

Preparing for a COVID-19 respiratory pandemic (February 26, 2020)

Yesterday, the Centers for Disease Control and Prevention urged people living in the United States to begin to prepare for the possibility of significant disruptions to daily life because of a coronavirus pandemic.

It's important to keep up with reliable news about the epidemic. The virus causing the outbreak is called nCoV-2019 while the disease itself is called COVID-19. When thinking about whether an infection will spread or not, we use the number of healthy people who will be infected by a sick person as an index of how much the infection will spread. This "basic reproduction number" is derived from epidemiology research and can be used in mathematical models that work like weather forecasting to predict the future.

The current calculation for the basic reproduction number for COVID-19 is 2.28 and was calculated using evidence from the *Diamond Princess* cruise ship passengers. This basic reproduction number is twice as high as that of seasonal influenza.

When thinking about how dangerous an infection is, we calculate something called the case fatality rate. The case fatality rate is the percent of sick people who die from an infection. Chinese experts estimate the case fatality rate for COVID-19 is 2.3% in Wuhan. 2.3% is 20 times higher than the case fatality rate for seasonal influenza but that is still much, much lower than that for SARS, MERS, or some other kinds of pneumonia.

We do not know if the basic reproduction number from the cruise ship or the case fatality rate in Wuhan can be generalized to the United States, but we do know that factors such as smoking and air pollution can affect the spread and severity of respiratory illnesses. Smoking rates and air pollution are both higher in China than in the United States.

CDC experts are probably telling us to start preparing because of how people in the U.S. handle the respiratory epidemic we have every year: influenza. In an average year, about 9-45 million people in the U.S. catch influenza. Seasonal influenza kills about 12,000-61,000 people in the U.S. every year. Annual influenza vaccination significantly reduces a person's risk of dying from influenza.

Non-technical, simple interventions could reduce how many people catch respiratory infections. The CDC as always recommends staying home if you feel sick or like you might be getting sick, covering coughs and sneezes, good hand washing practices, not touching your face, and regular cleaning of communal objects that get touched a lot. Wash your hands with soap after you cough or sneeze; sing the alphabet or Twinkle, Twinkle to make sure you scrub long enough. Most of us catch respiratory infections not by breathing in a pathogen but instead by touching a contaminated surface and then touching our faces – touching the face gives the pathogen access to our respiratory system through the eyes, nose, and mouth. Face masks are not recommended because they are not usually efficacious when used by novices in a community setting, and because they might be needed by experts in health clinics and hospitals.

Staying home when you might be getting sick or are sick is called social isolation. Social isolation helps stop the spread of a respiratory pathogen without interrupting normal economic activities. Social isolation can stop a transmission chain because the small number of family and friends caring for an isolated person can avoid getting sick by being vigilant about the other interventions such as hand-washing and not touching the face.

The best way to prepare for a COVID-19 is to think through how your community can best follow CDC recommendations for limiting the danger of respiratory infections. Think through how to help the most vulnerable people in your community. For example, do you have any neighbors who live alone and who might need help if they got sick and needed to stay home? Do you have a neighbor who might need childcare in the event that their child needs to stay home with a respiratory infection? Do you know someone on a fixed income who needs to get groceries on a weekly basis, so that they might run out if they needed to stay home when they are sick? All of these situations might arise, but we are equipped to handle them with common sense and compassion.