

Avoiding COVID-019

My summary of a very good blog post and published article. [The Risks – Know Them – Avoid Them](#). (Erin Bromage) and [A Regimen for Rëentry](#): Lessons learned from the way hospitals are preventing coronavirus in their employees and patients. (Atul Gawande)

How IT spreads: The virus spreads primarily from breathing in respiratory droplets of an infected person. Environmental transmission is when you touch something that has respiratory droplets of an infected person on it and you then touch your eyes, nose or mouth. This may be less than 6% of all transmissions. (The [CDC says](#) the virus does not spread easily in this way.)

The pattern for infectious transmission for coronavirus is similar to seasonal flu: a person is infectious before symptoms. The peak period is at the start of symptoms. The infectious period declines substantially in five days or so. There is very little evidence of transmission by carriers who can shed the virus but never suffer symptoms. (SARS was infectious only AFTER a person had severe symptoms, making it much easier to control.)

Infectious dose: You have to acquire an infectious dose to become infected. Estimates are you need 1,000 viral particles to get an infection. That can be from breathing in 1,000 particles in one breath or from one eye rub or breathing 100 viral particles in 10 breaths or 10 viral particles with 100 breaths. Successful infection = viral load x time.

An infectious person can release 200 million virus particles in 30,000 droplets with one sneeze. Breathing in someone's sneeze cloud with no mask on is high risk. A simple cough is 3,000 droplets. An infectious person breathing near you may release just 20 virus particles per minute: it would take 50 minutes for you to breathe in their every breath to get an infectious dose. Speaking raises this to 200 per minute: it would take 5 minutes for you to breathe in their every breath.

Less than 15 minutes spent with an infected person makes spread unlikely. Of 445 within six feet of an infectious COVID-19 patient for ten minutes or more, only two tested positive, both of whom also had an infected person in their household.

Most all transmissions are from family members: one member gets IT in the community and then infects other family members.

What are the highest risks for community transmission? Your primary risk is small, indoor, closed spaces. Your chance of getting an infectious dose increases as the size of space decreases; as the number of people increases; as the period of exposure increases; and with increases in speaking, singing or yelling.

- Restaurants. You tend to spend an hour and a half or more and a lot of people are talking.
- Crowded enclosed work areas like a call center. Open office plans or large face-to-face business conferences are a risk.

- Public transport. In a three-hour plane flight in 2002, a passenger at peak period of infection with SARS infected 22: 1/3rd of passengers in his same row and three rows in front were infected. Passengers as many as seven rows away – 18 feet – were infected.
- Social gatherings. Birthday parties, funerals, religious ceremonies.
- Public toilets. We do not know if a person releases the virus or just fragments in feces, but we know flushing aerosolizes many droplets.

What are the lowest risks for community transmission? Outdoors and outdoor exercise are lowest risk. One study found that 0.3% of traced infections are from the outdoor environment. Wind, humidity and sunlight lower viral survival. Infinite outdoor space and wind disperse any particles such that the viral load is very, very low. You usually come into fleeting contact with others. You are fine when passing joggers who may be inconsiderate and not wearing a mask. You'd have to be in the airstream of a jogger for 5+ minutes to reach a chance for infection.

Big box stores – grocery stores; Home Depot and the like – are very low risk. The volume of air is large. You spend a limited amount of time (less than one hour). Groceries now restrict the number of shoppers or you can figure out when they are not crowded; stores prescribe social distancing (e.g., one-way aisles); customers and staff wear masks.

Lessons learned from the way hospitals prevent coronavirus in their employees and patients. Four pillars of action: masks, distance and time of exposure; hygiene; screening (workplace); and culture of not being the one to infect another person. Each one is not enough. All together they are powerful.

1. Masks, distance and time of exposure

Your mask protects others from breathing your respiratory droplets when you don't think you're infectious. Your mask protects you from breathing respiratory droplets of an infected person. The evidence for mandatory masks is overwhelming.

Masks can prevent 99% of your respiratory particles from infecting others. Surgical masks are better than cloth masks. Surgical masks electrostatically capture particles. One study showed surgical masks were three times better in blocking outward respiratory droplets than cloth masks. All employees and patients in Gawande's hospital must wear masks

Lab research says surgical masks block about ¾ of inhalation of respiratory particles while homemade masks block about ½. One study (SARS in 2003) showed people who frequently wore masks in public were half as likely to be infected as those who didn't. Viral counts on a cloth mask that you've worn drop 99% in three hours.

Distance makes a difference. Six feet goes a long way to lowering risk, but it is a choice guided by practicality. A forceful sneeze can propel respiratory droplets 20 feet.

Exposure time makes a difference. The [choir in Skagit Valley](#) practiced for +2 hours. An index patient at the peak of infectiousness infected 52 of 61 attendees and two died. No one coughed. They just sang.

2. Hygiene

You protect yourself from environmental transmission by washing your hands. Frequency is the key. A study found hand washing five times a day cut medical visits for respiratory infections by 45%. Ten times a day reduced infections even more. Wash or sanitize your hands every time you go into and out of a group and every couple of hours you are in a group. Disinfect high-touch surfaces at least daily.

3. Screening and testing: basically for employees, but you should self-screen

Gawande's hospital adopted procedures begun in Asia. Before he can enter, he must check off a self-assessment on his cell phone that is linked to a web site. He must confirm he has not developed a single sign of the disease – a new fever, cough, sore throat, shortness of breath, loss of taste or smell, sore throat or just a bit of nasal congestion or runny nose. (A touchless, infrared temperature check may help, but fever is present in less than half of infectious patients who later develop other symptoms.) If he fails to get a green light, he cannot go to work.

Testing when people have symptoms is important. Positive cases can isolate. Their contacts can be notified and quarantine until tested. Employees at Gawande's hospital who do not get a green light to work but test negative for the virus – because of high false-negative test results – must isolate until any fever is resolved and symptoms have improved for 72-hours. Screening and testing has changed the culture: toughing it out and going to work sick is now a shameful act of disloyalty.

4. Culture: reinforce use of masks and distancing; hygiene.

People tend to focus on two desires: safety and freedom: keep me safe and leave me alone. Culture has to change to embrace the desire to keep others safe, not just themselves. It's the culture of the hospital operating room: never be the one to make someone else sick.

I primarily will reinforce culture for indoor spaces. I won't go into any store that allows customers with no masks or employees with no masks and fails to enforce the six feet rule. I'll report failures to management and promise not to buy. I did criticize some on the streets who were not wearing a mask. I'm not going to do that anymore. I show the example of what they should be doing: I will pull on my mask and hope they give us wide berth; if not I'll give them wide berth.