Living in COVID-19 World

What is Covid?

Covid-19 is a communicable virus that transmits principally through airborne droplets or aerosols generated by speaking, sneezing, coughing, and possibly breathing. Indoor transmission is highest risk:

* Contaminated surfaces are considered a negligible source of infection; and
* Outdoor transmission has been documented but has mostly been at events like weddings and funerals with high person-to-person contact.

Transmission happens very easily because a significant fraction of cases are substantially asymptomatic, and infectivity occurs before symptoms.

If you are potentially or known to have exposed, isolate. If you are symptomatic, advise contacts, and contact the health care system for current instructions.

Key Facts

1. This is a respiratory disease that you get directly from other people. Airborne transmission from droplets (and aerosols) generated by speech is probably the mechanism in nearly all cases.
2. Viral load seems to matter; those who get larger exposures seems to get more severe effects.
3. Household transmission is likely about 30% on average.
4. The virus seems to do best in the 10-15C degree range, and at moderate humidity, not transmitting so well at high or low humidity. Most viruses have low UV-resistance.
5. Of those with Covid, roughly:
	* 1. 50% will have no symptoms
		2. 40% will have symptoms that do not require hospitalization (“mild”)
		3. 10% will require hospitalization of which 25% will be admitted to ICU
		4. Long haul (including chronic fatigue syndrome and similar) seems to appear in about 1% of symptomatic cases
6. Available evidence suggests that asymptomatic cases are less contagious, and it appears that most cases are transmitted by a small double-digit percentage of the infected. Timing, conditions, and individual factors are important.
7. Reinfection has been, if rarely, found and confirmed.
8. Duration of immunity is uncertain and will vary between individuals and on the genetics of the variant you are exposed to.
9. Testing indicates that minks and ferrets are highly vulnerable to Covid, and with cats, are symptomatic hosts of Covid. Dogs can be infected but are poor hosts and generally asymptomatic if infected, and pigs and birds are not vulnerable.
10. Physical distancing and masks protect us AND spread out the cases so that those who are seriously affected can get adequate medical care with the available capacity
11. Viruses mutate easily, even doing so as an infection proceeds in one person. If those mutations lead to higher “success” (essentially reproduction and transmission), the strain with that mutation will come to dominate other strains, slowly optimizing the virus. This process is observed, with new strains being more infective than early strains. Concerns are that protective measures are less effective, and vaccines may not work as well. Both are observed in the recent progress of Covid. That said, the vaccines appear to be effective against the strains that have emerged so far, if to varying degrees.
12. Vaccines are just another selection pressure on the virus. They have just started being deployed, so we don’t know whether the virus is capable of mutating enough to dodge vaccines and remain a severe health hazard. Whether the virus has mutations that will allow it to survive/thrive in a vaccinated population is unknown and won’t be known for quite some time.

Prevention

The keys to prevention are physical distance, masking, and avoiding indoor spaces where masks are not worn. Masks protect you and others. Avoid all indoor activities without a mask.

One of the best pieces of information on prevention is a study by the National Football League, which among other tools, used RFID trackers to assess interactions and over 900,000 PCR tests. It showed that there is essentially no safe indoor interaction without a mask. Their final definition of a high-risk contact was sharing an indoor space without masks for 2min cumulatively in 24hrs. By implication, this suggests that any indoor space shared with diners or drinkers outside your bubble is high risk if any of them has Covid.

Masks

1. Masks are about protecting others but will also protect you.
2. Masks that are easy to breathe through probably are minimally effective. Tightly woven masks or multilayer masks are generally more effective. If you can see light through the mask, it is almost certainly not helping much.
3. Double masking has been recommended in the US and generally can’t hurt, provided (a) it doesn’t cause you to adjust your mask more frequently, and (b) it doesn’t lead to more leaks because resistance to breathing is too high. Double masking (with a disposable surgical mask under a cloth mask) can improve fit.
4. Masks should be washed or changed frequently and handled as contaminated.
5. Continue to avoid N95 masks, as supplies remain constrained and are essential material in health care. They also require more careful fitting to work properly, and so are less user‑friendly.

Bubble & Distance

1. Maintain distance of at least 2m (and least time inside this zone).
2. Maintain a bubble and ensure members of your bubble manage their risks.
3. Reduce contact with people outside your bubble (less time = less risk).
4. See people outside your bubble outdoors.
5. Avoid indoor spaces, especially if anyone is not wearing a mask. Good ventilation lowers risk, but risk is higher than outdoors.
6. Avoid crowds.
7. Avoid people generating respiratory droplets/aerosols (e.g., loud talking, shouting, singing, heavier breathing (exertion), coughing, laughing, not wearing masks, etc.).
8. In considering essential air travel, this is about risk management. The air filters in aircraft are very effective, but the ventilation systems have to pick up the air before it can be filtered, so if someone sneezes (or talks) (especially without a mask), droplets will be released. In an aircraft you effectively share the air space with a chunk of the passengers (probably in the order of 25 seats around you), but not everyone. In Canada, you cannot wear a mask with a vent. A mask and goggles will be highly likely to protect you.

Drugs & Vaccines

1. Vaccines confer some level of immunity but may not entirely prevent infection/transmission.
2. Vitamin D is an inexpensive way to reduce your risk; available data is suggestive of effectiveness and risk is negligible.
3. Get vaccinated when you can.

Disinfection

Most disinfection is theatre, as this is primarily an airborne risk. That said:

1. If you worry about hand transmission, wash your hands with soap and water for at least 20 seconds (sing “Happy Birthday”), and then dry thoroughly. If soap and water is not available, hand sanitizer with at least 65% alcohol is second best. Higher alcohol is not better, as the water content actually helps the sanitizing effect. Sanitizers are meant to disrupt the lipid layer that protects viral particles. Soap is better, as the foam helps disrupt this lipid layer. Warm water helps melt the lipids and warm water foams better. 65% alcohol is required to dissolve the fat layer. Bleach actually attacks the protein load of the virus (1-part bleach to 5-parts water). Bactericides are ineffective, as viruses are not alive. Vinegar or acids do not affect the fat layer.
2. Food transmission has not been identified. For reference, heat treating to 63C for 4 min (i.e., cooking) reduces viral contamination by a factor of 1000, and viruses do not reproduce in food, they need a live cell to do that work.
3. If you want to reduce risk of transmission inside your family, one measure you can implement is having dedicated towels (wash towels, then have assigned towels for each person).
4. Why are handwashing, temperature checks, etc. still being so consistently recommended? (a) Can’t hurt, (b) may reduce transmission of other things, like flu, and (c) give a psychological boost, by giving us some sense that we have control.

Behavioural Changes

1. Exercise is important to maintaining the health of your immune system. Being at home makes it easy to overeat, so consider this as a great opportunity to start doing those runs/rides/extended walks. You don’t need equipment or much space: do body exercises likes pushups, crunches, planks, squats. Lots of good resources online on technique (if you do these, try to do them right, get feedback from a friend or partner).
2. We recommend meditation to manage stress. Two resources are Headspace (a subscription app) and Insight Timer (free). Both offer guided meditation.

Vaccines

1. Covid is difficult because we had no natural immunity when it emerged. Three to five years from now, Covid-19 will likely be an endemic mild childhood illness, but like flu, will adversely affect some of the non-vaccinated. Vaccine boosters may be required at intervals.
2. Adverse events from vaccines are running about 11/million at time of writing. This is predominantly an allergic-type reaction. Most reactions are within 15minutes. Frequency is about 10times that of the flu vaccines. No deaths have been reported, treatment is generally epinephrine.
3. Some other things that look true but are still uncertain:
	1. A side effect of the vaccines can be swollen lymph glands which has been mistaken for other disease.
	2. A single dose of two-dose vaccines confer some protection from infection, but take a week or two to have effect.
	3. A single dose of a two-dose regime reduces severity if you are infected.
4. Vaccine producers are indicating immunity of more than 1 year arising from inoculation, but this may vary by person and vaccine.
5. There are a variety of approved vaccines. All appear to have excellent safety and efficacy. The best one to have is the one you can get in your arm the soonest. You can get the best one when we know what it is, and when it is freely available. At this time there is no indication you can’t get three different ones.

Symptoms

* Symptoms generally: appear within 4-6 days of exposure (95% in 2.5-11.5 days).
* Viral shedding appears to start about 2.4 days before symptoms occur and peaks about 17hrs before.
* Infected individuals are likely contagious for about 8 days in total.

Symptom frequency varies by age, with teenagers and children likely to show only cough. There is no particular pattern to symptoms, with many individuals showing only one or a few from this list:

* Cough, usually dry (not productive)
* Fever (subjective or >100.4°F/38°C)
* Muscle aches
* Headache
* Difficulty breathing
* Sore throat
* Diarrhea
* Nausea/vomiting
* Loss of smell or taste, abdominal pain

Other notable symptoms include fatigue, confusion, chills. Symptoms not indicative of Covid are sneezing and sniffles. Runny nose and sore throat are considered rare in Canada.

Covid can be considered probable if difficulty breathing begins about 5-7 days after initial onset of symptoms and should be taken seriously.

Particularly in seniors, one effect of Covid can be depressed blood oxygen that they are not aware of (“walking pneumonia”). A pulse oximeter (can be purchased online or at large drug stores for about $40) is an easy way to monitor blood oxygenation.

Testing

Nasal swab testing using the PCR test is the baseline testing method. False positives are rare. False-negative result rates are probably 10% or more. Tests take about a day. Rapid tests have much higher error rates, at about 30%. False-negative results appear to arise from (a) poor timing of the test, (b) poor sampling technique, or (c) other reasons we don’t know. Some people still consistently test viral negative even when they have all the symptoms (referred to as “epi-linked”).

Testing is not a major factor in managing your own case unless you are in a vulnerable category, it is primarily for infection control.

When you have Covid

For most people, this is a mild disease. Risk of hospitalization and morbidity increases rapidly with age from age 40, and health conditions including:

* Obesity (BMI>30)
* Type 2 diabetes
* Serious cardiovascular disease
* COPD
* Cancer
* Smoking
* Chronic kidney disease

You should manage by isolation if your bubble has low risk and your symptoms do not include shortness of breath. That said, if you are experiencing symptoms that include shortness of breath, low oxygen, or similarities to stroke or heart attack, medical care should be sought urgently.

Guidance on self-isolation if you have been exposed to someone with coronavirus disease (for example: <http://www.bccdc.ca/health-info/diseases-conditions/covid-19/self-isolation>) indicates 14 days at home, no contact with others to the extent possible, including not doing your own shopping. After potential coronavirus disease, isolation can end after all these are true:

* No sooner than 7 days after onset of symptoms;
* Three days fever-free with no fever medication; and
* Marked improvement in respiratory symptoms.

As noted previously, most people are not contagious 6 days after onset of symptoms.

Available information indicates that:

* Severe cases present themselves in various ways and appear to be as much caused by excessive immune response as by the virus itself.
* Adults have similar rates of hospitalization; children have low risk of hospitalization.

When hospitalization occurs, it is roughly 5 days after onset of symptoms. Cases that don’t become serious generally fully recover in 7-14 days after symptoms appear. Median hospitalization is 11 days from admission (or 16 from first symptoms).

Case fatality rates (effectively, percentage of diagnosed cases that die) are higher than the actual fatality rate (what are your chances of death if you contract it) but how much will likely never be known. It is likely just above 1% for those with no underlying conditions. Country/province experience varies tremendously for statistical, testing as well as population and health system reasons. For context, a bad flu season typically runs 0.1%, and the Spanish Flu is estimated to have been in the 3-3.2% range (high uncertainty).

Where Is This Going?

International experience is showing that this disease is very difficult to control without concerted action by most people, to physical distance and wear a mask, avoid indoor gatherings where people are talking, gyms where instructors are shouting. The means used in China (intense state resources and control) and New Zealand (island) aren’t available in most places, and so we are likely to continue with the “Hammer and the Dance” ([https://medium.com/@tomaspueyo/coronavirus-the-hammer-and-the-dance-be9337092b56](https://medium.com/%40tomaspueyo/coronavirus-the-hammer-and-the-dance-be9337092b56)) until vaccines are demonstrated to work against the strains that exist or emerge. Vaccines will likely come into their own in the fall of 2021.

Vaccine-induced resistance will likely matter. Early analyses indicated that the Ro (“R naught”) (number of people an infected person infects) is around 2.3-2.7 for Covid. Some research indicates that where vigilance is not high, Ro numbers can be over 5. This is significant because Ro determines the threshold for herd immunity. Herd immunity level, where transmission effectively stops because most exposed individuals are immune, is uncertain. Most observers believe it is more than 70%, and there is a good chance it is in the low 80% range. Herd immunity can be roughly estimated using the formula 1-1/Ro. At Ro=5.0, for example, 80% of the herd must be immune to achieve herd immunity, where at Ro=2.5, it is 60%. Where 60% might be possible, getting 80% compliance for vaccines would likely be an insurmountable barrier in a society where 30-40% of the population are vaccine-reluctant or opposed to vaccination.

Masks are likely here to stay, distancing for the medium term.

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*Disclaimer: This information represents the opinion of Will Gaherty (PGL’s President), and is being used by PGL as our main guidance.*