



COVID-19 Background

COVID-19 Case Activity (as of 3/17/20)

- Close to 200,000 confirmed cases worldwide, 7,893 deaths. Cases and deaths outside of China have surpassed cases and deaths within China. Likely more unreported.
- 104 countries have more than 10 confirmed cases outside of China.
- Japan, Iran, Italy, and South Korea all had an exponential growth of cases from 10s to 100s in less than a week.
- 5,894 cases in the U.S. Community spread is occurring in multiple states, including Colorado.
- New cases in Washington appear to be the result of hidden transmission for weeks, suggesting 50-1500 cases may be under the radar there.

About the virus

- It likely arose from a crossover, or “zoonosis” from animals in China in late November early December of 2019.
- It is most closely related to a virus called SARS which caused a small epidemic in 2002. It is also related to viruses that cause the common cold.
- It causes dry cough, fever, pneumonia, and in severe cases, kidney failure and death. The most common symptom is fever (80+%). Nasal congestion and runny nose are rare (<5%).
- 80% of cases are relatively mild, and do not require hospitalization. The rest look like moderate to severe pneumonia and are severe (15%) or critical (5%) often requiring hospitalization.
- Approximately 1% of people who get the virus die.
- After symptoms show, it takes 3 weeks - 1 month for severe cases to resolve.
- Risk is much higher for people over 40 and people with underlying health conditions.
- Children appear to be relatively unaffected but can spread the disease.
- Men may be twice as susceptible as women, although it is too early to tell with confidence.
- Immunity may not last long, and nobody has it to start with.

Transmission

- Similar to flu: Being within 6 feet of a cough or sneeze, touching a surface that has been coughed on and then touching your face, or eating food that has been coughed on are all ways to spread the virus.
- Relatively quickly. Approximately doubling the number of infected people every week.
- Probably can survive on many types of surfaces for 2-7 days.
- May spread when people are asymptomatic.
- It takes an average of 5 days (**range of 2-14**) for symptoms to develop.
- In the early stages, cases will likely be doubling about every week, meaning the odds of infection are about 2X higher each week it continues. This [video](#) explains how early epidemics expand exponentially.

Treatment

- No vaccine or approved medical countermeasure.
- Supportive care like mechanical ventilation can significantly decrease risk of death if ICU rooms are available.
- An antiviral, called remdesivir, is in clinical trials and shows some signs of efficacy.
- Historical timelines for new drug / vaccine rollout suggest mass availability in 2021.

Compared to Flu

- Seasonal flu kills <0.1% of infected people. COVID-19 is estimated to kill ~1%; 10X more lethal.
- The serial interval seems slower than the flu because of average time of incubation.
- We all have some natural immunity to flu even though each season the strain is different. Likely no immunity to COVID-19.
- We have a reliable vaccine against seasonal flu. We will not have a vaccine or effective treatment for COVID-19 for some time.
- Seasonal flu is very well characterized and understood. COVID-19 is still under intensive study. Long-term health effects of the virus are unknown.

Data Resources

- National flu season data: <https://www.cdc.gov/flu/about/burden/index.html>
- National COVID-19 data: <https://www.cdc.gov/coronavirus/2019-ncov/cases-updates/cases-in-us.html>
- Colorado COVID-19 data: https://docs.google.com/document/d/e/2PACX-1vRSxDeeJEaDxir0cCd9Sfji8ZPKzNaCPZnvRCbG63Oa1ztz4B4r7xG_wsoC9ucd_ei3--Pz7UD50yQD/pub
- CDC flu surveillance: <https://www.cdc.gov/flu/weekly/index.htm#ILIActivityMap>
- Boulder County flu surveillance: <https://www.bouldercounty.org/families/disease/influenza/>

Hard to draw conclusions on how COVID-19 compares to seasonal flu

- Transmission dynamics are context and time specific

COVID-19	Seasonal flu
Severe (15%) and critical infection (5%)	Between 140,000 and 960,000 hospitalizations each year
Crude mortality varies 0.7 - 4% dependent on testing, age distribution, healthcare system	Mortality averages well below 0.1%
It is not yet known what percentage of the population will get ill during a season	3% - 11% of US population ill each season (between 9.3 & 36 million people)
Incubation is 2-14 days, average of 5 days	Incubation is 1-4 days, average 2 days
Serial interval 5-6 days (slower)	Serial interval is 3 days (faster)
Children 0-19 seem less affected	Children are important drivers