>
<td>34,200</td>
<td>1 YEAR</td>
</tr>
<tr>
<td><strong>AMERICAN REVOLUTIONARY WAR</strong></td>
<td>25,000–</td>
<td>8 YEARS</td>
</tr>
<tr>
<td><strong>GUN DEATHS 2019</strong></td>
<td>15,292</td>
<td>1 YEAR</td>
</tr>
<tr>
<td><strong>MEXICAN-AMERICAN WAR</strong></td>
<td>13,283–</td>
<td>2 YEARS</td>
</tr>
<tr>
<td><strong>2009 H1N1 Pandemic</strong></td>
<td>12,469</td>
<td>1 YEAR</td>
</tr>
<tr>
<td><strong>OIF IRAQ WAR</strong></td>
<td>4,497</td>
<td>8 YEARS</td>
</tr>
<tr>
<td><strong>OEF AFGHANISTAN WAR</strong></td>
<td>2,216+</td>
<td>19 YEARS</td>
</tr>
<tr>
<td><strong>9/11 TERRORIST ATTACK</strong></td>
<td>2,977</td>
<td>1 DAY</td>
</tr>
<tr>
<td><strong>PEARL HARBOR ATTACK</strong></td>
<td>2,403</td>
<td>1 DAY</td>
</tr>
<tr>
<td><strong>GULF WAR</strong></td>
<td>294</td>
<td>1 YEAR</td>
</tr>
<tr>
<td><strong>OKLAHOMA CITY BOMBING</strong></td>
<td>168</td>
<td>1 DAY</td>
</tr>
</tbody>
</table>

*As of May 23, 2020 10:00 PM by Mario Hardy*
Covid-19

Severity and mortality
The Majority of Infections are Mild

Severity of symptoms

- **MILD**
  - Like flu, stay at home
  - 80.9%

- **SEVERE**
  - Hospitalization
  - 13.8%

- **CRITICAL**
  - Intensive care
  - 4.7%

The Bulk of People Recover

- Currently ill: 40%
- Recovered: 56.6%
- Mortality rate: 3.5%

Source: Johns Hopkins University
Who is affected most severely?

Mortality data

- Those > 65
- Those with chronic illness like heart disease, diabetes, lung disease
- Smokers

Even though the fatality rate is low for younger people, any suggestion of COVID-19 being just like influenza is false.

Even for those aged 20–29 years, once infected with SARS-CoV-2, the case fatality ratio is around three times higher than that of seasonal influenza in people aged 18–49 years.

COVID-19 infections are 10x greater than the "flu" even in the least affected group of individuals > 10 and < 40
Those Aged 60+ are Most At Risk

% infectees who die

<table>
<thead>
<tr>
<th>Age Group</th>
<th>% Who Die</th>
</tr>
</thead>
<tbody>
<tr>
<td>0–9</td>
<td>0%</td>
</tr>
<tr>
<td>10–19</td>
<td>0.2%</td>
</tr>
<tr>
<td>20–29</td>
<td>0.2%</td>
</tr>
<tr>
<td>30–39</td>
<td>0.2%</td>
</tr>
<tr>
<td>40–49</td>
<td>0.4%</td>
</tr>
<tr>
<td>50–59</td>
<td>1.3%</td>
</tr>
<tr>
<td>60–69</td>
<td>3.6%</td>
</tr>
<tr>
<td>70–79</td>
<td>8%</td>
</tr>
<tr>
<td>80+</td>
<td>14.8%</td>
</tr>
</tbody>
</table>

Especially Those with Existing Conditions

% with other serious ailments who die

- Cardiovascular disease: 10.5%
- Diabetes: 7.3%
- Chronic respiratory disease: 6.3%
- Abnormally high blood pressure: 6%
- Cancer: 5.6%
- No existing conditions: 0.9%
Demographics in part explains some of the differences in mortality due to COVID-19

Demography is one factor that explains huge differences in mortality in Italy and S. Korea

• The population of Italy differs from much of the world. According to a UN report in 2015, 28.6% of the Italian population was 60 years old or older. By comparison, in South Korea, 18.5% of the population is at least 60 years of age, ranking 53rd globally.

• In Italy, 90% of the more than 1,000 deaths occurred in those 70 or older.

• By contrast, the outbreak in South Korea has occurred among much younger people. There, only 20% of cases have been diagnosed in those 60 years old and up. The largest affected group is those in their 20s, who account for almost 30% of all cases.

• Other factors must also be taken into account as well.
  
  • For example, testing policy, contact tracing, and quarantine. In South Korea, the rate of testing was quite high (3,692 tests per million people as of March 8) compared to Italy (826 people per million).

➢ Note: Both countries have excellent health care systems
How COVID-19 Affects Different U.S. Age Groups

Hospitalization, ICU admission and fatality rates for reported U.S. COVID-19 cases by age group*

* Based on 2,449 COVID-19 patients with a known age.
(February 12–March 16, 2020).
Source: Centers for Disease Control and Prevention
The most common health problems among hospitalized COVID-19 patients

Based on a study of 5,700 patients in the New York City Area
Of all hospitalized patients, 88% had more than one comorbidity:

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than one</td>
<td>88%</td>
</tr>
<tr>
<td>One</td>
<td>6.3%</td>
</tr>
<tr>
<td>None</td>
<td>6.1%</td>
</tr>
</tbody>
</table>

Specific comorbidities of hospitalized patients with available EHR data, from most common to least:

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>53.1%</td>
</tr>
<tr>
<td>Obesity (BMI ≥30)</td>
<td>41.7%</td>
</tr>
<tr>
<td>Diabetes</td>
<td>31.7%</td>
</tr>
<tr>
<td>Morbid Obesity (BMI ≥35)</td>
<td>19%</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>10.4%</td>
</tr>
<tr>
<td>Asthma</td>
<td>8.4%</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>6.5%</td>
</tr>
<tr>
<td>Cancer</td>
<td>5.6%</td>
</tr>
<tr>
<td>COPD</td>
<td>5%</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>4.7%</td>
</tr>
<tr>
<td>End-stage kidney disease</td>
<td>3.3%</td>
</tr>
<tr>
<td>Obstructive sleep apnea</td>
<td>2.7%</td>
</tr>
<tr>
<td>History of solid organ transplant</td>
<td>1%</td>
</tr>
<tr>
<td>HIV</td>
<td>0.8%</td>
</tr>
<tr>
<td>Cirrhosis</td>
<td>0.3%</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>0.1%</td>
</tr>
<tr>
<td>Hepatitis C</td>
<td>0.1%</td>
</tr>
</tbody>
</table>
What about those aged 20-64 experiencing COVID-19

• 20% of COVID-19 deaths in the USA (first 4000 cases) as of March 16 were aged 20-64 years

• As of April 11th, 23.3% of those hospitalized were aged 18-49 years.

• Compared with the under-18 year old group, patients aged 18-64 years appear to be at higher risk for hospitalization and ICU admission
Any suggestion of COVID-19 being just like influenza is false. For those aged 20–29 years, the case fatality ratio is around three times higher than that of seasonal influenza in people aged 18–49 years.

COVID-19 infections are 10 times greater that of the “flu” even in the least effected group of individuals > 10 and < 40.
Children do not seem to be dying, but can they get very sick?

• Children are just as likely as adults to get infected*

• In general, children experiencing all coronaviruses do not become as ill as adults
  • During the previous outbreaks of Severe Acute Respiratory Syndrome (SARS) in HK and Middle East Respiratory Syndrome (MERS) in South Korean, very few pediatric patients were reported. Despite a high mortality rate of SARS and MERS in the adults, there were no fatalities in the pediatric patients. Children appeared to have a milder form of the disease caused by the coronaviruses, including Covid-19 (SARS-CoV-2).**

• There is a range of severity and symptoms of COVID-19 in children***
  • Infected children may be asymptomatic or have fever, dry cough and fatigue; some patients experience gastrointestinal symptoms, including abdominal discomfort, nausea, vomiting, abdominal pain and diarrhea. Most infected children have mild clinical manifestations and usually have a good prognosis. Usually they recover within 1–2 weeks after the onset of the disease.

• The idea that this is no big thing for youth is misguided – children can still experience pneumonia and be sick for a few weeks.
Younger adults and stroke

• There have been reports of adults experiencing strokes while sick with COVID-19 coming out of the Netherlands and US.
  • Strokes are usually more common in the elderly; however, these patients with COVID-19 are presenting with symptoms of strokes are as *young as 30 years old*.

• **This is due to blood clot formation while sick with the infection.** Researchers are not positive as to what is causing these blood clots to form and travel to the brain.
  • Young adults who experience symptoms of COVID-19 should monitor themselves for neurological symptoms.
  • **If you start to experience weakness/numbness on one half of your body/face, trouble walking, trouble speaking, or difficulty concentration, contact EMS immediately.**
How long does it take to recover from COVID-19

- Preliminary data from China shows that the period from disease onset to recovery ranges according to severity of disease
  - For **mild cases**, recovery is approximately **2 weeks**
  - For **severe/critical cases**, recovery is approximately **3-6 weeks**
Long-term effects of COVID-19

- Some people recovering from COVID-19 have reported **prolonged symptoms for 60 days or longer**
  - Symptoms range from chronic fatigue, muscle aches, and rashes to kidney problems
- Similar long-term effects were observed following the severe acute respiratory syndrome (SARS) pandemic in 2003. In one Hong Kong study, **27% of SARS survivors were found to meet chronic fatigue syndrome criteria** several years after developing SARS
I have heard that the mortality rate for men is greater than women

- Data from China show that among the tens of thousands of people infected there, 2.8 percent of men died from the virus compared with 1.7 percent of women. The median age of the fatal cases among women was five years older than among men*
- The mortality rate is twice as high among men in Italy as it is among women in every age group **
- In the US, hospitalization rate from COVID-19 is slightly higher in men than in women. Why?
  - Could be many factors
    - Differences in rates of smoking by gender
    - Differences in rates of high blood pressure and heart disease by gender
    - Differences in the way that male and female immune systems respond, and/or as a result of hormonal changes***
      - Differences exist: For example, women tend to have more autoimmune disorders than men
      - Gender differences in the microbiota
    - Differences in medication use
More Men Dying of COVID-19 Than Women

Percentage of deaths by gender due to the COVID-19 disease

Data as of March 27
Sources: Wall Street Journal, Global Health 50/50
COVID-19 Laboratory-Confirmed Hospitalizations
Preliminary data as of May 09, 2020

Characteristics Of Covid-19-associated Hospitalizations

Sex

- Male
- Female

<table>
<thead>
<tr>
<th>Age</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4 yr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-17 yr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-49 yr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50-64 yr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>65+ yr</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percent

1. Data presented on COVID-19-associated hospitalizations collected through COVID-NET are preliminary and may change as more data are received.
2. The discrepancy between the total number of cases identified to date on ‘Laboratory-Confirmed-COVID-19-Associated Hospitalizations’ (https://gis.cdc.gov/grasp/COVIDNet/COVID19_3.html) and ‘COVID-19-Associated Hospitalizations By Age’ and the number of cases with information on characteristics (including race/ethnicity) differs because the characteristics data are restricted to cases with complete chart reviews. These data will be updated each week as additional chart reviews are completed.
3. The denominator for each characteristic is the total number of patients with non-missing data for that characteristic.
4. Race/Ethnicity is classified as Non-Hispanic White, Non-Hispanic Black, Hispanic and Other. The other category contains Asian/Pacific Islander, Native American/Alaskan Native, Multi-Race, and Other.
I have read that this virus effects some racial groups more than others

• There is no evidence to date suggesting that any particular racial group constitutes a group at risk because of race-related genetics.

• However, those living and working in environments of risk and engaged in risky behavior related to group norms are more likely to be exposed to this virus.

• Members of particular ethnic groups are more at risk due to difficulties in engaging in physical distancing related to housing, intergenerational contact associated with familial responsibility, and occupation, etc. Demographics and overall health status are also risk factors influencing the crude numbers of people hospitalized and dying.

• You have no doubt heard that COVID-19 is an equal opportunity viral threat. This is only partially true. There are social and structural determinants of both disease transmission and prognosis based on access to resources and health care.
  • For example, African Americans in the USA are far more likely to die of COVID-19. Black Chicagoans account for half of all coronavirus cases in the city and more than 70% of deaths, despite making up 30% of the population.
  • Louisiana, a major US hotspot, was the first southern state to categorize Covid-19 deaths by race. 70% of deaths were among African Americans, despite making up only 33% of the state’s population.
COVID-19 Laboratory-Confirmed Hospitalizations
Preliminary data as of May 09, 2020

Characteristics Of Covid-19-associated Hospitalizations
Race/Ethnicity
- Non-Hispanic White
- Non-Hispanic Black
- Hispanic
- Other

1. Data presented on COVID-19-associated hospitalizations collected through COVID-NET are preliminary and may change as more data are received.
2. The discrepancy between the total number of cases identified to date on ‘Laboratory-Confirmed COVID-19-Associated Hospitalizations’ (https://gis.cdc.gov/grasp/COVIDNet/COVID19_3.html) and ‘COVID-19-Associated Hospitalizations By Age’ and the number of cases with information on characteristics (including race/ethnicity) differs because the characteristics data are restricted to cases with complete chart reviews. These data will be updated each week as additional chart reviews are completed.
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COVID-19: The racial disparity
Black Mainers account for 1.4 percent of the state’s population but make up 23.6 percent of its COVID-19 cases, the highest racial disparity in the nation.

| WORST STATES BY RANK |  |
|----------------------|--|---|---|
| Maine                | 1.4% | 25.6% | 22.2% |
| Missouri             | 11.5% | 18.3% | 30% |
| Michigan             | 13.8% | 15.8% | 29.6% |
| Minnesota            | 6.6% | 21.8% | 15.2% |
| Alabama              | 13.9% | 26.7% | 40.6% |
| Mississippi          | 13.7% | 30% | 51.7% |
| South Dakota         | 2.2% | 15.8% | 15.6% |
| Ohio                 | 12.4% | 25% | 12.6% |
| Wisconsin            | 6.4% | 18.5% | 12.1% |
| Arizona              | 11.1% | 15.2% | 26.3% |

COVID-19's Devastating Impact On African Americans
African American share of state/city populations and COVID-19 deaths (as of Apr 06, 2020)

- **Louisiana**: 32% population, 70% deaths
- **Illinois**: 15% population, 42% deaths
- **Michigan**: 14% population, 41% deaths
- **North Carolina**: 22% population, 22% deaths
- **Chicago**: 30% population, 69% deaths

Sources: 2010 Census, respective state/city health departments
Deaths and Cases Disproportionately Affect African Americans In Most States

PERCENTAGE DIFFERENCE IN SHARE OF DEATHS/CASES, COMPARED WITH AFRICAN AMERICANS' SHARE OF THE POPULATION

- Less than proportional
- More than proportional

Insufficient data

DEATHS

CASERS
Impact on Native people in the USA

• There is a wide range of COVID-19 rates among different American Indian reservations, but a handful of reservations have many-fold greater infection rates compared to the general U.S. population.

• The case of New Mexico: As of May 11, 2020
  • The state’s 23 tribes have borne the brunt of the COVID-19 pandemic. Nearly 60% of people identified to date through testing as infected with the virus are indigenous.
  • Half of the 200 people who had died in New Mexico from COVID-19 were Native Americans, a jarring number for a population that makes up 11% of the state’s population.
I have heard that Blood Type influences COVID-19 risk

• A new study found that those with **A blood types** had a significantly higher risk of COVID-19 while people with **O blood types** had a significantly lower risk.

• This study was published on a website **where peer review is not necessary and was limited by a low sample size**!

• These findings need to be explored further; however, experts believe this is biologically plausible.

• Another study by 23andMe found that O blood types may be protective against the virus.

• These findings are preliminary and there is not enough evidence to cause a false sense of security among those with O blood types (or panic among those with A blood types)!
How does COVID-19 Spread?
How does it spread?

• This virus is spread in large droplets by coughing, sneezing, and even talking
• You are at risk if a person coughing is close to you as droplets descend to surfaces; that is why it’s best to remain 6 feet or more from others
• All the surfaces where droplets land are infectious for 24 hours to a week depending on what the surface is made out of:
  • A recent study finds that the virus can survive on hard surfaces such as plastic and stainless steel for up to 72 hours and on cardboard for up to 24 hours.
How does it spread?

• This virus is spread in large droplets by coughing, sneezing, and even talking

• You are at risk if a person coughing is close to you as droplets descend to surfaces; that is why it’s best to remain \underline{6 feet or more} from others
  • When in a place with loud talking and singing six feet may not be enough

• All the surfaces where droplets land are infectious for 24 hours to a week depending on what the surface is made out of:
  • A recent study finds that the virus can survive on hard surfaces such as plastic and stainless steel for up to 72 hours and on cardboard for up to 24 hours.
COVID-19 PANDEMIC

How is the virus transmitted?

**Single Sneeze**
Can produce up to 10,000 droplets.

Single cough can produce up to 3,000 droplets.

Virus becomes airborne and can remain suspended in the air in very tiny droplets for hours.

If the droplets land on surfaces, the virus may survive for as long as 24 hours on cardboard and up to 3 days on stainless steel and plastic, according to a recent study.

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Source: AL JAZEERA | Last updated: 11:30 GMT, March 24, 2020
Secondhand smoke as an analogy for COVID-19 droplets in the air

- Imagine everyone is smoking, and you’d like to avoid inhaling as much smoke as possible.*
- In a cramped indoor space, that smoke is going to get dense and heavy fast. If the windows are open, some of that smoke will blow away.
- If fewer people are in the space, less smoke will accumulate, and it might not waft over to you if you’re standing far enough away.
- But spend a lot of time in an enclosed space with those people, and the smoke grows denser.
- The denser the smoke, the more likely it is to affect you. It’s the same with this virus: The more of it you inhale, the more likely you are to get sick.
<table>
<thead>
<tr>
<th>SURFACE</th>
<th>LIFESPAN OF COVID-19 VIRUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paper and tissue paper**</td>
<td>3 hours</td>
</tr>
<tr>
<td>Copper*</td>
<td>4 hours</td>
</tr>
<tr>
<td>Cardboard*</td>
<td>24 hours</td>
</tr>
<tr>
<td>Wood**</td>
<td>2 days</td>
</tr>
<tr>
<td>Cloth**</td>
<td>2 days</td>
</tr>
<tr>
<td>Stainless steel*</td>
<td>2–3 days</td>
</tr>
<tr>
<td>Polypropylene plastic*</td>
<td>3 days</td>
</tr>
<tr>
<td>Glass**</td>
<td>4 days</td>
</tr>
<tr>
<td>Paper money**</td>
<td>4 days</td>
</tr>
<tr>
<td>Outside of surgical mask**</td>
<td>7 days</td>
</tr>
</tbody>
</table>

*At 69.8 to 73.4°F (21 to 23 °C) and 40% relative humidity  **At 71°F and 65% relative humidity

Source: New England Journal of Medicine*; The Lancet Microbe**
How does the virus spread?
Protect your nose, mouth, and eyes

- The virus infects you through your nose or mouth via your hands or an infected cough or sneeze onto or into your nose or mouth.
- This virus only has cell receptors for lung cells (it only infects your lungs).
- The eye is also a portal for entry and site for virus transmission.
- Some evidence suggests that the virus might spread via a fecal-oral route, but the data is still preliminary and few cases have been documented.
  - The virus that causes COVID-19 has been found in the feces of some patients diagnosed with COVID-19. However, it is unclear whether the virus found in feces may be capable of causing COVID-19.
Can the virus remain in the air in aerosol form for some time?

• The primary point of contact appears to be the virus on surfaces
  • At present the biggest concern is the surfaces you touch

• However, some research suggests that the virus may remain in the air for some time if aerosolized.
  • For minutes up to three hours,* depending on environmental conditions
  • A Chinese, 48-seat bus study found that the virus infected people in a closed environment with air-conditioning up to 15 feet, suggesting that in some environments the transmission distance of this coronavirus exceeds the commonly recognized safe distance of 6 feet.
Asymptomatic & mildly symptomatic in relation to disease transmission

• Several studies have shown that people without symptoms are causing substantial amounts of infection.

• Chinese data suggests that the number of “silent carriers” could be as high as one-third of those who test positive
  • More than 43,000 people in China had tested positive without immediate symptoms by the end of February and were quarantined

• Of the 135 people in the Tianjin cluster, between 62% and 77% contracted the infection from someone who was pre-symptomatic.

• Between 48% and 66% of the 91 people in the Singapore cluster contracted the infection from someone who was pre-symptomatic.

• Iceland is attempting to test its entire small population and has the means to do so. It has reported that so far 50% of all cases identified are asymptomatic.

• Asymptomatic cases were found on the Diamond Princess cruise ship: 322 of 621 people tested positive but showed no symptoms

• It appears that a Massachusetts coronavirus cluster with at least 82 cases was started by people who were not yet showing symptoms

• Hence the importance of physical distancing

• The > 60 group must distance themselves from youth. Someone you know, even your grandchild may be asymptomatic.

• Engage in safe forms of social interaction with loved ones such as sociality through social media and the phone.
Incubation period

• 4 to 6* days appears to be the median amount of time, but the range is much larger with some studies suggesting up to 24 days***.

• Existing data suggests that about 97.5 percent of people who develop symptoms of COVID-19 infection will do so within 11.5 days of exposure.

• The researchers estimate that for every 10,000 individuals quarantined for 14 days, only about 101 would develop symptoms after being released from quarantine.**
When are you most contagious if you have a mild to moderate illness

• In COVID-19 peak shedding occurs from the upper airways early on in the infection which makes for a virus much harder to contain than another coronavirus like SARS (where peak shedding occurs deep in the lungs) *

• At peak shedding, people with COVID-19 are emitting more than 1,000 times more virus than was emitted during peak shedding of SARS infection

• Research suggests that peak shedding for COVID-19 occurs before you feel ill. This emphasizes the importance of precautionary measures and helps explains why this is much harder to contain than previous coronavirus outbreaks like SARS and MERS.
How many people will a sick person infect?

Current studies suggest that a person with COVID-19 will on average infect between 2-3 additional persons, but the range of estimates is around 2-6.5.*

These estimates are likely to change as we progress in the pandemic.

*This number may change as we learn more about this new disease.
New coronavirus
Most estimates put the fatality rate below 3%, and the number of transmissions between 2 and 4.

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.
Infections often cluster in households

- Limited information is known about household clustering in the U.S., but a study in Beijing found that family cluster spread of disease accounted for 57.6% of person-to-person spread.

- Based upon risk models of close contacts with those who developed COVID-19 from Guangzhou, China:
  - 19% of people in the same household can expect to become sick.
  - 14% of people who see the sick person regularly, but don’t live in the same household can expect to become sick.

- A preprint research paper found that physical distancing reduced COVID-19 transmission outside the household:
  - Before physical distancing household transmission was 5%-35% of cases.
  - After physical distancing household transmission was 30%-55% of cases.

- **Bottom line:** Household transmission is common. If you work in an environment of risk you need to adopt precautions so you do not bring the virus home to family members, especially family members having a preexisting condition or > 60 years of age.
  - Health care and other essential workers are top of this list.
How long do people shed the virus and how does this relate to being contagious?

• **Presence of the virus does not necessarily indicate level of contagion**

What do we know so far?

• Wuhan data: Median duration of viral shedding was 20.0 days (IQR 17.0–24.0) in survivors.
  • The longest observed duration of viral shedding in survivors was 37 days

• A small but important German study found that people with mild infections can still test positive by throat swabs for days and even weeks after their illness.*

• **However, those only mildly sick are most likely not still infectious by about 10 days after they start to experience symptoms, and moderately sick by days 10-11.**
  • The scientists could not grow viruses from throat swabs or sputum specimens after day 8 of illness from people who had mild infection.
  • The researchers found very high levels of virus emitted from the throat of patients from the earliest point in their illness—when people are generally still going about their daily routines. Viral shedding dropped after day 5 in all but two of the patients, who had more serious illness.
Does a high viral load or infectious dose make COVID-19 worse?

- Research has shown that those with severe COVID-19 symptoms often have much higher viral loads than those with minor symptoms.

- We know from influenza that a greater exposure to the virus often causes a more severe illness.
  - However, it is unclear as to whether a greater exposure to the virus for COVID-19 causes more severe symptoms.
  - It's also important to consider patient characteristics, as people with compromised or weakened immune systems due to extreme stress, exhaustion, or other conditions could cause a lower threshold of exposure needed to cause severe symptoms.
Is there a possibility of re-infection?

- Dr. Anthony Fauci and other researchers think it is likely that someone who gets infected once is actually immune.
  - Other experts think that one has an intermediate level of protection that dwindles over time, similar to that of influenza.
  - We know from previous coronavirus outbreaks that immunity to the infections decreases as time goes on and that the level of antibodies you develop may be dependent on how severe your illness was (mild illness = very little immunity).

- The question is not just is re-infection possible, but how long immunity lasts. This may vary by the amount of antibodies a person produces after having experienced this coronavirus. At this current time, it is too early to know.
Is there a possibility of re-infection?

- Much remains unknown about the virus and the duration of antibody production and disease resistance. Longitudinal serological studies profiling more symptomatic and asymptomatic individuals are urgently needed to determine the duration of antibody-mediated immunity.
- Reports of patients testing positive for the coronavirus a second time have come out of China, Japan, and South Korea.
  - Some researchers believe this is due to reactivation of the virus and not because of reinfection. I.e. people may almost be completely recovered and then their infection increases again.
  - Other research suggests that asymptomatic individuals may have a weaker immune response to Sars-CoV-2 virus.
- Reports of re-activation have health experts worried that the illness could remain dormant after an apparent recovery.
  - Or that immunity from one strain of SARS-CoV-2 virus might not protect against all strains.
Can children spread the virus that causes COVID-19?

• Contact tracing has demonstrated that children can spread COVID-19, though likely at a reduced rate relative to adults.¹

• Children may be less susceptible to the virus, have a milder viral course, or a reduced viral load – all of which would contribute to a lesser role in transmission.¹,²

• Children, particularly school-aged children, may have more contacts than adults, thereby expanding their role in transmission in certain settings.¹

• Dr. Jeffery Shaman, epidemiologist at Columbia University: “...to open schools because of some uninvestigated notion that children aren’t really involved in this, that would be a very foolish thing.” ³
How fast does this virus escalate?

Depends on steps taken during trajectory of illness
COVID-19 spreads fast

• Compared to SARS and MERS, COVID-19 has spread strikingly fast: While MERS took two and a half years to infect 1,000 people, and SARS took roughly four months to hit that figure, COVID-19 reached 1,000 cases in just 48 days

• The disease's global fatality rate is estimated to be less than 4 percent, compared to 35 percent for MERS and 10 percent for SARS
Exponential spread: For every two to six days that we delay engaging in physical distancing, the number of infections double

Official line:
• Every person with the COVID-19 virus infects approximately two to four people.
• The infection rate doubles every two to six days (there is a range depending on what policies/programs different countries are implementing)
• That means that if 50,000 people have the virus today, then in 6 days, 100,000 people will have it.
• In another 12 days it’s 400,000 and less than two weeks later it’s over a million people.
• We have 330 million people in the US. The experts expect that 40-70% of people will be infected.
Exponential spread of COVID-19

Total number of confirmed U.S. coronavirus cases at each Tuesday: January to March 10

Jan. 14 — 0
Jan. 21 — 1
Jan. 28 — 5
Feb. 4 — 11
Feb. 11 — 14
Feb. 18 — 25
Feb. 25 — 59
Mar. 3 — 125
Mar. 10 — 1,004
And so on........
Exponential Spread in March, USA

New coronavirus cases announced in the U.S. each day

Source: C.D.C., state and local health agencies, hospitals.
**Exponential spread of COVID-19**

<table>
<thead>
<tr>
<th>Range of Cases</th>
<th>Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero cases to 1 million cases</td>
<td>~100 days</td>
</tr>
<tr>
<td>1 million to 2 million cases</td>
<td>12 days</td>
</tr>
<tr>
<td>2 million to 3 million cases</td>
<td>13 days</td>
</tr>
<tr>
<td>3 million to 4 million cases</td>
<td>12 days</td>
</tr>
<tr>
<td>4 million to 5 million cases</td>
<td>11 days</td>
</tr>
<tr>
<td>5 million to 6 million cases</td>
<td>10 days</td>
</tr>
<tr>
<td>6 million to 7 million cases</td>
<td>8 days</td>
</tr>
<tr>
<td>7 million to 8 million cases</td>
<td>8 days</td>
</tr>
<tr>
<td>8 million to 9 million cases</td>
<td>6 days</td>
</tr>
</tbody>
</table>
Where are we in the Disease Trajectory?

Based on our evolving experience with COVID-19
The WHO Pandemic Phases

March 29th, 2020 – Cumulative Confirmed Cases

Country by country: how coronavirus case trajectories compare
Cumulative number of confirmed cases, by number of days since 100th case

Graph: FT graphic: John Burn-Murdoch / @jburnmurdoch; Source: FT analysis of Johns Hopkins University, CSSE; Worldometers; FT research. Data updated March 29, 19:00 GMT ©FT
March 28th, 2020 – Cumulative Confirmed Cases

Total confirmed COVID-19 cases
The number of confirmed cases is lower than the number of actual cases; the main reason for that is limited testing.

Source: European CDC – Situation Update Worldwide - Data last updated 27th May, 02:44 (GMT-07:00), European CDC – Situation Update Worldwide
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June 23rd, 2020 – Cumulative Confirmed Cases
Third week of June – daily confirmed deaths
March 28th, 2020 – Cumulative Deaths

Total confirmed COVID-19 deaths

Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.

Source: European CDC – Situation Update Worldwide - Data last updated 20th May, 08:29 (GMT-07:00), European CDC – Situation Update Worldwide CC BY
May 20th, 2020 – Cumulative Deaths

Total confirmed COVID-19 deaths

Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.

Source: European CDC – Situation Update Worldwide - Data last updated 20th May, 08:29 (GMT-07:00), European CDC – Situation Update Worldwide CC BY
June 23rd, 2020 – Cumulative Deaths

Cumulative confirmed COVID-19 deaths

Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.

Source: European CDC – Situation Update Worldwide - Data last updated 23rd Jun, 07:33 (GMT-07:00), European CDC – Situation Update Worldwide

CC BY
March 28\textsuperscript{th}, 2020 – Daily Deaths

**Daily new confirmed COVID-19 deaths**

Shown is the rolling 7-day average. Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.

Source: European CDC – Situation Update Worldwide - Data last updated 23rd Jun, 07:33 (GMT-07:00), European CDC – Situation Update Worldwide CC BY
June 23rd, 2020 – Daily Deaths

Daily new confirmed COVID-19 deaths

Shown is the rolling 7-day average. Limited testing and challenges in the attribution of the cause of death means that the number of confirmed deaths may not be an accurate count of the true number of deaths from COVID-19.

Source: European CDC – Situation Update Worldwide - Data last updated 23rd Jun, 07:33 (GMT-07:00), European CDC – Situation Update Worldwide
CC BY
April 21st, 2020 – Streamgraph Distribution

The US now accounts for more than thirty per cent of global daily deaths.
May 18th, 2020 – Weekly Average Streamgraph Distribution

The global Covid-19 death toll is continuing to ease slowly. Daily deaths of patients diagnosed with coronavirus (7-day rolling average).

The US accounts for thirty per cent of average global daily deaths.
June 21st, 2020 – Weekly Average Streamgraph Distribution

Global Covid-19 death toll: Latin America offsets decline in Europe and the US

Daily deaths of patients diagnosed with coronavirus (7-day rolling average)

Latin America now accounts for 48 per cent of average global deaths

Jun 15-21
Average daily deaths
4,815

Jun 15-21
LatAm total
2,304

Jun 15-21
Rest of Latin America
591

The US share of average global daily deaths has fallen to 12 per cent

Rest of Europe

Rest of Asia

Rest of Africa

Rest of N America

Mexico

Brazil

US

India

Russia

UK

Mideast

* Canada, Bermuda, Greenland and St Pierre and Miquelon

Mar 15 - Jun 21
Average daily deaths
393
April 21st, 2020: Total Deaths in the USA
May 27\textsuperscript{th}, 2020: Total Deaths in the United States
June 23rd, 2020 – Total Deaths in the United States
RISING AND FALLING NEW CORONAVIRUS CASES
CHANGE IN NUMBER OF NEW CASES COMPARED TO 14 DAYS AGO*

**LARGEST INCREASE:** ARIZONA
**LARGEST DECREASE:** ILLINOIS

DATA THROUGH 6/11/2020

*CHANGE IN SEVEN-DAY AVERAGE OF NEW CASES TWO WEEKS AGO TO 6/11/2020. "STRONG" CHANGE: +/- 200; "FLAT": +/- 2.7
BECAUSE OF A DATA REPORTING ANOMALY, A SIX-DAY AVERAGE WAS USED FOR MICHIGAN.
SOURCE: NY TIMES COMPILED OF STATE AND LOCAL GOVERNMENTS AND HEALTH DEPARTMENTS DATA*
Which States are experiencing increases in cases?
Arizona daily cases June 25th
Moving into *Post-Peak* Pandemic

- *New Cases* and *New Deaths* in the US have approximately plateaued at peak levels, with slow drops in both.
  - Some public health researchers suggest that this may be primarily be due to New York’s decrease in new cases (as they were the epicenter in the US)

- A reduction in control measures & physical distancing at this point in time may cause both counts to rise.

- Some US states have not reached their peak transmission; this could continue with the relaxation of restrictions that were put in place.

- Physical distancing and control measures are needed following peak transmission to prevent subsequent and immediate growth of new cases.
Multiple Peaks are likely

• True prevention of subsequent peaks in cases can only be achieved with herd immunity – when enough people are immune from recovery or vaccination.

• Vaccine development is ongoing, though this development may take 12-18 months.

• Factors that may contribute to subsequent peaks of cases:
  • Relaxation of control measures.
  • Physical, social distancing measures are lifted.
  • Localization of new waves – new locations, climates, populations, and movements of people.
  • Non-permanent immunity.

• Prevention of subsequent waves can be supported with consistent control measures and social distancing.
The demographic of new cases is shifting in the USA

• More cases are being reported in the 20-40 age bracket
• The shift appears to be related to
  • Members of this group refusing to comply with social distancing and mask wearing unless strictly enforced by law, and acting as if the threat of severe disease for them is not worth the social risk of living their best life
  • Members of this group re-entering the work place and exposed to environments of risk

Example is California and Florida:
• June: in California, people under 35 now make up about 44% of new infections in that state, compared with 29% last month
• June: In Florida people under 37 make up about half of that state's newer cases
Seasonal Transmission cannot be assumed

• “Given that countries currently in ‘summer’ climates, such as Australia and Iran, are experiencing rapid virus spread, a decrease in cases with increases in humidity and temperature elsewhere should not be assumed...Changes in weather alone will not necessarily lead to declines in cases without extensive public health interventions.”

• Historical context of the previous 10 influenza pandemics, dating 250 years, demonstrate peaks relative to time of emergence and spread, not seasonality.

• Similarly, pandemic influenza strains have not exhibited the typical seasonal pattern of endemic/epidemic strains that have decreased in summer months.
Likely scenarios
There are three possible scenarios we could encounter

• Because many US states have moved into their post-peak transmission period, it is important that we consider possible scenarios that are likely to occur given that we do not have any pharmaceutical ways of preventing infection and that likelihood of generating herd immunity through active infections or vaccination soon is low.

• Relying strictly on non-pharmaceutical interventions, there are three likely scenarios we should prepare for:

1. Peaks and Valleys
2. Fall Peak
3. Slow Burn
Three Possible Pandemic Curve Scenarios

1. Peaks and Valleys
2. Fall Peak
3. Slow Burn
Peaks and Valleys

• In this scenario, we would see an initial wave of cases (the one we are currently experiencing) which is then followed by consecutive drops (valleys) and increases (peaks) in cases.

• Over time, these would gradually diminish.
Fall Peak

• In this scenario, it is predicted that the current peak we are in will be closely followed by a much larger “fall peak” (or winter peak), similar to what we see happen annually with the flu and during the 1918 flu pandemic.

• After this second, more severe fall/winter peak, we would see multiple smaller peaks following until the outbreak diminishes.
Slow Burn

- In this scenario, we would see a severe heightened peak in the spring (where we are currently), and then a gradual, drawn out period of smaller peaks and valleys until the outbreak has diminished.
Which scenario will we see?

• It is important to remember that each of these scenarios is likely given our current situation: we only have non-pharmaceutical interventions like physical distancing, mask use, handwashing, and other preventative hygiene behaviors at our disposal to prevent the spread of infection.

• If some of these restrictions and precautionary measures are relaxed too much or disregarded, we could end up with a scenario similar to Peaks and Valleys but with very significant “peaks” with very little decreases in case counts to reach the “valleys”.
Response will require adaptation over time.
Herd Immunity, Testing, and Contact Tracing
Herd immunity is key to control in an epidemic like this

- Herd immunity (also known as community immunity) is defined by the CDC as “a situation in which a sufficient proportion of a population is immune to an infectious disease (through vaccination and/or prior illness) to make its spread from person to person unlikely.”

- When someone becomes immune to a pathogen, through vaccination or recovery from illness, that person will no longer spread the pathogen, meaning that person is not the only beneficiary of their immunity.

- Herd Immunity is key to controlling epidemics and pandemics.
An Example of Herd Immunity
Measles

- An outbreak of measles occurred in Milwaukee, Wisconsin in the late 1980s.
- Researchers studied 1,011 adolescent measles cases confirmed between September 1989 and June 1990.\(^1\)
- Results showed an “association between immunization coverages and measles attack rate...” in which an increase in vaccination was associated with a decrease in the number in of people who contracted measles.
- Researchers estimated that an immunization coverage of approximately 80% would be sufficient to prevent sustained measles outbreaks in urban communities.
COVID-19 is different from measles as there is no vaccine: So the herd immunity situation is different

• There’s no vaccine for COVID-19 yet – there will probably not be one available to the public for a year or more

• The only option is immunity after recovery from the virus. This means the majority of people will need to catch the virus at some point in time.
  • We will likely need at least 50% of the population to be immune to have herd protection.

• But not at the same time or the health system gets swamped

• The curve everyone is talking about flattening entails spreading out the rate of infection to reduce case load in hospitals for the severely ill.
The diagram illustrates the impact of protective measures on the number of cases over time since the first case. It shows two scenarios: one with protective measures (blue area) and one without protective measures (red area). The healthcare system capacity is represented by a horizontal line. The diagram is adapted from CDC / The Economist.
LOWER AND DELAY THE EPIDEMIC PEAK

Proactive measures taken early in an epidemic reduce burden on the healthcare system and slow the spread of disease.

IMMEDIATE INTERVENTIONS

With control measures

Healthcare system capacity: Personnel, ICU beds, ventilators

Threshold may vary

CC BY 2.0 Esther Kim @K_thos
Carl T. Bergstrom @CT_Bergstrom
Limitations to Herd Immunity for COVID-19

- Currently, it is still unknown whether an infection with COVID-19 results in immunity to reinfection.
  - If it does, we don’t know how long that immunity would last.
- The proportion of the population that would need to get COVID-19 in order to develop herd immunity is also unknown.
  - The required percentage of people immune to achieve herd immunity in previous flu pandemics has ranged between 13 and 100%.
  - Some research has suggested that at least 50% of the population would need to have been infected AND immune to reinfection to achieve herd immunity for COVID-19.
- Given what we currently know about the death rate of COVID-19, it would be extremely dangerous and result in millions of deaths to try and achieve herd immunity without a vaccine.
  - Therefore, persons should not knowingly attempt to acquire the infection in order to try and gain immunity akin to “chickenpox parties.”
Current lessons from Sweden

• Sweden has taken a rather unconventional approach to controlling their outbreaks by relying on generating a herd immunity without lockdown measures (which many proponents of physical distancing and other precautions suggest should occur here in the US).

• With no lockdown measures in place, Sweden’s death rate due to COVID-19 is greater than the rate here in the US with our comparatively relaxed lockdown measures in place.

• Initially, Sweden saw death rates from COVID-19 that were similar to other European nations that had closed down their economies. Mid May, the Scandinavian nation’s daily death toll per 1 million people is 8.71 compared to the United States’ 4.59. Sweden's mortality rate is the highest in Europe.
What would happen if we followed Sweden’s strategy to reach herd immunity
Covid-19 testing

Why is testing important
Different kinds of tests tell us different things
What is the Importance of Testing?

• Testing allows confirmed cases to be isolated quickly and known contacts to be identified early, accounting for spread of the illness.¹

• If we limit testing to those who are very ill, we miss those spreading the disease asymptotically or with minor symptoms.¹

• Effectiveness of testing is evident in South Korea:²
  • Used the WHO validated testing kit
  • Test as many people as possible even with minor suggestive symptoms
  • Contact trace
  • Isolate
Three Main Types of Testing

Polymerase Chain Reaction (PCR)

The Swab Test

A diagnostic test used in the United States at present identifies people who are currently spreading the virus. The test does not reveal who has previously been infected.

- PCR for COVID-19 requires a nasal swab or sputum sample that identifies the specific viral RNA from the COVID-19 virus. It’s the gold standard to see if you are actively infected.
- PCR detects the presence of this virus molecule in a person. It does not detect the disease effect, meaning a person can be PCR positive before they have symptoms.

Serological (antibody)

The Blood test

A blood-based serological test detects antibodies that people produce after they’ve become infected. These antibodies can appear in the blood weeks after infection. Antibodies detect the immune system’s response to the presence, not the current presence of the virus.

- This test has epidemiological uses, supporting retrospective case counts, as well as diagnostic uses.
- It has been employed in China, Taiwan, and Singapore and is currently being deployed in the USA.
Antigen tests: Another type of test that indicates infection at one point in time

- Antigen* tests have been widely used to identify diseases like the seasonal flu.
- They require a saliva or nasal swab
- They are relatively inexpensive and can provide results in minutes.
- Antigen tests identify active infection through the presence of antigens specific for corona viruses which causes the body to produce antibodies**

How accurate are they?
- Antigen tests are very specific for Coronavirus virus, however they are not as sensitive as molecular PCR tests. ***
- False positive test results are rare, BUT false negatives occur between 10-50% of the time
- The benefit of better quality rapid antigen tests (having a 10% false negative rate) is that they are cheap enough for people to be tested repeatedly.
  - It is unlikely that two false negatives will be experienced if performed a few days apart
We need different types of tests to inform us about the incidence and prevalence of COVID-19

**Incidence**
- The number of *new cases* of a disease divided by the average population at risk during a specific time period.

**Prevalence**
- The number of *existing cases* of a disease in a population at a given time period.
When you hear about test statistics always differentiate between statistics that refer to the incidence or prevalence of the disease

- **PCR tests (the swab) and antigen tests** are helpful in determining where we are currently at in the outbreak because they are important in calculating **incidence rates**, which tell us how many new cases of COVID-19 we are experiencing.

- Serology tests (the blood test) are helpful in determining **prevalence rates**, or how many people have ever had COVID-19. These rates are crucial to determining how close we are to achieving **herd immunity**.

- Because these two tests are measuring different aspects of the outbreak, they should not be combined together into one statistic.
Why are there False Negative PCR Tests?

The Swab test

• A PCR test is very reliable but **only valid for a single point in time**.
• A “false negative” is when someone who has the disease receives a negative test result.
• There are a number of reasons why a PCR test may result in a false negative:
  • It might be too early in the illness, when the amount of virus in the airway is still small.
  • It could be a problem with how the swab was done.
  • There could be issues with the handling or transport of the swab.
  • There could be laboratory error.
Why are serological tests so important?

The Blood test

• Identifies people who were not known to be infected:
  • Identifies current, silent infections, as well as those who have recovered.
  • Supports contact tracing.
• Presence of antibodies can mean several things:
  • Ability to care for sick.
  • Potential to donate antibodies through plasma.
  • Return to work, other demands.
• However - does a positive response for the antibodies mean that a person is actively infected, or that they have been infected in the past?
Two types of serological tests

The Blood test

**ELISA immunoassay**

- Gold standard, but labor intensive, take longer to receive results, and expensive
- Assesses IgM levels which indicate ongoing, or recent, infection.
- Excellent tests for determining true immunity by antibody titers.
  - “Titers,” or levels of antibodies, provide a quantification of antibody presence (high or low)

**Lateral flow assays**

- Array of rapid turnaround tests that are cheap and usually rely on color change to give you a qualitative “binary” yes or no answer to whether antibodies are present in your blood
  - A common lateral flow assay is a pregnancy test
- Accurate when positive, but have higher false negative rates compared to ELISA
  - Miss cases early on and are not helpful in the first 1~2 weeks of illness, may miss those having suppressed immune systems
- Not great for diagnosing “active” cases of COVID-19 infection, but useful for surveillance of large populations after the fact.
Antigens are structural parts of a virus. In the novel coronavirus, a series of spikes on the outside help the virus spread. The virus uses these spikes to bind to cells and infect them.

These spikes can be neutralized, or blocked by antibodies. Antibodies are proteins produced by the immune system to fight infection.

Developing a blood based serological test

How COVID-19 antibody testing works:
1. Researchers take lab-grown COVID-19 antigens and put them into special plates that immobilize them. Antigens are structural parts of viruses.
3. Parts of the blood containing antibodies are extracted into a serum. Antibodies are produced by the immune system to fight infection.
4. The serum and a detector antibody are added into the special plate mixture. Detector antibodies alert researchers to the presence of virus antibodies.
5. If COVID-19 antibodies are present, they will stick to COVID-19 antigens and block them.
6. The detector antibodies will stick to the COVID-19 antibodies to cause a reaction.
7. The reaction causes the liquid in the plate to turn blue. If the liquid turns blue, it means the patient has had or currently has COVID-19.
Big questions remain related to testing for COVID-19 immunity

- **How accurate are the tests?** – especially the lateral flow assays that are being developed and sold by many labs with suboptimal oversight
  - Both sensitivity and specificity of tests need to be considered. I.e. what are the rates of false positives and false negatives in these tests.

- We still don’t have a reference point for COVID. **We don’t yet know at what level of antibody production that a person becomes immune and how long that immunity lasts.**
  - One might test positive to a lateral flow assay, but these only measure the presence of antibodies, a low level of antibody response might mean they are not immune from reinfection.
  - Immunity exists on a continuum: Not everybody that gets exposed to the disease produces the same amount of antibodies

- **What percentage of the antibodies being produced are neutralizing antibodies (that prevent the disease by binding to the virus), and what percentage are antibodies that just recognize the virus**
Questions remain about the protective effect of antibodies

• It is still unknown having antibodies to COVID-19 would prevent re-infection.
  • We know from outbreaks of related coronaviruses (SARS and MERS) that whether someone develops antibodies and how long those antibodies lasts varies.

• Based on the assumption that those who have the infection are immune from acquiring it again, researchers suggest that **70% of the population would need to acquire COVID-19 to provide herd immunity**.
  • Currently only about 5% of the US population would be immune based on this assumption
How often should you get retested?

• A crucial part of any reopening plan will include recommendations for *retesting*, because each test only provides information about a snapshot in time.

• Currently, it is recommended that you get a PCR (the swab) test if you *have been exposed* to someone with a known infection and/or are *experiencing symptoms* consistent with COVID-19.
  • PCR (the swab) tests are fully covered via your insurance provider, or through Medicaid funds the government has allocated to cover the cost of testing for those who are uninsured.
How often should you get retested?

- How often you get retested for COVID-19 will vary depending on your occupation and the availability of tests among other reasons.

  - Those in occupations with a high risk of infection (like first responders and healthcare workers) would be required to be retested more frequently using PCR (the swab) tests because of their routine and prolonged exposure with people who have COVID-19.

  - Individuals who work in office settings or occupations with the ability to remain physically distant, follow mask wearing recommendations, and institute adequate disinfecting protocols would only need to be retested with a PCR (the swab) test if they have been exposed or are showing symptoms.
As states have reopened, there has a greater need for testing. One method to address this is via pooled PCR (the swab) testing.

- **Pooled PCR (the swab) tests combine parts of individual samples from groups of individuals and test them as one sample** using sensitive molecular biological detection methods.
- If the sample comes back positive, then each person’s original sample that was included in the pooled sample is tested individually to determine who among the group has an active infection.
- If the sample comes back negative, then each individual sample does not need to be tested.
- This saves money, time, and significant numbers of test kits and increases the test capacity of the existing laboratory infrastructure.
Pooled testing can contribute to a sense of group responsibility

• When a group that interacts routinely is tested together they get a sense of shared risk as well as shared responsibility to each other.

• This in turn supports a shift from individual behavior change to group norms that support the health of the unit – say people who work together in close quarters.
  • This might translate, for example, to mask wearing, or physical distancing
  • But steps must be taken not to stigmatize one who tests positive

• This also facilitates contact tracing: if one person tests positive in the site, then others know all need to isolate as well as get a PCR test to see if they may have in turn transmitted the virus to family members or other groups they interact with routinely
How often should I be retested with serology (the blood sample) tests?

• Because serology (the blood sample) tests determine whether you have EVER had the infection and not whether you have an active infection, how often you get retested with serology (the blood sample) tests will be less frequent.

  • Serology (the blood sample) tests detect antibodies to the infection which do not form unless you’ve had the infection or have been vaccinated against it.
  • As outbreaks progress, and a greater proportion of the population has been infected, retesting with these tests will become more important.

• Currently, however, retesting with serology (the blood sample) tests should be relatively infrequent compared to PCR (the swab) tests.
Big questions remain related to testing for COVID-19 immunity

• **How accurate are the tests?** – especially the lateral flow assays that are being developed and sold by many labs with suboptimal oversight
  • Both sensitivity and specificity of tests need to be considered. I.e. what are the rates of false positives and false negatives in these tests.

• We still don’t have a reference point for COVID. **We don’t yet know at what level of antibody production that a person becomes immune and how long that immunity lasts.**
  • One might test positive to a lateral flow assay, but these only measure the presence of antibodies, a low level of antibody response might mean they are not immune from reinfection.
  • Immunity exists on a continuum : Not everybody that gets exposed to the disease produces the same amount of antibodies

• **What percentage of the antibodies being produced are neutralizing antibodies (that prevent the disease by binding to the virus), and what percentage are antibodies that just recognize the virus**
Viruses mutate, and at varying rates (some mutate very quickly while others are fairly stable).

Current viral genomic research suggests:
- **At least 10 strains** of the COVID-19 have been identified
- Only small differences between the virus strains that cause COVID-19
- They have a slow rate of mutation

At the moment, scientists think:
- It is unlikely differences in mortality and symptom presentation are related to people being infected with different strains of the virus. **There may be a difference in how infectious they are.**
- Immunity gained from infection will be across the different strains, but the question is **how long that immunity will last.**
- A vaccine developed for SARS-CoV-2 would be a single vaccine, rather than a new vaccine every year like the flu vaccine (more like chickenpox and measles vaccines) and have a long-lasting effect
- **Nine different types of vaccines are underdevelopment** : see ** for descriptions of various vaccine strategies.**
Testing early matters

• While the US is now testing more people per capita than South Korea, there are a few important things to keep in mind:
  • South Korea’s outbreak has been on the decline since early March, with an average rate of less than 9 new cases daily in the past two weeks.
  • In comparison, the US has had an average rate of greater than 28,000 new cases daily over the past two weeks.
• The major difference is the timing and intensity of testing efforts.
  • South Korea began robust testing very early on in their outbreak, which when combined with rigorous contact tracing, helped them to curb their outbreak early on.
Ramping up testing early on in the outbreak helps to reduce the spread of infection, and shorten the duration of the outbreak.
Testing early matters

Whereas waiting to increase testing until the outbreak is already well underway increases the duration and peak of the outbreak.
Testing early matters

• Because South Korea began robust testing efforts early, the average number of daily cases is low so they don’t need to test the same amount of people that we do in the US.

• To give you an idea as to how robust their response was compared to the US:
  • At the height of their outbreak, South Korea was testing 16 times the amount of people as they had confirmed cases. I.e., for each person that was positive, they also tested 15 other people who came back negative.
  • In comparison, on the day we had the most new cases the US only testing 4 times the amount of confirmed cases. I.e., for each person that tested positive, they were also testing 3 other people who came back negative.
  • South Korea’s testing response was 4 times that of the US.
Contact tracing

Why is it an important next step after testing
What is contact tracing, and why is it important?

• Contact tracing is a vital public health process in which individuals who may have been exposed to an illness are identified and then notified of their exposure so that they can take necessary precautionary measures (such as testing and self-isolation) to prevent exposing other people.

• This is essential to curbing and preventing outbreaks of infectious diseases. E.g., illnesses that can be passed from person-to-person.
  • If people who have been exposed are informed EARLY, then transmission of the virus to other people can be prevented.
How does contact tracing work?

• Contact tracing is conducted for every disease/illness that health departments have defined as **reportable illnesses**.
  • **Reportable illness** are those that are of importance for public health due to their abilities to spread throughout the community and potentially cause significant harm.

• When laboratories, physicians, and other healthcare providers identify a person as being positive for a reportable illness, they are **required by law to report that information to the health department**.
  • At this point, someone from the health department contacts (usually via phone call) you so that they can identify possible exposures that led to your illness and so that you can identify people you were in contact with that could have been exposed due to you also being sick.

• **This is all done to prevent others from getting sick**
Contact tracing is generally done through a phone call.
How contact tracing works for COVID-19

• For COVID-19 contact tracing, health departments are performing contact tracing for each person who is identified as a case.

• How are you classified as a case?
  • Cases are divided into two different categories: Confirmed cases and probable cases.
  • Confirmed cases as people who have Confirmed Laboratory Evidence of a COVID-19 infection.
  • Probable cases are people who meet either Clinical Criteria AND Epidemiologic Evidence or who meet Presumptive Laboratory Evidence AND either Clinical Criteria OR Epidemiologic Evidence.
Laboratory and Clinical Criteria for Cases

• **Laboratory Criteria**
  - Confirmatory Laboratory Evidence = a positive PCR (the swab) test
  - Presumptive Laboratory Evidence = a positive serology (the blood sample) test

• **Clinical Criteria**
  - At least 2 of the following:
    - Fever
    - Chills
    - Rigors (shivering)
    - Myalgia
    - Headache
    - Sore throat
    - Loss of smell/taste
  - OR
  - At least one of the following:
    - Cough
    - Shortness of breath
    - Difficulty breathing
  - OR
  - Severe respiratory illness with at least one of the following:
    - Clinical or radiographic evidence of pneumonia
    - Acute Respiratory distress syndrome
  - OR
  - No alternative more likely diagnosis
Criteria used to determine if someone is a “contact”

• If you receive a phone call from the health department but have not been tested for COVID-19, you were likely identified as a contact.

• Contacts are those who have had some sort of interaction or contact (physical and non-physical) with a person who has tested positive for COVID-19.
  • Generally, includes those who have been within 6 feet of a person for at least 15 mins
  • 15 minutes is a general guideline; may be more or less depending on the situation
    • i.e. Those in the same room as an infectious person for an extended period, even if more than 6 feet away, should be treated as a contact
  • Physical contact with droplets (i.e. touched used tissues of someone with COVID-19, touched the same surfaces as an infectious person, etc.)
What happens in Arizona

• **Here in Arizona**, when you go to get a **swab test** for COVID-19, if you test positive for the virus, those results are **automatically reported to the state health department**.
  • This is a requirement for all healthcare facilities, as it is classified as a **reportable illness**.

• Once the health department receives the information of your positive test result, **contact tracers working for the health department will contact you** to ask you questions about your illness and people you were in contact with prior to getting tested.

• They will then use this information to **contact the people you identify and tell them they have been exposed to someone who has tested positive for COVID-19 and that they should get tested and self isolate**.
COVID-19 contact tracing faces unique challenges

• Traditional contact tracing relies on contact tracers interviewing you via phone, to identify possible contacts who you may have exposed.
  • If you don’t know everyone you may have been around before you received your test result, all contacts aren’t able to be identified and notified.

• With COVID-19, there is significant lag time that occurs in each step of the process.
  • Because it is so similar to other respiratory illnesses (and because some people experience only a couple symptoms if any at all), people who are sick with the virus often do not seek out testing right away.
  • Then, because of less than optimal testing capacity, once someone gets tested there is often an additional 2-7 days before that person receives their test results.
  • To top it all off, there are not enough contact tracers so that each positive case is followed up when they receive notification of someone testing positive.
Contact tracing apps

• Currently, there are some apps in development that would aide traditional contact tracing.
  • None of these would mandatory, but would be “opt-in” and greatly increase your chances of finding out whether you were exposed EARLY so that you can take necessary precautions to keep your family, friends, and others from also catching the infection.

• These apps would use GPS information from your phone and other people who have the apps to identify everyone that would have been a contact of yours before you received a positive test result.
  • This would shorten the time between you receiving a positive test result and contacts being notified of their exposure
  • It would also identify and notify people who have been exposed that you wouldn’t normally be able to identify through a phone interview with the health department
What about contact tracing apps?

• An example of this is the TraceTogether App used by the Ministry of Health in Singapore.

• Resident’s phones that have the TraceTogether app installed communicate with each other by exchanging proximity information with each other when they come into close contact.

• This information is then stored on your phone, and is only shared with the Ministry of Health when a user who was in close contact with you tests positive for COVID-19.
  • The Ministry of Health would then contact you to schedule testing to determine if you have acquired the infection.
  • Proximity information is deleted after 25 days so that you are only notified about recent contacts, and not ones that test positive months after being in contact.
Contact tracing and testing

• Both robust contact tracing efforts and robust testing are needed in order to fully understand the outbreak and to prevent surges in cases:
  • Contact tracing is effective, but if there isn’t enough testing, then we aren’t able to identify everyone who is sick and figure out who they may have exposed.
  • Testing is effective, but if there isn’t a way to contact people who may have been exposed by infected individuals, then those who were exposed continue to expose others.
  • BOTH are needed to identify who is infected and to prevent further transmission through quarantine and isolation.
## Difference between quarantine and isolation

### Quarantine
- Quarantines are for people or groups who don’t have symptoms but were exposed to the sickness. A quarantine keeps them away from others so they don’t unknowingly infect anyone.

### Isolation
- Reserved for those who are already sick. It keeps infected people away from healthy people to prevent the sickness from spreading.
Follow up after contact tracing

• After someone having COVID-19 is identified and others they have come in contact with them contacted and tested, all potential carriers of the disease need to go into isolation.

• Some countries, like Singapore and Hong Kong, have placed those deemed capable of spreading the disease in government isolation centers. Other countries, like the USA, have called for self-quarantine measures.
  • The latter is often problematic for those living in tight quarters with others.
  • Harvard’s Edmond J. Safra Center for Ethics has estimated that in the USA 14 percent of infected or exposed people would need somewhere to voluntarily isolate outside their residence because they cannot do so safely at home.

• Isolating those with COVID runs up against core cultural values in many cultures related to
  • The responsibility of family members to care for the ill
  • The perception that social isolation contributes to a negative prognosis
  • Fear of a bad death.

• In such cases, culturally appropriate social support needs to be seen as a primary health concern.
Contact tracing may also be retrospective

• Most contact tracing is prospective, but Japan employs a Track–trace-cluster method that is retrospective

• Method based on Japan’s TB program and designed to identify the source of a disease and super spreaders that cause a disease cluster
  • Retrospective detective work involving tracing back and establishing a chain of transmission to patient zero
  • The goal is to investigate activities around multiple cases, to determine the place or person that was the common source of transmission.
  • Then find all the people who came into contact with the source.

• This method differs from most contact tracing which is prospective and tries to identify close contacts to test, and if necessary isolate.
Contact tracing vs community monitoring

- Contact tracing is different than community monitoring.

- In contact tracing, people who may have been exposed are identified by someone who has tested positive for the virus.
  - These people are informed that they may have been exposed (without disclosing the person who tested positive to maintain confidentiality).

- In community monitoring, all individuals in a community are under constant surveillance to identify and isolate people who become sick right away.
Physical distancing

Why is this essential to mitigate COVID-19
Physical Distancing Buys Us Time

• Distancing is currently the only way of slowing down the number of cases and reducing the number of serious cases needing hospitalization.

• Distancing helps prevent healthcare surges - which need to serve not only COVID-19 cases, but a broad range of urgent as well as routine health problems

• Gives suppliers time to make and distribute essential resources needed by health care providers to protect themselves and patients.

• Allows for time to develop:
  • Better clinic and home-based tests for present and past COVID-19 infection.
  • More effective antiviral treatment options, curative and preventative.
  • Vaccine development.
Physical Distancing in the 1918 Pandemic

An important history lesson

The Vital Importance of Social Distancing
How a reduction in social contact can reduce the spread of the coronavirus

<table>
<thead>
<tr>
<th>Normal behaviour</th>
<th>In 5 days</th>
<th>In 30 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Person infects</td>
<td>2.5 people</td>
<td>406 people</td>
</tr>
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</table>

<table>
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<tr>
<th>50% less contact</th>
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<tr>
<td>1 Person infects</td>
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<table>
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<th>75% less contact</th>
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<tr>
<td>1 Person infects</td>
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</table>

Source: Signer Laboratory/Gary Warshaw
Chart 23: Model of Cumulative Cases of Coronavirus with Social Distancing Measures Taken One Day Apart

Cumulative cases

No social distancing

Social distancing one day later (n+21)

Social distancing started on day n+20

+40%!

Number of days

Source: Tomas Pueyo
The difference one week makes

• According to an analysis from Columbia University, the U.S. could have avoided at least 700,000 infections if social distancing measures begun on March 15 had actually started on March 8.

• The study estimated that roughly 36,000 deaths from COVID-19 could have been prevented.
  • Two caveats to this calculation are that
    • Few cases had been identified in the USA the week of March 8, making it difficult to persuade the public to engage in social distancing.
    • The percentage of deaths resulting from total infections is an estimate that would need to take into account patient characteristics and hospital capacity

• In any case, many deaths could have been avoided.
Lessons learned from success stories
Countries controlling COVID-19
Lessons learned from Asian countries doing the best to contain the disease

• What has worked the best in Asia:
  • Early travel restrictions
  • Aggressive testing and screening of contacts
  • Strict quarantine rules
  • Use of social media to get out uniform and consistent messaging
  • Political will to deal with this crises and a clear chain of command

• Which countries:
  • Hong Kong, Singapore, South Korea, Taiwan, Vietnam

➢ What they have in place enabling them to do so
  • Universal healthcare
  • Clear management structures for the public health response
  • Proactive communication protocols to get the population on board
  • Preparedness resulting from experience with containing SARS and other pandemics
Hong Kong and Singapore have limited the spread of coronavirus; S Korea is slowing the rate of infection. Most western countries show a similar trajectory.
Lessons from New Zealand

• Compared to the US, New Zealand took a much stricter approach to reducing the spread of the virus that causes COVID-19.

• When New Zealand only had 6 cases, Prime Minister Jacinda Ardern enacted swift, decisive policies to quarantine any person entering the country and then to restrict all travel into the country altogether.

• In addition to robust tracing and testing, the country provided clear and consistent messaging to its communities as to how to protect themselves and their friends, families, and neighbors (which we have not seen here in the U.S.).

• Because of these efforts, New Zealand has completely stopped local transmission, is reopening businesses, and is in the process of completely eliminating the virus from the country.
How they beat Covid-19

- **Early, common-sense action**
  Don’t wait for “more data” or results from complicated models

- **Isolate away from home**
  Set up facilities to isolate an infected family member away from the rest

- **Strong lockdown**
  Even within the country

- **Strict travel restrictions**
  The stricter these are, the shorter the lockdown

- **Massive testing**
  Face masks for everyone

---

Normalised daily new COVID-19 cases vs time, 18-day average

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Created by Derrick VanGunst, Harvard University.
Data source for Taiwan and Hong Kong: https://www.worldometers.info/coronavirus/
For more information about government measures taken to stop the spread of COVID-19, visit gpec.org.
Guidelines for opening up society
Physical Distancing

- **Persistence is necessary**: ending a lock-down and returning to business too soon will lead to a second surge in cases.

- Experts are considering a potential long-term intervention strategy in the future in which the curve is spread out to keep the curve low so as to avoid overwhelming healthcare capacity.
  - **When the curve appears low**: reduce physical distancing and follow prudent preventive health behavior.
  - **When the curve appears to rise**: return to physical distancing.

- This "lightswitch" approach would need to be carefully monitored with adequate testing and a good surveillance system – something the US does not have at present.
What do we need in order to lift restrictions and re-open states/the country?

• Without an available vaccine or extensively tested treatment, health departments will need to rely on a combination of robust testing, contact tracing, and isolation of identified people with positive COVID-19 swab tests (NOT blood tests) in order to safely lift restrictions.

• Researchers estimate that the US would need to complete 20-30 million PCR (swab) tests daily to completely reopen the economy while also stopping the epidemic in its tracks.
  • With our current testing capacity, this is not possible, so some restrictions and precautions need to stay in place while testing and tracing is expanded.
How many tests do we need to do to lift restrictions and re-open states/the country?

• Both the Harvard Global Health Institute and the Rockefeller Foundation recommend that in the short term the US needs to ramp up PCR (swab) testing to at least 500,000 people a day or 3 million per week, roughly 1% of the population every week.

• What does this mean for your state?
  • This is a national goal. However, depending on the size of the outbreak in each state, they too should reach certain thresholds before completely reopening and lifting all restrictions.
How many people should states be testing?

• Based on current estimates, each person who has tested positive for the virus that causes COVID-19 via PCR (swab) tests exposes on average 10 other people. The World Health Organization recommends that any country/state should be testing enough people so that the ratio of positive PCR (swab) tests to negative tests is less than 10% before removing the restrictions that are currently in place.
  • This number will vary between states because of the differences in size of each state's outbreak.

• This would essentially mean that each state needs to be testing at least 10 other people for each identified positive case (such that all potential contacts have been identified).

• How do you know if your state is testing enough?
Recommended Testing Limits – How are they determined?

• Using methods developed by the Harvard Global Health Institute, the following chart provides an estimate of where we are at nationally and among select states in terms of meeting regional and national testing goals described previously.

• This method utilizes projected death counts from a well-supported and cited model developed by Youyang Gu to estimate the number of cases each state has two weeks prior. This estimated number of “true” cases is then used to determine a minimum number of tests to reach that 10% or less threshold recommended by WHO.

• The following chart will be continually updated to reflect changes in projections and recommended testing thresholds as the epidemic continues.
Which states are meeting the WHO guidelines and which are not?

<table>
<thead>
<tr>
<th>States <strong>meeting</strong> testing recommendations</th>
<th>States <strong>NOT</strong> meeting testing recommendations</th>
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<tr>
<td>• Alaska</td>
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<td>• Wisconsin</td>
<td>• Indiana</td>
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<tr>
<td>• District of Colombia</td>
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</table>
Where are we at currently?

• The US, nationally, is still far below the recommended number of daily PCR (swab) tests needed to safely reopen based on the size and progression of the epidemic we are experiencing.
  • We are still below the recommended 500,000 per day with a 3 day average of ~456,000.
  • Using the less than 10% threshold, the US is doing better, conducting approximately 61% of the daily tests we would need to meet the WHO recommendation.

• In Arizona, we’ve managed to reach 38% of the daily recommended tests on average in order to safely lift restrictions and control the outbreak.
Society is shut down at times of surge to not swamp the health care system

What needs to be in place to reopen society

Gradually
Rational Criteria for loosening COVID-19 Restrictions

When and How to Reopen After COVID-19

COVID-19 PHYSICAL DISTANCING MEASURES CAN BE LOOSENED WHEN ALL OF THE FOLLOWING CRITERIA ARE MET:

<table>
<thead>
<tr>
<th>Epidemiology</th>
<th>Health Care</th>
<th>Public Health</th>
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<tbody>
<tr>
<td>✓ Decreasing cases in the context of increasing testing (or stable testing with decreasing positivity) for at least 14 days</td>
<td>✓ Ability — including staffing — to double number of patients treated in intensive care units from current census</td>
<td>✓ All cases interviewed for contact elucidation</td>
</tr>
<tr>
<td>✓ Decreasing numbers and proportions of cases not linked to a source case (goal less than 3 unlinked cases per 2-week period)</td>
<td>✓ Ability — including staffing — to screen large numbers of symptomatic patients safely (e.g., outdoor tents, drive through)</td>
<td>✓ Contacts isolated for at least 90% of cases</td>
</tr>
<tr>
<td>✓ Steady decrease in ICU in syndromic surveillance for at least 14 days</td>
<td>✓ Sufficient PPE for all health care workers even if cases double</td>
<td>✓ 100% of symptomatic contacts and others with symptoms undergo testing within 12 hours of identification of symptoms</td>
</tr>
<tr>
<td>✓ Decline in deaths for at least 14 days</td>
<td>✓ Sufficient face masks to provide to all patients seeking care even if cases double</td>
<td>✓ Enough hand sanitizer to place at entry and strategically placed in buildings including workplaces</td>
</tr>
<tr>
<td>✓ Decreasing healthcare worker infections such that infections are now rare</td>
<td>✓ More discharges than admissions for COVID-19</td>
<td>✓ Designated facilities for non-hospitalized COVID-infected people who can’t be safely cared for at home (e.g., because of space constraints, homelessness, medically vulnerable household members, or otherwise)</td>
</tr>
</tbody>
</table>

Visit PreventEpidemics.org for more.
Prevent Epidemics is a project of Resolve to Save Lives, an initiative of Vital Strategies.
## Criteria for reopening society over time

**Once the loosen criteria are met, the following actions can happen over time to reopen:**

<table>
<thead>
<tr>
<th>Action</th>
<th>4-6 weeks later if no significant increase in cases and criteria remain met</th>
<th>8-16 weeks later if no significant increase in cases and criteria remain met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash hands often</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Cover coughs</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Don’t go out if ill</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Face mask if ill persons go out</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Surface and object cleaning</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Enhanced ventilation</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Isolation of cases</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Quarantine of contacts of cases</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Physical distancing to 6 feet when possible – avoid crowding</td>
<td>Pause physical distancing</td>
<td>Pause physical distancing</td>
</tr>
<tr>
<td>Stop visits to nursing homes, hospitals, congregate facilities</td>
<td>Continue</td>
<td>Continue</td>
</tr>
<tr>
<td>Ban all gatherings including religious (above 10, 50 people)</td>
<td>Continue - 10</td>
<td>50</td>
</tr>
<tr>
<td>Restaurant closures</td>
<td>Reopen with physical distancing*</td>
<td>Reopen</td>
</tr>
<tr>
<td>Bar closures</td>
<td>Continue</td>
<td>Reopen with physical distancing*</td>
</tr>
<tr>
<td>General business closures</td>
<td>Partial reopening*</td>
<td>Additional phased reopening</td>
</tr>
<tr>
<td>Special situation business closures</td>
<td>Partial reopening*</td>
<td>Reopen</td>
</tr>
<tr>
<td>Post-secondary ed closures</td>
<td>Continue</td>
<td>Consider reopening</td>
</tr>
<tr>
<td>K-12 In-person closures</td>
<td>Reopen*</td>
<td>Reopen</td>
</tr>
<tr>
<td>Day care closures</td>
<td>Reopen*</td>
<td>Reopen</td>
</tr>
<tr>
<td>Quarantine of travelers from high-prevalence areas</td>
<td>Continue, informed by data on spread</td>
<td>Continue, informed by data on spread</td>
</tr>
</tbody>
</table>

*People over age 60, including employees and those who are medically vulnerable continue to shelter in place, including employees. Online education/work encouraged whenever possible.*
Lessons learned from phased reopening of society

• Germany was hard hit by the pandemic. They were one of the most affected countries in the EU and globally along with Italy, the UK and others.
  • Because of their aggressive contact tracing and testing efforts, they achieved a significant enough decline to begin a phased re-opening of their economy.

• Germany is prepared to institute some sort of a “light switch” approach when it comes to controlling their outbreak.
  • Along with their phased reopening, some states are able to lock down at a moment’s notice of increased case counts, as has already occurred in 3 separate regions.
What are Immunity passports and are they a good idea

• Italy has provided a check list that for exiting from lockdown that requires mandatory antibody blood tests as the country seeks to set up a system of “immunity passports” that indicate you have been exposed to the virus and recovered from COVID-19 if you were symptomatic.

• German researchers are considered issuing immunity certificates based on an antibody blood test.

• The UK has also considered immunity bracelets.
Logistical problems in issuing certificates of immunity: here are three

- **Testing issues**: At present, recovery from the illness and the results of serological tests do not reliably guarantee someone is immune.
  - It is unclear whether antibody production due to COVID-19 equals immunity, and people appear to produce different levels of antibodies.
  - We do not know how long protective immunity lasts after infection, or how often one would have to be retested to verify immunity

- **Social issues**: Will certification result in a stigmatization of those who are immune or not immune?
  - It could create a two-tiered workforce where antibody-positive workers might be favored for jobs leading to a perverse incentive for people to contract the virus, particularly millennials who might feel their chances of surviving it are high

- **Political issues**: There may be considerable fallout for undocumented immigrants. If certification requires proof of residency, they might be less likely to test for immunity.
What happens if you relax restrictions and reopen society too early?

A few examples from the USA
Lessons Learned from the 1918 flu

• We know that from a previous respiratory virus pandemic that the timing of easing restrictions if vital to preventing a second wave of cases.

• In cities that maintained non-pharmaceutical interventions (physical distancing, closures, etc), a second wave of cases was not observed.

• In cities that opened prematurely at the start of a decline, saw a second wave of cases that was more severe than the first.
How long does it take to see the possible effects of reopening and events like memorial day celebrations

- Societal factors play into how long it will take for us to see any effect of reopening society.
  - If the public chooses to continue to follow physical distancing, handwashing, and mask wearing recommendations and limiting trips into public for only essential activities (such as grocery shopping, doctors appointments, etc.), then the effect of a premature reopening may not be observed for a longer time.
  - On the other hand, if a proportion of the public rushes out into the community and chooses to disregard these evidence-based recommendations, the likelihood that we will observe an increase in the severity of the outbreak (i.e., a significant increase in the number of new cases and deaths) soon is much greater.
How long will it take to see the possible effects of reopening

• Many US States have allowed their stay-at-home orders to expire and have allowed businesses to reopen and other restrictions to relax.

• **Time is a major contributor.** The fact that it takes on average 4-6 days for someone who gets sick to show symptoms means that there is a delay in when we will be able to see increased transmission.

• This is further complicated by the additional days that a person who is sick waits before getting tested and the couple days it takes to receive results.

• This is all dependent on if a person who is infected shows symptoms. We know from previous studies that roughly 25% of people with the infection don’t show symptoms so they will never know to go get tested.
June 26, 2020

Record surges in Arizona, Florida, Texas, in the last week
June 26th: cases surge to highest levels in several states

- The United States set a record for new covid-19 cases for the third time in three days, passing the 40,000 mark for the first time.
- Thirteen states set their own records for the average number of new cases reported over the past seven days:
  - Arizona, California, Florida, Georgia, Mississippi, Missouri, Oklahoma, South Carolina, Tennessee, Texas, Idaho, Washington and Utah.
- Arizona is facing more per capita cases than recorded by any country in Europe or even more than the confirmed number of cases in hard-hit Brazil.
- Among states with at least 20 people hospitalized for covid-19, the disease caused by the coronavirus, no state has seen its rate of hospitalizations increase more rapidly than Arizona since Memorial Day.
- Six states set new single-day highs, led by Florida with 8,942 cases, more than 60 percent higher than its previous high set on Wednesday.
- Georgia, South Carolina, Tennessee, Idaho and Utah also set new single-day records.
What to do at home to stay safe

Beyond obeying a physical distancing mandate
Wash your hands: learn how and with what

- Standard message: Wash your hands with soap thoroughly for 20 seconds and/or use a greater than 60% alcohol-based hand sanitizer
- *Soap and water is more effective than hand sanitizers*
  - Washing with any water is good, hot water is better –lather up!
  - Washing you hands a lot –apply skin moisturizer so skin does not crack providing a place for virus to lodge
  - Use hand sanitizer when no soap and water alternative
  - Baby wipes are not effective
  - Do not expose your skin to straight bleach solutions or hydrogen peroxide
- Whenever you return home from ANY activity that involves locations where other people have been, wash your hands with soap
- Money exchange is a possible route of transmission
  - Wash hands afterward
  - Do not try to launder money by microwave—it does not work
How & When to Wash your hands

How to wash your hands
- **Wet** your hands with water (warm or cold)
- **Lather** your hands by rubbing them together with the soap. Lather the backs of your hands, between your fingers, and under your nails.
- **Scrub** your hands for at least 20 seconds.
- **Rinse** your hands well under clean, running water.
- **Dry** your hands using a clean towel

When to wash your hands
- **After** returning from a shop or public space
- **Before, during, and after** preparing food
- **Before** eating food
- **After** using the toilet
- **After** changing diapers or cleaning up a child who has used the toilet
- **After** blowing your nose, coughing, or sneezing
How often you hand wash makes a difference in spread of respiratory disease caused by virus

• Frequency of hand washing makes a big difference.
• A study conducted at a military boot camp found that a top-down program of hand washing five times a day cut medical visits for respiratory infections by forty-five percent. Research on the 2002 coronavirus outbreak found that washing hands more than ten times a day reduced people’s infection rate by even more.
• Core message: Wash or sanitize your hands every time you go into and out of a group environment, and every couple of hours while you’re in it, plus disinfect high-touch surfaces often – at the very least daily.
Proper handwashing technique is **thorough**: 
Clean surfaces you routinely touch – or that are touched by others – often

- Counters, door knobs, steering wheel, bathroom
- Cell phones, computer keyboards
- Use appropriate cleaning products (look up approved list cited in notes)****
  - An effective bleach solution can be made by mixing 1/3 cup or 5 Tablespoons per one gallon of water or 4 teaspoons or 20 cc per quart.
- How about ultraviolet light devices?
  - Only type C are effective and only for smooth surfaces (think cell phone or a screen). UV-C penetrates superficially, and the light can’t get into nooks and crannies. It also irritates skin (not to be used on hands or face)
  - It is unclear if the sun can destroy COVID-19. No measurable UV-C light from the sun reaches the earth’s surface
Note of caution about hand sanitizers: check the label about type of alcohol used

Methanol is not an acceptable ingredient for hand sanitizers and should not be used due to its toxic effects

- The FDA notes that “substantial methanol exposure” can result in “permanent blindness, seizures, coma, permanent damage to the nervous system or death.”

9 Hand Sanitizers Subject to FDA Safety Warning

- All-Clean Hand Sanitizer (NDC: 74589-002-01)
- Esk Biochem Hand Sanitizer (NDC: 74589-007-01)
- CleanCare NoGerm Advanced Hand Sanitizer 75% Alcohol (NDC: 74589-008-04)
- Lavar 70 Gel Hand Sanitizer (NDC: 74589-006-01)
- The Good Gel Antibacterial Gel Hand Sanitizer (NDC: 74589-010-10)
- CleanCare NoGerm Advanced Hand Sanitizer 80% Alcohol (NDC: 74589-005-03)
- CleanCare NoGerm Advanced Hand Sanitizer 75% Alcohol (NDC: 74589-009-01)
- CleanCare NoGerm Advanced Hand Sanitizer 80% Alcohol (NDC: 74589-003-01)
- Saniderm Advanced Hand Sanitizer (NDC: 74589-001-01)
How about doing laundry if I suspect that I or a family member has COVID-19?

• If you’re caring for someone in the house who is sick or you’re cleaning the clothes of a family member who may have been exposed to the coronavirus, consider those clothes contaminated and keep them in a separate laundry bin until it’s time to do the wash.5
  • Place a washable or disposable liner in that laundry bin so that you can either launder it or throw it away after you remove the dirty clothes.
  • Use gloves when handling clothes and/or wash hands immediately after
• Wash contaminated clothes and linens as usual, but “launder items using the warmest appropriate water setting for the items and dry items completely”5

• Bleach may help inactivate viral microbes in the wash6
  • For whites and light colors could add bleach to the load
  • For colors, could use detergent that contains color-safe bleach if appropriate for fabric
• Dryers may be better than hanging the clothes to dry because the heat may also help inactivate any viral microbes. Dry fabrics are less likely to transfer germs than wet ones.
• Clean surfaces of washing machine and the laundry bin with bleach or other household disinfectant after you’ve removed the dirty clothes.
Handwashing and cleaning surfaces are important

But

The vast majority of cases are contracted through being exposed to air borne droplets
The reason for physical distancing of a least 6 feet ****
In terms of the spread of COVID-19

The major risk factors are:

• Close-up, person-to-person interactions for extended periods.

• Crowded events.

• Poorly ventilated areas.

• Places where people are breathing heavy, talking loudly, or singing.
Physical Distancing

• The CDC recommends at least 6 feet of distance between individuals to prevent the spread of viral particles from one person to another

• Every time we breathe, speak, or exhale in a similar fashion, droplets leave our mouths. COVID-19 is transmitted through these droplets
  • Larger droplets may fall quickly to the ground
  • Smaller droplets may linger in the air

• This distance may depend on factors such as location and activities
  • Mask wearing behavior
  • Population density within an area
    • Areas with poor circulation may warrant distances further than 6 feet
  • Physical activity/exercise
When to mask

- Mask wearing makes precautionary sense, especially in high risk circumstances.
- Wearing a mask will probably make little difference if you’re just walking or biking around town away from high concentrations of people.
- If you are likely to be in close contact with someone infected, a mask cuts the chance of the disease being passed on.
  - Masks are highly recommended for family members who need to care for someone who is ill – ideally both the patient and caretaker should have a mask.
- Wearing a mask may prevent touching of nose and mouth in public
- If you’re showing symptoms of coronavirus, or have been diagnosed, wearing a mask protects others.
- If you are >65, especially if vulnerable due to a precondition, wearing a mask when in public is warranted.
Mask wearing

- If you are asymptomatic and contagious, masks reduce the spread of disease.
- Currently, the CDC recommends homemade masks when entering potentially crowded areas, shops, etc.
- If your work in essential industries exposes you to people in close quarters, wear a mask.
If I decide to wear a home made mask, what material is most effective?

- Double layers: Overall, double layers do not help much. The double-layer pillowcase captured 1% more particles, and the double-layer shirt captured just 2% more particles.

- Looking at the data, the dish towel and vacuum cleaner bag were the top-performing materials.

- However, the researchers chose the pillowcase and the 100% cotton t-shirt as the best materials for DIY masks due to breathability.

- These materials filter out approximately 50% of 0.2 micron particles, similar in size to the coronavirus.
Mask effectiveness before and after 3 hours

After being worn for 3 hours, homemade mask captured 5% more particles

- Dish Towel: 63.0% before, 68.8% after
- Surgical Mask: 77.7% before, 78.1% after
- N95 Mask: 99.1% before, 98.2% after

References:
Open-data tests: Smart Air smartairfilters.com
How about washing masks and reusing them?

- **Surgical masks:** Avoid washing or sterilizing any part of surgical masks using water, alcohol, dish-washing solution, hand wash, soap or any kind of detergent.
  - If outer and inner layer of the surgical mask is damaged, it loses its filtration and water-resistant functions.

- **N95 masks:** Washing these masks with soap and water is much worse than natural “aging.”
  - Washing decreases particle capture by 21%. Cleaning with rubbing alcohol reduced effectiveness by 37%

- **Homemade Masks:** Wear them, wash your hands after taking them off, and wash them properly
  - You should not reuse a homemade mask without washing it first
  - Recommend making multiple homemade masks and rotating them

- **When taking off masks at home:**
  - If a **disposable** mask, take off mask using ear loops, pull away from face, and discard in a lidded trash can
  - If using a **homemade** mask, remove mask using ear loops, pull away from face, and put place in separate laundry bin
  - **Wash hands immediately using soap and water**
Caution when wearing homemade masks

• If you wear a mask, then you must know how to use it and dispose/clean it properly.
• If used incorrectly, the mask may end up contaminating you.

Three common mistakes:
• Less diligence complying with physical distancing recommendations when wearing a mask
  • 6-feet social distancing is still important even with a mask
• Touching your mask and then your face often.
  • Masks are uncomfortable and people adjust them and take them on and off frequently. This may expose you to the virus more as you touch your contaminated mask and face more often.
• In the process of trying to clean a mask, you may contaminate yourself and your home.
Wearing masks is symbolic

• **Civic responsibility:** In Asia, wearing a mask is not seen as just a means of protecting yourself from getting infected, but also seen as an act that minimizes the chance of infecting others with a potential infection harboring in your body
  • This is a sign of health citizenship*

• **If all people wear a mask there is no stigma associated with wearing a mask**
  • In this case, it does not signal that you are a “dangerous other”
  • It rather indicates you are a responsible other
  • Aside from places like Japan, the Czech republic instituted a policy of all citizens wearing masks as a control measure. Both the symbolic and epidemiological significance of this act are noteworthy.
    • In just 10 days, the country went from no mask usage to nearly 100 percent usage, with nearly all the masks made at home with easily accessible materials, like old t-shirts.**

• **Unfortunately, in the USA some “conservative” leaders are attempting to associate the wearing of masks with a loss of freedom and liberty, instead of civic responsibility and health citizenship.**
Surgical vs. N95 masks

• N95 masks are to protect YOU from the secretions of others, and the surgical mask is to protect others FROM you.

• Although surgical masks are in widespread use by the general population, there is no evidence that these masks prevent the acquisition of COVID-19, although they might slightly reduce the spread from an infected patient breathing in your face.

• A well-conducted, large, cluster randomized trial, undertaken largely in US primary care settings, did not identify a meaningful benefit from N95 respirators when compared to surgical masks for the prevention of influenza among staff.**

• N95 masks are most needed by those in hospital settings and are in short supply.
Masks are in short supply for health care workers

- Do not stockpile N95 masks
- Conserve them so those who work in health care settings have adequate protection until the supply is plentiful
Protection against COVID-19 entails doing several things in concert. Mask wearing must be used in combination with other forms of protection and not be seen as a panacea

• An apt analogy may be drawn from road safety
  - Air bags reduce the risk of dying by about 30-40%.
  - When added together with seatbelts, they are synergistic and reduce risk together by 65-70%.
  - We add licensing, speed limits, anti-lock brakes, police enforcement, and other things to achieve very good risk reduction (well into the upper 90s).
  - We need to be even more careful when we drive in more dangerous situations, such as in a snowstorm.

• Protecting yourself (and society) from COVID-19 works exactly the same way: mask + physical distance + lockdown during the surge
How about wearing gloves?

• Unless you're a health-care worker or, say, a cook with a cut on your hands, it is not recommended that the general public wear gloves.
  • Experts say that gloves don't make sense for most people to wear

• Using your ungloved hands – and then washing them often – is the best bet for the typical tasks of everyday life.

• Wearing gloves might cause you to practice worse hand hygiene because you keep wearing the now-dirty gloves instead of washing your hands.

• Gloves are only useful when you use them and take them off the right way and in a meaningful way.
  • Many people who take off their gloves actually contaminate their hands with whatever was on the gloves
Food or food packaging has not been identified as a risk factor for COVID-19 transmission

• Currently there is no evidence to support transmission of COVID-19 associated with food (food itself—not packaging or handling)

• There is likely very low risk of spread from food products or packaging that are shipped over a period of days or weeks at ambient, refrigerated, or frozen temperatures.

• Your biggest risk, especially if you are ordering takeout, is most like the person who delivers your food.
  • physical distancing should still be in place, even if contact is brief.
    Wash hands before eating

• There is also no evidence to support transmission of COVID-19 associated with imported goods and there have not been any cases of COVID-19 in the United States associated with imported goods.
Do not engage in diagnosis by treatment

- Do not take leftover antibiotics you have at home to see if your respiratory illness is bacterial or viral.
- This may alter your microbiome, effect your immunity, and render you more susceptible to a more severe form of COVID-19.
- The intestinal microbiota influences the balance between pro-inflammatory and regulatory responses and shapes the host’s immune system.
I have heard that medication X might be an effective treatment

• Do not listen to anyone advocating treatment for COVID-19 not qualified to do so!

• Drug side effects and drug interactions have to be taken into account when prescribing medication as well as the health status of those taking them.

• When it comes to medicine prescription, the devil is in the details:
  • Who should/should not take X medication
  • In combination with/without other medications
  • When
  • What dosage

• Do not inject disinfectants or expose yourself to UV-C light; these can cause severe injury and will not treat COVID-19
Case-in-point:

Fearing coronavirus, Arizona man dies after taking a form of chloroquine used to treat aquariums

By Theresa Weldrop, Dave Altsap and Elliott C. McLaughlin, CNN

1 Updated: 12:50 PM ET, Wed March 25, 2020

(CNN) — A Phoenix area man is dead and his wife is under critical care after the two took chloroquine phosphate in an apparent attempt to self-medicate for the novel coronavirus, according to hospital system Banner Health.

Hydroxychloroquine and chloroquine have not been shown to be safe and effective for treating or preventing COVID-19. They are being studied in clinical trials for COVID-19, and we authorized their temporary use during the COVID-19 pandemic for treatment of the virus in hospitalized patients when clinical trials are not available, or participation is not feasible, through an Emergency Use Authorization (EUA). The medicines being used under the hydroxychloroquine/chloroquine EUA are supplied from the Strategic National Stockpile, the national repository of critical medical supplies to be used during public health emergencies. This safety communication reminds physicians and the public of risk information set out in the hydroxychloroquine and chloroquine healthcare provider fact sheets that were required by the EUA.

Hydroxychloroquine and chloroquine can cause abnormal heart rhythms such as QT interval prolongation and a dangerously rapid heart rate called ventricular tachycardia. These risks may increase when these medicines are combined with other medicines known to prolong the QT interval, including the antibiotic azithromycin, which is also being used in some COVID-19 patients without FDA approval for this condition. Patients who also have other health issues such as heart and kidney disease are likely to be at increased risk of these heart problems when receiving these medicines.


Get a “flu” buddy and prepare your home

• Get a flu buddy (aka “pandemic pal”) and make back-up plans for care of children, pets, and those in need of special assistance

• Prepare a hot zone in your home just in case someone falls ill

• Stock up on essential foods and medicines, etc.
Young Kids and COVID-19 spread

• Data from the epidemic in China: kids get infected at the same rate as the population average
• Kids are less likely to get severely sick than adults, but are just as contagious
• Parents and grandparents can get very sick from children
  • Limit contact with *grandparents > 60 years of age, especially if suffering from a chronic disease like diabetes or respiratory problems or if a smoker
• Play: Form a small playgroup and play outside. Adults should stand > 6 feet away from children other than their own
  • Don’t go into each other’s homes
  • Playgrounds: COVID-19 virus can live on surfaces for hours or days in a laboratory environment, but there are no data that I am currently aware of regarding survival of the virus on playground equipment.
Why schools have to be closed
What if I suspect my child has COVID-19?

• If you think symptoms are serious enough to see a doctor, call your doctor
• If your child has the virus, clinicians will provide supportive care to children with COVID-19
• No special antiviral drugs have been approved for treatment
I have COVID-19 symptoms and am concerned I might have COVID-19?

- **Call ahead to your doctor or emergency care facility. Do not walk in or you risk other lives.**
  - Waiting rooms are often full of older patients with heart disease, cancer, and other conditions for whom the coronavirus could be fatal
  - Confirm with your doctor/health provider that your symptoms are consistent with COVID-19
    - Are your symptoms related to allergies? common cold? flu?
- **Common symptoms of COVID-19 from the CDC**
  - Cough
  - Shortness of breath/difficulty breathing
  - Fever
  - Chills
  - Muscle pain
  - Sore throat
  - New loss of taste/smell

- If symptoms are not severe you will be given instructions on how to self-treat at home and monitor your symptoms, and if a test is necessary and available at the time of assessment by phone.
Danger signs of COVID-19

• When to seek emergency medical attention\(^{13}\) (symptoms of coronavirus):
  • Trouble breathing
  • Persistent pain/pressure in chest
  • New confusion
  • Inability to wake or stay awake
  • Bluish lips or face

• When seeking medical attention: call first.
  • Call your doctor or emergency room before going in and tell them your symptoms. They will tell you what to do.

• Wear a facemask: If available, put on a facemask before you enter the health care facility.

• Try to stay at least 6 feet away from other people in the waiting room.
What does COVID-19 do to the lungs?

• Covid-19 often begins as an upper respiratory tract infection.
• Among some, the virus travels down the throat and enters the lower respiratory tract.
• If that happens, the virus damages the lung’s tiny air sacs — alveoli — where oxygen enters the blood and carbon dioxide leaves.
• Inflammatory cells and fluid then render the alveoli unable to do their job. This makes it more difficult for oxygen to travel from the lungs into the bloodstream starving bodily organs (causing acute respiratory distress syndrome)
• When this becomes an acute condition one has to be placed on a ventilator. The ventilator is not a treatment to heal damaged lungs; it gives the lungs a longer time to recover on their own.
Given that COVID-10 affects the lungs, should I be monitoring my oxygen level if I feel ill

- Yes, it is a good idea. A simple finger insert pulse oximeter allows you to do this at home and the devise is not costly.

- Notably, people may have silent hypoxia long before they complain of difficulty breathing and think of seeking medical care. Silent hypoxia occurs with COVID-19.

- When you have hypoxia, you compensate for the low oxygen in your blood by breathing faster and deeper: classic signs of pneumonia
  - The body’s physiological response is inflammation as more and more air sacs collapse and the pneumonia worsens until oxygen levels plummet.
  - Fluid builds up and the lungs become stiff, carbon dioxide rises, and patients develop acute respiratory failure.

- One doctor has described what happens in this way*
  - Pneumonia is an infection of the lungs in which the air sacs fill with fluid or pus. Normally, patients develop chest discomfort, pain with breathing and other breathing problems. But when COVID pneumonia first strikes, patients don’t feel short of breath, even as their oxygen levels fall. And by the time they do, they have alarmingly low oxygen levels and moderate-to-severe pneumonia.
Smoking and COVID-19

• To date, no study has reported on current smoking as a major risk factor for COVID-19

However

SMOKING MAKES COVID-19 SYMPTOMS MORE SEVERE

• In a study of patients admitted to the hospital due to pneumonia caused by COVID-19, it was found that current and former smokers were significantly less likely to improve over time.
• Instead, the disease was 14 times more likely to progress to the point where the patients required intensive respiratory assistance.
• The connection between smoking history and adverse pneumonia treatment outcomes and/or death are well established, which bolsters the observations that current or former smokers are at a far greater risk of severe respiratory outcomes once the virus is contracted.
What else can I do if I feel I am “coming down with something”

• There are additional measures that **may reduce** the risk of infection and the severity of viral respiratory diseases in general:
  • *Care for your throat and engage in practices that support the self-cleaning powers of the respiratory tract*. Gargling with salt water or antiviral mouthwash, steam inhalations.
  • Vitamin D has been previously shown to support general immune health
    • *This does NOT mean that Vitamin D can be used to treat COVID-19, simply that Vitamin D has immuno-supportive effects*
  • Zinc supplements **may reduce the duration of respiratory illness**
    • They are available in capsule, tablet, and lozenge form. One review of seven studies showed that zinc lozenges containing 80-92mg of zinc may reduce common cold duration by up to 33%. Zinc-containing nasal sprays, however, should be avoided.***
Should I get a seasonal flu vaccine if I have not done so? Yes, for three good reasons!

• It is possible to get the “flu” and COVID-19 at the same time and this would increase the severity of your illness.

• As the coronavirus continues to spread across the country, doctors say it's more important than ever to build up herd immunity for other strains of “flu.”
  • This protects the elderly and other vulnerable people.

• It is very important to protect yourself from influenza virus and not put more pressure on the health system with the impending cases of coronavirus.
  • The last thing they need is this double burden.
How about pets, can they catch or pass on the virus

• Previous studies of SARS found that cats can be infected and pass it on to other cats. But there was no indication during the SARS pandemic that SARS-CoV became widespread in house cats or was transmitted from cats to humans.

• COVID-19 can be passed onto cats, but there is not data suggesting it can be passed on from cats to humans.

• It is possible for humans to pass the virus onto their cats.
  • The US Centers for Disease Control and Prevention recommends that people with COVID-19 limit contact with their pets, including avoiding stroking them, being licked and sharing food.

• Do not wash your pets with caustic solutions of bleach, etc.
Re-entry

When restrictions are relaxed or lifted
Ending the lockdown and opening up businesses does not mean returning to life as usual

• The same precautions need be followed.
• This is not a time to relax one’s preventive health practices.
• Herd immunity is no where near reached.
• The new normal is a safe normal.
### Social activities and levels of risk

<table>
<thead>
<tr>
<th>HOME ALONE OR WITH HOUSEMATES</th>
<th>OUTDOOR ACTIVITIES</th>
<th>OUTDOOR GATHERINGS</th>
<th>INDOOR GATHERINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOWEST RISK</strong></td>
<td><strong>MODERATE RISK</strong></td>
<td><strong>HIGHER RISK</strong></td>
<td><strong>HIGHEST RISK</strong></td>
</tr>
<tr>
<td>Stay home as much as possible.</td>
<td>Wash your hands and don't touch your face.</td>
<td>Wash your hands and don't touch your face.</td>
<td>Wash your hands and don't touch your face.</td>
</tr>
<tr>
<td>Try to allow only people you live with into your home.</td>
<td>Stay at least 6 feet from people you don't live with.</td>
<td>Stay at least 6 feet from people you don't live with.</td>
<td>Stay at least 6 feet from people you don't live with.</td>
</tr>
<tr>
<td>Wash your hands.</td>
<td>Wear a mask.</td>
<td>Wear a mask.</td>
<td>Wear a mask.</td>
</tr>
<tr>
<td>If you're sick, stay home and isolate from housemates.</td>
<td>Avoid shared surfaces, like swings or benches.</td>
<td>Don't share food, toys, and other items, and avoid shared surfaces.</td>
<td>Don't share food, toys, and other items, and avoid shared surfaces.</td>
</tr>
<tr>
<td>Participate in events like these infrequently.</td>
<td></td>
<td>Participate in events like these infrequently.</td>
<td>Participate in events like these infrequently.</td>
</tr>
</tbody>
</table>

Adapted from Julia Marcus, Harvard, and Eleanor Murray, Boston University
**Transportation safety**

- **Practice hand hygiene and respiratory etiquette.**
  - Before you leave, *wash your hands* with soap and water for at least 20 seconds or use hand sanitizer with at least 60% alcohol.
  - Once you reach your destination, *wash your hands again* with soap and water for at least 20 seconds or use hand sanitizer.
  - Avoid touching your eyes, nose, and mouth with unwashed hands.
  - Cover your coughs and sneezes with a tissue or use the inside of your elbow. Throw used tissues in the trash and wash your hands immediately.
  - **Practice social distancing.**

- **During travel,** try to keep at least 6 feet (2 meters) from people who are not in your household — for example, when you are waiting at a bus station or selecting seats on a train.

- **Wear cloth face coverings.**
  - Wear a *cloth face covering* when physical distancing is difficult.
  - **Note:** Cloth face coverings should **not** be placed on:
    - Babies and children younger than 2 years old
    - Anyone who has trouble breathing or is unconscious
    - Anyone who is incapacitated or otherwise unable to remove the cloth face covering without assistance

  - Cloth face coverings are meant to protect other people in case the wearer is unknowingly infected but does not have symptoms.
Airplane travel

**How to reduce risk?**

• A window seat may reduce risk as you will have fewer people in a 6-foot radius around you.

• Bring wipes to disinfect anything you may need to touch.

• Check with airline ahead of time for sanitizing and distancing policies

• Wear a mask and bring hand sanitizer

• Some experts think using the air conditioning nozzle above your seat is an effective way to reduce your risk of infection
Restaurant risk

• The more an individual interacts with others, and the longer that interaction, the higher the risk of COVID-19 spread. The risk of COVID-19 spread increases in a restaurant or bar setting as follows:

• **Lowest Risk:** Food service limited to drive-through, delivery, take-out, and curb-side pick up.

• **More Risk:** Drive-through, delivery, take-out, and curb-side pick up emphasized. On-site dining limited to outdoor seating. Seating capacity reduced to allow tables to be spaced at least 6 feet apart.

• **Even More Risk:** On-site dining with both indoor and outdoor seating. Seating capacity reduced to allow tables to be spaced at least 6 feet apart.

• **Highest Risk:** On-site dining with both indoor and outdoor seating. Seating capacity **not** reduced and tables **not** spaced at least 6 feet apart.
Now that you are out and about

Toilet safety

- When out and about or at work, the safest toilets are toilets with the least traffic, fewest occupants at one time, and greatest distance between people at stalls and sinks.
- Public restrooms are confined, high-traffic spaces that no doubt will contribute to the transmission of coronavirus.
- Wear a mask when in a toilet (especially one with high traffic/heavy usage)
- Wash hands (or use hand sanitizer) after using a toilet.
  - Common sense, but studies have found that a majority of people do not, in fact, wash their hands after using a toilet.
- Wash hands when changing a baby, don’t just use a wet wipe as these are not sanitizers.
Toilet safety

- Viral RNA is detectable in fecal samples from cases of COVID-19, indicating that the virus sheds into the stool.
  - Viral gastrointestinal infection and potential fecal-oral transmission can last even after viral clearance from the respiratory tract.
- Whether or not fecal-oral transmission of COVID-19 is common requires additional investigation.
  - At the moment, research indicates that the virus is being shed in feces, leading some to argue that the presence of virus in the sewer system is a marker of its presence in a population.
- To reduce the chance of dangerous toilet plume, virus, and bacteria escaping from the toilet into the air, always close the lid of the toilet (if available) and then flush.
  - 80% of particles that escape from fecal matter into the air can be prevented by closing the lid of a toilet when flushing.
Toilet safety : hand dryers

• Researchers at the University of Connecticut and Quinnipiac University in 2018 confirmed suspicions that hand dryers inhale bacteria from the air and deposit them on your freshly washed hands.
  • Petri dishes exposed to bathroom air for two minutes, hand dryers off, grew no more than one colony of bacteria. Petri dishes exposed to hot hand-dryer air for 30 seconds grew up to 254 colonies of bacteria.

• Use touchless paper-towel dispensers wherever possible

• On your way out, after drying your hands, use a fresh paper towel to open the restroom door.
Personal notes

Reflections
Role of educators in the time of COVID-19
Role of Health social scientists and invitation to join a COVID-19 collective
Personal Notes

• We need to get past fear-based messaging to community-based messaging and messaging that appeals to our sense of global as well as local health citizenship.

• COVID-19 needs to be treated as a family and community disease – if it is, the pandemic will be controlled faster – We learned this with Ebola. We need to provide those who need to self-quarantine with the resources to enable them to do so.

• We need to get into the weeds with a “devil in the details” approach to keeping ourselves safe.

• **Above all else: stay put, cocoon**

• “Social distancing” does not mean social disconnection – this is a time for community building, not social isolation at the personal or country level. We are in this together.
This is a test of family and cultural values as well as political responsibility.

- It is also a time for thinking about serious health care reform and the need for safety nets enabling public health recommendations to be implemented quickly by the average citizen and sustained economic support during the crises for all, especially the most vulnerable

- We must be prepared for periodic pandemic and reemerging disease threats. They are really not all that uncommon!!!!

- Pandemics need to be considered in stages: preparedness-response-recovery
This is not a one time unforeseen pandemic—we need to invest in preparedness and rapid response systems. We must be prepared for a future in which emerging and re-emerging diseases are expected.
It is important to think about the impact of COVID-19 in terms of a larger health care footprint.
Your responsibility as a university professor

• Aside from staying safe yourself, making sure your students are not compelled to be in spaces where they are going to be exposed
  • For example, university students without internet who may go to coffee shops to get online
  • Provisions for them to get internet to complete classes
• Educating youth about why their physical distancing is so important to containing this disease and preventing the swamping of our health care system which is ill prepared for a large surge
  • Making this an ethical and citizenship issue
• Dispelling the impression that “youth will only get a mild case with flu-like symptoms which is no big deal”
  • Note: More young people are being admitted to hospital in Italy with coronavirus, as the outbreak continues…this follows a first wave of the elderly being hit hard
As an engaged anthropologist what can you do

Action items: here are a few examples

• Social determinants of health: Beyond looking at rates of disease by group, consider the ability of specific groups in specific home, community, and work environments to adhere to public health physical distancing guidelines
  • Identify constraints and opportunities for reducing risk
    • What may be done to reduce risk of contagion that is feasible
    • What resources would make a big difference
    • Move the discussion from groups at risk and risky behaviors to environments of risk***

• Identify what information sticks and does not stick given all that is out there and changing on a day by day basis – Participate in translational research efforts and identifying/supporting local spokespeople who are trusted and can act as filters of information
As an engaged anthropologist what can you do

- Remind everyone that the household is an important unit of analysis: **the families of both the ill and health care providers** whose families themselves may be seen as dangerous to interact with and be indirectly stigmatized.

- **Consider opportunities for social connection and support** for different types of people at this time of high risk contagion so **physical distancing does not become social isolation over what is likely to be a several month social isolation trajectory**.

- Document “what if” scenarios as a means of getting people to engage in anticipatory problem solving.
  - For example, given different contexts, what would you do if you live alone and fall ill—how would you get resources?
  - What would you do if your children or grandchildren fell ill?
  - Given X means of employment, what is the best ways of protecting yourself while getting to work and while at work, and so on.

- **Work with your community to get out practical scenario driven advice.**
For working lists of engaged health social science research priorities and join a crowd source collective

See

Arhe.medanthro.net
MedanthCovid-19.org
AAA communities platform

https://www.facebook.com/groups/128678891021711/
Concerns

✓ Youth will blow this illness off and not social isolate
✓ Elders will not self isolate because they want to be close to their families and grandchildren
✓ People will try and escape hot spots by leaving and going to other “safer” places or places with better medical care and thus spread the illness
✓ Confusing and contradictory messages by political leaders will lead to confusion and distrust of messages at a time when transparency and evidence based problem solving is needed
✓ Malicious messages mislead the public, undermines trust, and fosters epidemic fear
Survey data

Supports my concerns
Targeted misinformation and disinformation by Trolls and Bots as a form of bioterrorism

The Online Coronavirus Threat
Known coronavirus-related malicious online threats, by type*

- Malicious spam emails: 199,379
- Malicious files: 81,315
- Malicious URLs: 22,767

* Threats detected from January 1 to March 27, 2020.
Source: Trend Micro

The Countries Targeted Most by Malicious Coronavirus Spam
Countries targeted by largest share of global malicious spam emails with 'coronavirus' in the subject

- United Kingdom: 20.8%
- France: 11.5%
- United States: 8.2%
- Italy: 5.9%
- Belgium: 5.2%
- Germany: 5.1%
- India: 4.9%
- Netherlands: 3.5%

* January 1 to March 27, 2020.
Source: Trend Micro
Political partisanship may be our undoing if it undermines public health dictates. Will reason prevail?

<table>
<thead>
<tr>
<th></th>
<th>Democrats</th>
<th>Republicans</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FAMILY WORRIES</strong></td>
<td>68%</td>
<td>40%</td>
</tr>
<tr>
<td><strong>AVOID GATHERINGS</strong></td>
<td>61%</td>
<td>30%</td>
</tr>
<tr>
<td><strong>TRAVEL PLANS</strong></td>
<td>47%</td>
<td>23%</td>
</tr>
<tr>
<td><strong>RESTAURANTS</strong></td>
<td>36%</td>
<td>12%</td>
</tr>
</tbody>
</table>

**Figure 3**

Majorities Across Partisans Say Shelter-In-Place Measures Are Worth It To Protect People

Which comes closer to your view:

- Strict shelter-in-place measures are worth it in order to protect people and limit the spread of coronavirus
- Strict shelter-in-place measures are placing unnecessary burdens on people and the economy and are causing more harm than good

<table>
<thead>
<tr>
<th></th>
<th>Democrats</th>
<th>Independents</th>
<th>Republicans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>80%</td>
<td>84%</td>
<td>61%</td>
</tr>
<tr>
<td>19%</td>
<td>5%</td>
<td>16%</td>
<td>38%</td>
</tr>
</tbody>
</table>

### Degree of concern about coronavirus continues to vary across age, income, racial and ethnic groups

<table>
<thead>
<tr>
<th></th>
<th>Will get COVID-19 and require hospitalization</th>
<th>Might unknowingly spread COVID-19 to others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
<td>Somewhat</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>64</td>
<td>62</td>
</tr>
<tr>
<td>White</td>
<td>51</td>
<td>51</td>
</tr>
<tr>
<td>Black</td>
<td>39</td>
<td>63</td>
</tr>
<tr>
<td>Hispanic</td>
<td>46</td>
<td>73</td>
</tr>
<tr>
<td>Ages 18-29</td>
<td>23</td>
<td>46</td>
</tr>
<tr>
<td>30-49</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>50-64</td>
<td>23</td>
<td>53</td>
</tr>
<tr>
<td>65+</td>
<td>22</td>
<td>54</td>
</tr>
<tr>
<td>Upper income</td>
<td>14</td>
<td>46</td>
</tr>
<tr>
<td>Middle income</td>
<td>19</td>
<td>48</td>
</tr>
<tr>
<td>Lower income</td>
<td>36</td>
<td>57</td>
</tr>
<tr>
<td>Rep/Lean Rep</td>
<td>13</td>
<td>35</td>
</tr>
<tr>
<td>Cons</td>
<td>12</td>
<td>51</td>
</tr>
<tr>
<td>Mod/Lib</td>
<td>20</td>
<td>45</td>
</tr>
<tr>
<td>Dem/Lean Dem</td>
<td>32</td>
<td>64</td>
</tr>
<tr>
<td>Cons/Mod</td>
<td>34</td>
<td>65</td>
</tr>
<tr>
<td>Lib</td>
<td>29</td>
<td>61</td>
</tr>
</tbody>
</table>

**Notes:** Whites and blacks include only those who are not Hispanic; Hispanics are of any race. Family incomes are based on 2018 earnings and adjusted for differences in purchasing power by geographic region and for household size. Source: Survey of U.S. adults conducted June 16-22, 2020.

**PEW RESEARCH CENTER**

### Partisan, racial gaps in concerns about the pandemic have grown since April

<table>
<thead>
<tr>
<th></th>
<th>Will get COVID-19 and require hospitalization</th>
<th>Might unknowingly spread COVID-19 to others</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dem/Lean Dem</td>
<td>Total</td>
</tr>
<tr>
<td>April</td>
<td>47</td>
<td>64</td>
</tr>
<tr>
<td>June</td>
<td>51</td>
<td>62</td>
</tr>
</tbody>
</table>

**Note:** Whites and blacks include only those who are not Hispanic; Hispanics are of any race. Source: Survey of U.S. adults conducted June 16-22, 2020.

**PEW RESEARCH CENTER**
Most U.S. adults say individual actions affect spread of the virus a great deal

% who say the actions of ordinary Americans affect how the coronavirus spreads in the U.S. a great deal

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>59</td>
</tr>
<tr>
<td>White</td>
<td>58</td>
</tr>
<tr>
<td>Black</td>
<td>62</td>
</tr>
<tr>
<td>Hispanic</td>
<td>61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 18-29</td>
<td>52</td>
</tr>
<tr>
<td>30-49</td>
<td>59</td>
</tr>
<tr>
<td>50-64</td>
<td>61</td>
</tr>
<tr>
<td>65+</td>
<td>63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgrad</td>
<td>71</td>
</tr>
<tr>
<td>College grad</td>
<td>67</td>
</tr>
<tr>
<td>Some college</td>
<td>59</td>
</tr>
<tr>
<td>HS or less</td>
<td>61</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Political</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rep/Lean Rep</td>
<td>29</td>
</tr>
<tr>
<td>Dem/Lean Dem</td>
<td>63</td>
</tr>
</tbody>
</table>

Note: Whites and blacks include only those who are not Hispanic; Hispanics are of any race.

PEW RESEARCH CENTER
### Majorities Willing To Share Test Results Using Smart Phone App

If you were tested for coronavirus, would you be **willing** or **unwilling** to use an app for your phone to share the results with public health officials in order for them to track the spread of the outbreak?

<table>
<thead>
<tr>
<th></th>
<th>Willing (68%)</th>
<th>Unwilling (29%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Democrats</td>
<td>81%</td>
<td>17%</td>
</tr>
<tr>
<td>Independents</td>
<td>69%</td>
<td>27%</td>
</tr>
<tr>
<td>Republicans</td>
<td>57%</td>
<td>41%</td>
</tr>
<tr>
<td>18-29 year olds</td>
<td>78%</td>
<td>19%</td>
</tr>
<tr>
<td>30-49 year olds</td>
<td>71%</td>
<td>28%</td>
</tr>
<tr>
<td>50-64 year olds</td>
<td>62%</td>
<td>35%</td>
</tr>
<tr>
<td>65+ year olds</td>
<td>63%</td>
<td>33%</td>
</tr>
</tbody>
</table>

**SOURCE:** KFF Health Tracking Poll (conducted April 15-20, 2020). See topline for full question wording.
Hope is a good thing. But wishful thinking is not an antidote to Covid-19. Better to error on the side of caution and prepare for a next possible wave, than drown in the undertow.
Majority of Republicans now say ‘the worst is behind us’ in coronavirus outbreak

% who say, in thinking about the problems the country is facing from the coronavirus outbreak, the worst is ...

Note: No answer responses not shown.
Growing gap between white and black adults in views of whether the worst of the pandemic is still to come

% who say, in thinking about the problems the country is facing from the coronavirus outbreak, the worst is still to come

<table>
<thead>
<tr>
<th></th>
<th>April</th>
<th>June</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dem/Lean Dem</td>
<td>87</td>
<td>76</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>59</td>
</tr>
<tr>
<td>Rep/Lean Rep</td>
<td>56</td>
<td>38</td>
</tr>
<tr>
<td>Black</td>
<td>79</td>
<td>71</td>
</tr>
<tr>
<td>Hispanic</td>
<td>77</td>
<td>70</td>
</tr>
<tr>
<td>Lower income</td>
<td>77</td>
<td>69</td>
</tr>
<tr>
<td>Upper income</td>
<td>72</td>
<td>69</td>
</tr>
</tbody>
</table>

Note: Whites and blacks include only those who are not Hispanic; Hispanics are of any race. Source: Survey of U.S. adults conducted June 16-22, 2020.

PEW RESEARCH CENTER
Perceptions do not match reality

COVID-19 fatigue leads many people to want to believe the disease is running its course when it is actually steadily increasing or re-emerging. As a result of early reopening of society too soon or becoming lax in physical distancing and the wearing of masks etc., this could be Arizona.
The United states does not have a homogenous “Culture of health”
Disputes over relaxing restrictions are likely to index other cultural and political divides

### Americans Divided on Return to Normal Life

% of respondents who’d return to normal day-to-day activities “right now” without government restrictions

<table>
<thead>
<tr>
<th>Party</th>
<th>Apr. 2-6</th>
<th>Apr. 20-26</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dem</td>
<td>4%</td>
<td></td>
</tr>
<tr>
<td>Ind</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Rep</td>
<td>44%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>18-44</th>
<th>45-64</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>13%</td>
<td>21%</td>
<td>17%</td>
<td>29%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Area</th>
<th>Urban</th>
<th>Suburban</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>15%</td>
<td>18%</td>
<td>28%</td>
<td></td>
</tr>
</tbody>
</table>

Based on a Gallup poll conducted April 20-26, 2020
Source: Gallup
Republicans far more comfortable than Democrats going to salons, restaurants, indoor events, parties

<table>
<thead>
<tr>
<th>Activity</th>
<th>Dem/Lean Dem</th>
<th>Total</th>
<th>Rep/Lean Rep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Going out to the grocery store</td>
<td>73</td>
<td>79</td>
<td>87</td>
</tr>
<tr>
<td>Visiting with a family member or close friend inside their home</td>
<td>68</td>
<td>77</td>
<td>88</td>
</tr>
<tr>
<td>Going to a hair salon or barbershop</td>
<td>37</td>
<td>53</td>
<td>72</td>
</tr>
<tr>
<td>Eating out in a restaurant</td>
<td>28</td>
<td>44</td>
<td>65</td>
</tr>
<tr>
<td>Attending an indoor sporting event or concert</td>
<td>11</td>
<td>23</td>
<td>40</td>
</tr>
<tr>
<td>Attending a crowded party</td>
<td>8</td>
<td>18</td>
<td>31</td>
</tr>
</tbody>
</table>

PEW RESEARCH CENTER
Since last fall, more Americans say the government should do more to help those in need

% who say the government ...

<table>
<thead>
<tr>
<th>Should do more to help the needy, even if it means going deeper into debt</th>
<th>Total</th>
<th>Among Rep/Lean Rep</th>
<th>Among Dem/Lean Dem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Should do more</td>
<td>49</td>
<td>58</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>48</td>
<td>40</td>
<td>72</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Can't afford to do much more to help the needy</th>
<th>Total</th>
<th>Among Rep/Lean Rep</th>
<th>Among Dem/Lean Dem</th>
</tr>
</thead>
<tbody>
<tr>
<td>Can't afford to do much more to help the needy</td>
<td>48</td>
<td>40</td>
<td>72</td>
</tr>
</tbody>
</table>

Note: No answer responses not shown.

PEW RESEARCH CENTER
Older U.S. adults see COVID-19 outbreak as a major threat to their personal health; younger Americans say it is a major threat to their finances

<table>
<thead>
<tr>
<th></th>
<th>Your personal financial situation</th>
<th>Your personal health</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All adults</strong></td>
<td>41%</td>
<td>38%</td>
</tr>
<tr>
<td>Ages 18-29</td>
<td>40</td>
<td>26</td>
</tr>
<tr>
<td>30-49</td>
<td>43</td>
<td>34</td>
</tr>
<tr>
<td>50-64</td>
<td>46</td>
<td>43</td>
</tr>
<tr>
<td>65+</td>
<td>32</td>
<td>49</td>
</tr>
</tbody>
</table>


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There can be no exceptions to physical distancing when it becomes necessary.

Outbreaks have occurred where this has not be respected as a basic tenant of public health.
Bottom line:
When called for,
Stay put,
cocoon.
Check in on
your family,
friends,
neighbors.
Don’t just
think of
yourself.

Your grandparents were called to war. You're being called to sit on your couch. You can do this.
Bottom line

• The only approach to flattening the curve of COVID-19, until we develop, test, and distribute a vaccine or find a cure
  • Is test (widely and routinely), contact trace, and isolate (provide and support viable isolation options for all who need it)
  • All three need to be done in concert or the approach does not work, all are equally important
  • All three steps require trust by diverse members of society and a sense of health citizenship based on evidence based public health that eclipses partisanship
    • Society is composed of different cultural groups and each has to buy into a common strategy for the greater good