



COVID19 - A PRACTICAL REFERENCE GUIDE

June 2020

This reference guide is will guide you to better decisions for you and your family. It will help you gain a clearer understanding of the threat of the virus, and how to best deal with it.

Daniel Ruben, MD, MPH, MBA
DR@LSAWealth.com

COVID19 - A Practical Reference Guide

- Coronavirus - The Virus..... 2**
- Transmission 4**
 - Illness5
- Epidemic/Pandemic 6**
- How do we beat this Virus 6**
 - Epidemiology/Public Health6
 - Physical Barriers 6
 - Testing 8
 - Contract Tracing 8
 - Vaccine 10
 - Medical Treatment12
- Differences and Controversies 14**
- FAQ 14**

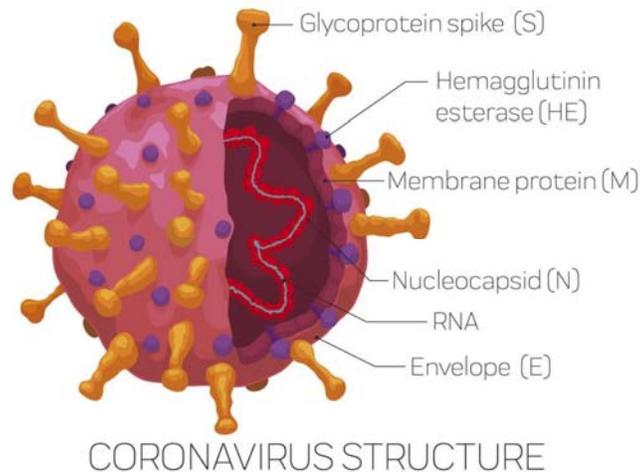
We didn't really expect this. Our world turned upside down by a virus so tiny we can't even see it under a microscope. How is it that in this modern world of science and technology we let it cause such havoc? Are we over-reacting? Or should we be doing more? We turn to experts to answer these questions for us. However, while these experts may provide us insight and perspective, what if they don't have the answers? At least not yet. The global situation is dynamic and evolving rapidly. But life goes on now. In your town, in your home, in your job. You have a life and a livelihood to protect. This guide is meant to be concise and practical rather than comprehensive. It is written for the non-expert who wants to cut through the noise and get a clearer perspective.

The information provided is my interpretation of the work and tremendous efforts of so many others who toil daily in the labs and in the field. The credit for discovery of all this knowledge belongs to them. While if any misinterpretation or misstatement of fact are discovered in this document, that's wholly on me.

Dr. Daniel Ruben
June 3, 2020

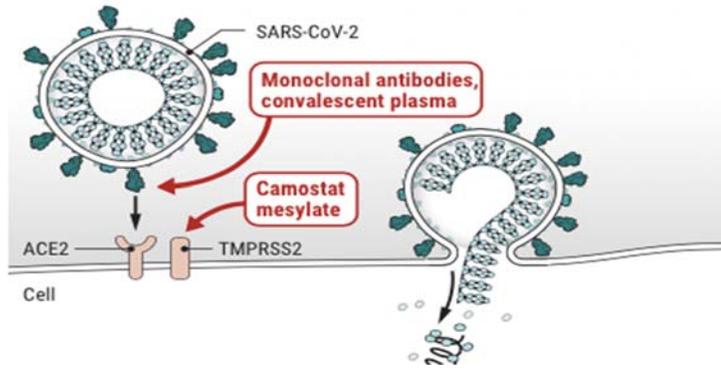


COVID 19 is a disease caused by a virus. This virus, known as SARS-CoV-2 by scientists, is looks the same to other coronaviruses that we have seen before. But it is different enough to make it a mystery and challenge with which we must cope. It is not evil as I have heard it called by Governor Cuomo and others. It is in fact indifferent. It just wants to live.

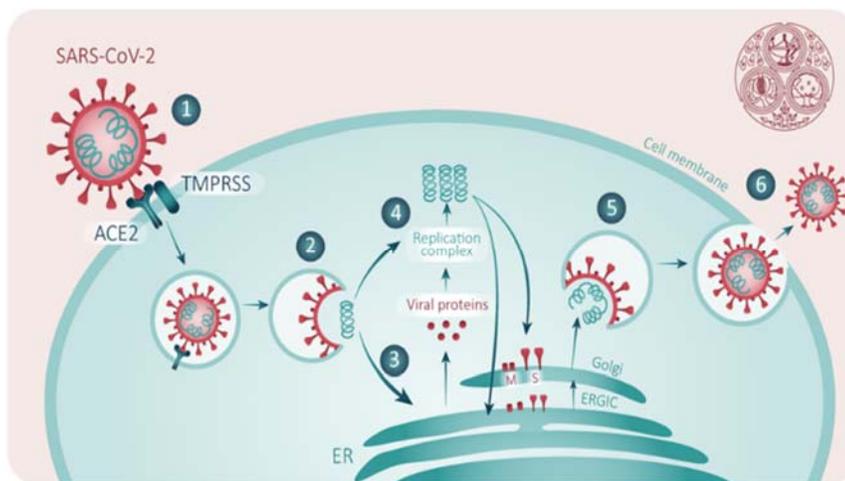


- **The “corona” virus is an RNA virus –**

- what is an RNA virus? – a virus where all the genetic material is carried in a molecule called RNA (while we humans also have RNA in our cells, the genetic material is carried on DNA)
- other examples of RNA viruses - EBOLA, Hepatitis C, influenza, Rabies, West Nile, polio, measles (HIV is a “retrovirus” – RNA is turned to DNA (via reverse transcriptase).
- RNA is the principal genetic material – surrounded by membrane – and spikes all around (crown)
- The coronavirus has a “key” that enters the human cell by opening a “lock” on the surface of the cell (respiratory cell in lung or nose). That key that the Coronavirus has is the “spike” protein that sticks out from the viral membrane.



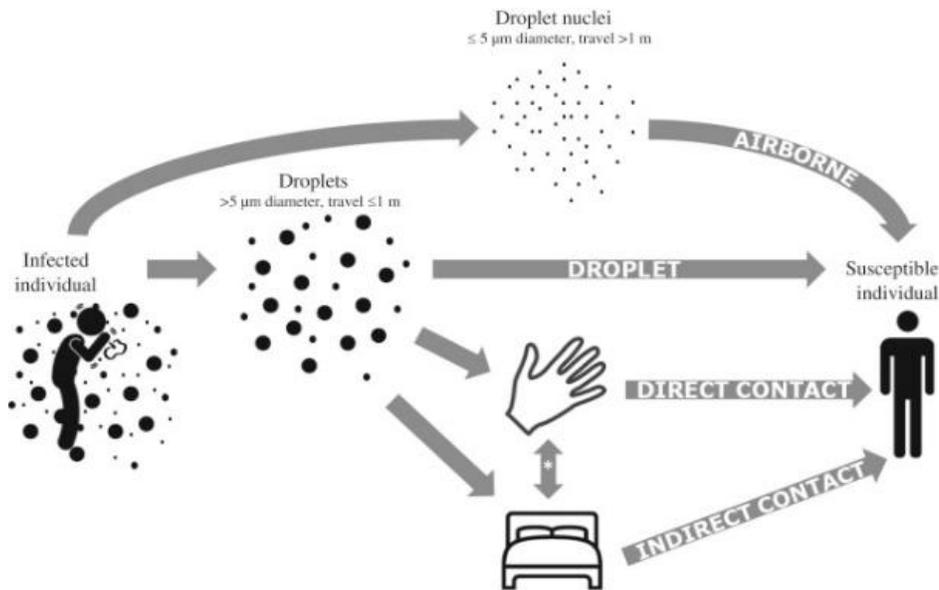
- Once inside the lung cell, the virus uses resources of host cell to reproduce (The RNA in virus uses same “language” or “letters” as the RNA in human cells. Therefore, the human cell can perfectly read the viral RNA). The RNA is a form of blueprint (instructions) of how to build a protein. The building blocks for proteins are the same in humans and in the virus (and in all living forms).
- The RNA thus takes over the machinery and building blocks of the host cell to construct proteins that form the structure of the virus, and makes more copies of the RNA itself.
- Multiple copies of the virus are thus produced within the cell, the cell bursts and thousands of viral particles are released, entering other cells and repeating the process



- Virus does not have its own “building blocks” or “machinery” to reproduce (make copies of itself) on its own. It MUST have a host cell in order to reproduce.
- Therefore, it is important to remember that in order to live COVID must infect living host. If there is no living host around, it will die.

- **Transmission –**

- The coronavirus lives in the cells that line the nose and throat and airways. It continues to multiply and eventually spreads down into lungs.
- A sneeze or cough can release tiny water droplets which can have virus. These drops can float around for a while – and infect people that the droplet directly touches. Or the droplet can land on a surface that someone touches (with hands, then touches face (eyes, mouth, nose)).
- Apparently, it doesn't take much of a dose to infect – i.e. it is very contagious – very efficient.



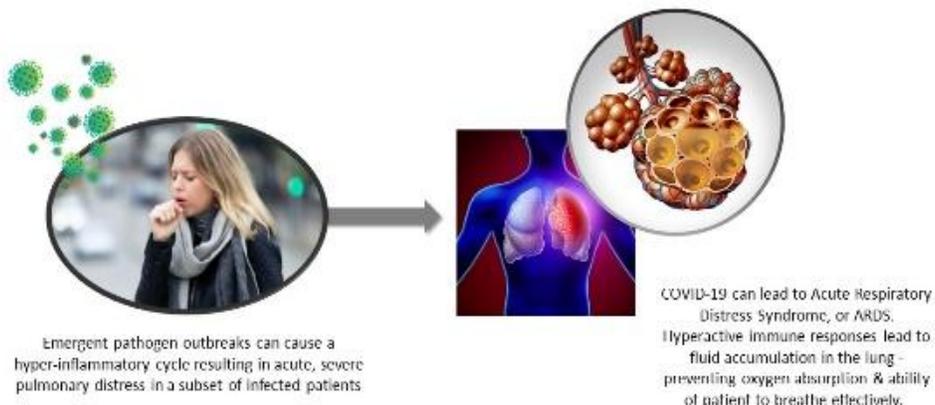
* Transmission routes involving a combination of hand & surface = indirect contact.

- **Illness**

- Initially no symptoms – The virus multiplies in the lining of the nose and the throat and can shed millions & billions of infectious virus particles. Some people may never feel sick (no symptoms). They probably develop a defense (immune response) against the virus and eventually kill it.
- Symptoms of the common “cold” often develop. And in more severe instances “pneumonia” develops.
- When the pneumonia (Pneumonitis) gets severe, the lung fills up with fluid and the person can’t breathe.
- When a person cannot breathe modern medicine can breathe for them by mechanical means. This process buys time until the ill person can either muster up their defenses to ultimately defeat the virus, or not.
- If a person heals, the virus dies. If the person dies, the virus dies. The only way that the virus can survive is if it finds ANOTHER person (host) to infect. Otherwise it dies.

COVID-19 INFECTION CAN LEAD TO LUNG INFLAMMATION

MOST PATIENTS RECOVER FROM INFECTION
BUT IN SOME, IMMUNE RESPONSES LEAD TO ARDS - RESPIRATORY FAILURE



- **Epidemic/Pandemic – Viral spread (local/widespread)**
 - In an epidemic the virus is thriving – moving from one host to another, multiplying like crazy
 - In a Pandemic – the virus is partying even harder and procreating more widely – at our expense.

- **So how do we beat this virus?** – As we previously said, if the virus does not have a susceptible host to live in, it dies. It cannot live on its own (though it can stay viable for 1-2 days on some surfaces).
 - There are two major strategies: 1. **Epidemiological**, and 2. **Medical**
 - Epidemiological (Public Health) approach means stopping the virus from spreading in populations/communities.
 - Medical approach means stopping/killing the virus while it is inside an individual person

- **Public health, epidemiological battle against COVID-19** would mean killing the virus by depriving it of susceptible hosts. How do we do that?
 - Either we build an effective mechanism of defense in the host that deprives the virus of a sanctuary in which to live and multiply (i.e. **IMMUNITY**). Or if we can't do that; or until we do that...
 - Stop the virus from travelling from one susceptible host to another by **using physical barriers** (such as distance, plexiglass, masks, hand washing, disinfecting...)
 - This is what we are doing now, and it is hard.
 - It is costly in economic, social, and psychological terms; as well as costly to our overall health. And these costs increase exponentially with time!

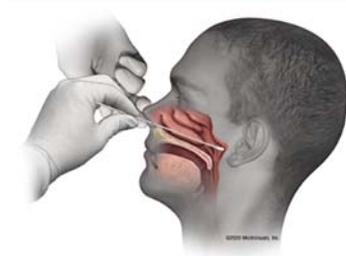
- This strategy is inconsistent with the structure and function of our society and requires central political and policy intervention and enforcement to “induce” the populace to act in a manner that is contrary to their customary patterns



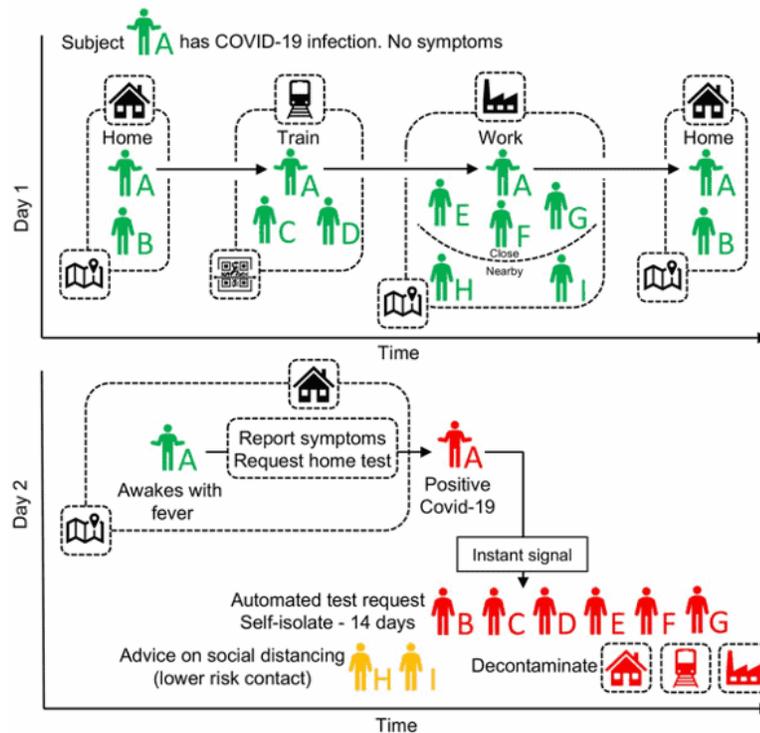
- Therefore, as the pandemic persists, and as costs to our social fabric rapidly grow to harmful levels; and in the absence of another way to protect the us from infection, we are moving to moderate the strictness of this approach, and arrive at some type of “balance.” While we would expect to see some spiking in the level of infections as we loosen the

physical barriers, we are searching for a way to sustain our lives and livelihoods as the virus looms invisibly in the background.

- **Testing** – The Coronavirus is invisible. We can't see it and we can't see when a person is infected and contagious. Since we can't see it, we can't explicitly avoid it. Testing is a way to detect the virus in infected individuals and thus make the virus "visible" for a 'snapshot' of time. The idea is that once visible we can stay away from it (quarantine infected individuals).
 - Testing results are valid at the time that the test is done (sample is taken). A person that tests 'negative' may still get infected any time if exposed.



- **What is contact-tracing?** When a person tests 'positive,' it is important to isolate that person that he/she does not infect others. Contact-tracing is the process of searching and finding all the people to whom the infected person has been exposed, and then testing them. You then trace all the contacts of all the 'positive' cases and quarantine and test them. You repeat that process until you run out of positive cases.
- Having the **widespread ability to test and contact trace**, would obviate the need for generalized physical separation, since those infected would be isolated from the general 'naïve' (susceptible) public.



- In parallel we are desperately, and rapidly, moving to develop effective mechanisms of defense so that we will no longer be susceptible hosts. That is, the virus will no longer be able to infect us. What is the strategy there?
 1. Protective vaccine that would render us immune - that would be great!
 2. Another possibility which may be effective though less than ideal would be to develop a drug that can be used prophylactically (to prevent infection) when the virus is around.
 3. Some have suggested that we let the virus infect us all (or some threshold number) and the ones remaining alive would thus be immune.
- This last option of business as usual while allowing the virus to do its thing is a bit frightening in that while we do not know how many people would ultimately die. It would likely be in the millions. [in the 1918 influenza pandemic, otherwise known as the “Spanish” Flu, it is estimated that 2.5%-5% of the population died (that is 50-100 million).

- If we had a vaccine, and we could vaccinate a large number of the population, then we would likely be able to continue life as usual. In such a case the virus would not be able to find a susceptible host and its effects would be limited. This is the situation that we see today, at least in most of the developed world, with diseases that were frightening several decades ago, but are hardly seen today (Polio, Diphtheria, small pox).
- **Vaccine** - Where are we with the development of a vaccine? How long does it take? Why does it take so long? Why do we think that this time we can develop a vaccine in a much-shortened time scale than historically? – A novel method of creating a vaccine, the RNA vaccine
 - **RNA vaccine** – We know the full RNA sequence of the Coronavirus. In fact, we can create the RNA sequence that provides the blueprint (the “code”) for the key protein (spike protein) that aids the virus in penetrating our cells. What if we could introduce that piece of RNA into a person (without the rest of the viral RNA). Would that RNA be picked by cells in the person and produce that protein? And if so, would that protein be seen as something “foreign” by that person’s immune system? And if so, would it create antibodies (defenses) against that protein? And if so, would those antibodies actually protect that person from infection, if they were to be exposed to the virus? How do we get answers to these questions?
 1. First, you find some healthy volunteers and inject various doses of your RNA preparation/vaccine.
 - You wait for a while and see that nothing bad happens to them.
 - If nothing bad happens to them then you know that it is safe (you do not know yet whether it works)
 2. The next step is to see if the individuals who received the injections produced antibodies against that portion of the virus (the spike protein). You would be able to measure it in their blood.

3. You then need to design a study to see that the vaccine actually works. That is, to see if it prevents individuals who are exposed to the virus from being infected. How do you do that? You can't actually purposefully try to infect the people whom you have injected with the RNA vaccine with the virus. That would be considered unethical. So, what do you do?
- you find an area where the virus is rampant, a lot of people are being infected (high and/or growing *incidence* of infection).
 - You gather a whole bunch of people, the more the better, and inject them with either your RNA vaccine or a placebo (sugar water) at random. Both you, the one giving the shot, and the person getting the shot do not know if they are getting the placebo or the vaccine (double blind).
 - Then over time you monitor to see who gets infected and sick with the virus, and who does not.
 - Let's say a lot of people get infected. Then you determine (unblind) how many of those infected got the vaccine vs. how many of those infected got the placebo.
 - If there was no infection (or a relatively small number) in the group that received the vaccine, and a large number of infections in the ones that received the placebo (did not receive the vaccine), then you have a winner. You have a vaccine that is now shown to be effective at preventing infection.
 - If you have a similar number of infections in the vaccine and placebo group, then it's back to the drawing board (you've got nothing)
 - The classical ways to make a vaccine is to inject a formulation of dead virus, or virus that is somehow weakened and cannot cause illness, but can induce a protective immune response (antibodies). To grow these viruses and make and

test multiple preparations to find one that is safe and effective can take a great deal of time.

1. Thus, this “new” way of creating a vaccine by injecting part of viral RNA sequence is a hope for shortening the time.
2. However, there are currently no such (RNA) vaccines available. This would be the first. If we find that it is effective, there may still be challenges to overcome.
 - Can it be produced and distributed at a large scale?
 - RNA can be fragile, will it last on the shelf? For hours? Days? Weeks? Before losing its effect?



- **Treatments** – Drugs to treat COVID (Coronavirus Disease)
 - Most people that get infected probably get only mild or no symptoms, while they can infect others. In those people the virus runs its course, and then is likely successfully expelled by the person’s immune defenses (just as a common cold runs its course and then you get better).
 - Some people get very sick, and some even die.
 - Those that get very sick or die get a very severe pneumonia (lung infection and inflammation).
 - The treatment today is to support the patient, whatever it takes, until the patient can get well on their own. This may include

1. Giving supplemental Oxygen, fluids, nutrition, and even putting them on a machine that breaths for them, until they recover enough to breath on their own. Or not.
- There are two major paths to develop drugs to treat COVID
 1. One path is drugs that act on the virus directly to kill it (Antiviral).
 2. The second is to control the excess swelling and inflammation in the lungs that lead to overwhelming lung damage (Anti-inflammatory).
 - Antiviral candidates include Remdesivir, it interferes with the coronavirus's ability to replicate (reproduce itself) inside the host. Remdesivir, injected intravenously daily for 5-10 days in hospitalized patients with severe disease, accelerated their recovery compared to placebo. However, it did not significantly reduce deaths when compared to placebo. Certainly not a home run, but a good solid base hit.
 - There are other antiviral approaches being explored as we speak. [antibodies against virus, RNA Polymerase inhibitors, base analogues... <https://www.statnews.com/2020/05/04/how-gilead-drug-remdesivir-works-against-coronavirus/?jwsourc=cl>]
 - Chloroquine and hydroxychloroquine – While there were initial indications that these drugs would be helpful, they turned out to be ineffective, and perhaps even harmful, in COVID-19
 - The other approach to treating severe disease is to use medicines that suppress the host's immune response. Why would you want to do that?
 - It appears that in people that get severely ill, their lungs fill up with fluid and they can't breathe. Their immune response in the lung becomes overstimulated leading to overwhelming inflammation. This is referred to as a "Cytokine storm." Cytokines are the substances that induce the overwhelming inflammation in the lung.
 - Various medications that suppress this cytokine storm are being evaluated. The trick is to allow the person's immune response to protect

it from the virus, but at the same time to prevent the immune response from becoming overactive in a way that would be harmful. That is a perplexing balancing act that is challenging to refine.

- **Transfer (passive) immunity** - Another approach that we have been hearing about is the transference of immunity from a recovered COVID19 patient, who presumably has protective antibodies in their plasma. [Blood is drawn from person who has recovered from COVID19, their plasma is isolated and infused into an infected person]
- **Differences and controversies in the treatment** of COVID19 - Because this illness is so new there are no effective treatment that cure the disease currently. Therefore, every doctor uses their best medical judgement, and the best tools and data at their disposal, to what they think makes most sense based on their education and experience. The primary goal is to support the patients' needs to stay alive, so that the disease may take its course and resolve. And just as there are many highly skilled doctors with varied experiences, judgements and predilections, there the treatment that you may get if inflicted with the illness may differ depending on your doctor, your hospital, and your geographic location. At least until we know what works and what doesn't work. So, at least until then, it would be a good idea to take precautions and stay healthy.

FAQ

- Should we expect Pandemic to recede somehow when the weather gets hot? - NO
- Does a mask help? A mask is a physical barrier that prevent droplets from projecting into the air and landing on another person, or on surfaces. Wearing masks also makes you less likely to touch your face, which is how you would get infected if your hand touched a surface with viable coronavirus.
- Is this virus going to come back every year, like the Flu? We don't know, but it certainly may and is even likely. Therefore, developing a vaccine becomes that much more important even if it takes a few months or a couple of years.

- Should I go back to work? That is a balancing act that is different for every individual and family. There is a lot to consider and a lot at stake. Reach out to the appropriate resources to help you make the right decisions and implement them in a way that you and your family safe and solvent. I am fortunate, in these unfortunate times, to be uniquely qualified to be helpful to my clients and to others who have reached out.

Be well,

[Daniel Ruben, MD, MPH, MBA](#)



LifeStrategiesAdvisors.com
LSAWealth.com/blog.htm

This information is for general educational purposes only and is not to be construed as recommendation or advice. For legal, medical, financial or tax advice please consult your legal, medical, financial or tax professional before making decisions. Dr. Daniel Ruben is a Registered Principal, offering securities and advisory services through Independent Financial Group LLC (IFG), a registered broker-dealer and investment adviser. Member FINRA & SIPC. Life Strategies Advisors and IFG are unaffiliated entities