Coronavirus Q+A with Doctor Dan Ketterer (Version 2.0, updated 3/17/19)

Hi everyone, I'm Dr. Daniel Ketterer, an Infectious Disease physician in Atlanta, Georgia. I wanted to take a moment to help address some of the most pertinent questions regarding SARS-CoV-2 / COVID-19, and provide guidance for what you can do to help your family and society.

--What is Coronavirus/SARS-CoV-2/COVID-19?

Coronaviruses are a large family of RNA viruses primarily found in animals. Some of these viruses have altered their genetic code so that they can also infect humans in addition to animals.

There are 7 known coronavirus strains which infect humans, 4 cause a cold-like illness and 3 have caused more serious illnesses.

The 3 known to cause serious illness are:

SARS-CoV-1 (the virus that caused the 2003-2004 SARS outbreak)

SARS-CoV-2 (the virus that causes COVID-19)

MERS-CoV (The virus that causes Middle Eastern Respiratory Syndrome)

Using HIV as an analogy:

HIV is the virus/infectious particle that can cause the clinical syndrome known as AIDS.

SARS-CoV-2 is the virus/infectious particle that can cause the clinical syndrome known as COVID-19.

--What symptoms should I be aware of to suggest COVID-19?

The 3 most reported symptoms are (in order of prevalence):

Fever

Cough

Fatigue

Smaller numbers of patients also are presenting with diarrhea, muscle or joint aches, or headaches, as the first symptoms of COVID-19.

--How is this different from seasonal influenza?

This is very different and much more serious than seasonal influenza:

There are no approved treatments for COVID-19.

There is no protective vaccine for SARS-CoV-2 available yet.

There is no herd immunity to help limit the virus from being spread broadly.

The probability of developing severe lung disease (called Acute Respiratory Distress Syndrome or ARDS) is much higher with SARS-CoV-2

In severe cases, there are many reports now of patients dying of heart-related complications even if they survive their pneumonia or ARDS. This is especially true if they have a history of congestive heart failure or other heart disease.

--How is it spread?

The majority of cases are spread 2 ways:

1)Droplet respiratory transmission (coughing or breathing on someone)

2)Fomite transmission (a surface gets contaminated with virus from respiratory droplets, a person touches it, then touches their mouth, nose, or eyes).

There is a lot of concern in the public about airborne transmission and confusion about airborne and droplet transmission. To put it simply, droplet transmission occurs when respiratory secretions containing coronavirus are coughed or breathed out. These droplets tend to fall to the ground within 6 feet or so, which is why for social distancing, 6 feet is ideal.

Airborne transmission implies the virus-containing droplets are able to stay floating in the air for a period of time. This has the potential to infect people from the air even after an infected person leaves the room. Measles is an excellent example of this as it can remain infectious in the air for up to 2 hours and partially explains why measles is one of the most contagious diseases in humans, and highlights the importance of making sure you and your family have all been vaccinated.

At this time, the medical community is treating COVID-19 as a droplet spread disease and not spread through airborne transmission. This makes a big difference because the face masks required for airborne vs. droplet transmission are different. With droplet transmission, for the healthcare workers taking care of COVID-19 patients, a simple surgical face mask (the rectangular masks with 2 loops for your ears), is sufficient along with eye protection in the form of a face shield and a disposable gown and gloves so the virus isn't transmitted from patient to patient is sufficient.

If this was airborne, those taking care of COVID-19 patients would need additional layers of protection in the form of a fit-tested N95. An N95 mask means a mask filters 95% of all particles larger than 0.00003 centimeters in diameter, which should block enough of the virus-containing droplets in the air to prevent infection from diseases that spread via airborne routes. Besides the N95 masks and the protections needed for droplet precautions mentioned above, patients have to be placed in rooms with strict continuous air filtration or negative pressure to keep the virus or infectious agent out of the air as much as possible.

The health-care community is trying to be extra safe by requiring N95 masks for healthcare personnel taking care of COVID-19 patients ONLY if the infected person is receiving procedures that run the risk of aerosolizing the virus. These procedures include placing a breathing tube down the throat or providing nebulizer treatments that can create these virus-containing aerosols that could potentially stay in the air for a prolonged period of time. To be clear, from available data at this time, coughing or sneezing does not produce the aerosols that stay in the air to transmit SARS-CoV-2.

While airborne transmission via aerosol-producing methods is still being investigated, there have been case reports where health care workers have been exposed during aerosol- generating procedures. However, those exposed wearing ANY type of mask, surgical or N95, did not get sick. If guidance on this changes, I will update the guide.

In the meantime, healthcare providers are experiencing such severe shortages of N95 masks that most of us taking care of COVID-19 patients have to carry and use the same mask for an entire day. There is not a good reason for anyone in the general public, neither the sick in self-quarantine, nor the folks caring for the sick at home to have N95 masks. If you have unopened boxes of N95 masks at home, please see the end of this guide for an important recommendation that can save lives.

--Should I wear a surgical mask if I don't have symptoms?

Masks are intended for 2 populations right now:

1) Those who have COVID-19 infection.

2)Those in the healthcare field or caretakers in prolonged contact with confirmed or potential COVID-19 patients.

--If I'm infected with SARS-CoV-2, what is the expected outcome?

The outcome depends on multiple factors, namely if you are at high risk for severe disease, i.e. those with advanced age (over 60), congestive heart failure, immunocompromised or requiring immunosuppressive medications, diabetes, or pregnant. For the cases from China, 80% of those with the virus had mild illness and recovered, 14% developed severe disease (pneumonia, breathing issues) requiring hospitalization, and 5-6% developed critical disease requiring ventilators and other critical support interventions in the ICU.

--Who should be tested for COVID-19?

Until we have large scale testing kit availability AND a way to test people without putting uninfected people and health care personal at risk, those with mild symptoms (fever, cough) and who do not have risk factors mentioned in the previous question, should stay at home and contact the health department instead of leaving self-quarantine to get tested.

The health department will use your information to do something called contact tracing, which means try to identify people that may have given you the virus or those you could have potentially transmitted it to.

--How is testing performed?

For right now, the testing is via a swab sample from the inside of the nose and the back of the throat of a suspected infected person. The swabs are processed using a technology called RT-PCR to see if they can detect the RNA of the SARS-CoV-2 virus in the specimen. Additionally, many facilities are also testing for influenza and other respiratory pathogens that mimic COVID-19.

--Does the testing test for infectious SARS-CoV-2 virus?

No, it looks for the presence of certain RNA targets of the virus, but that does not necessarily mean the virus is infectious. This is most relevant when someone feels better and isn't having fever but still tests positive and makes the question of when someone can return to work and come off quarantine very challenging. On average, it seems most people once they get sick will shed virus for 7-12 days.

--What are the other limitations of the current screening test?

The RT-PCR test, if positive, confirms the diagnosis of infection with the SARS-CoV-2 virus almost 100% of the time. Simply put, if you test positive, you almost certainly have the virus.

However, a negative test can happen even if the person has been exposed to the virus in 3 main ways:

1)The individual is tested early after exposure and not enough virus is present on the swabs to meet the cutoff of a positive test.

2)The swabs are not obtained correctly. This can happen by using the incorrect swab type, or not swabbing deep enough in the nasopharyngeal cavity or oropharyngeal cavity where the virus tends to congregate

3)The transport of the swabs isn't done correctly, or the test itself is flawed, as is what happened with the original batch of test kits having faulty "controls" which made the tests inconclusive.

Improved testing methods that are based on targets on the virus that can be performed rapidly are in the works and aim to improve the speed of diagnosis.

--My church/school/event is closed/cancelled, does that mean someone there has the virus or that the outbreak is worsening?

No, do not fear public gathering closures, they are absolutely necessary right now to contain the spread of the virus so that we can best identify and treat those already infected.

If public gatherings continued to happen, tracing healthy people potentially exposed by the sick will become impossible for the health departments. If we can't identify and notify those exposed quickly, those exposed will spread the disease to more people instead of going into self-isolation. The best thing you can do is not panic and educate yourself in preparedness measures from CDC, WHO, NIH and your especially your local health department now so that in the event you or a family member gets exposed, you can immediately act on a plan.

--How long after exposure until I have symptoms?

The average has been 5-6 days with a range of 2-14 days. This is why those potentially exposed are being asked to self-quarantine for 14 days.

--How long after I start to feel sick until I feel better?

On average, people with mild illnesses, such as those with isolated fever and cough, can expect to take 2 weeks to fully recover. Those with more severe illness, such as pneumonia, breathing difficulties, ARDS or heart involvement, can take 3-6 weeks to fully recover if they do not worsen to the point of critical illness or death.

--What medicines are available for COVID-19?

Right now several medications are being developed and investigated. Some of these medications are already available today to treat different illnesses, some are medications that were developed to treat other viral illnesses and never released, and some are being developed now specifically because of this outbreak. Many of these medications have shown potential to stop the virus in laboratory settings, but outside of ongoing trials and a few cases, have not been used widely in humans in the current pandemic for SARS-CoV-2.

While there are many medications and vaccines in various stages of development right now, but there is not a well-tested, standard-of-care therapeutic approach to COVID-19 at this time. As treatment guidelines for COVID-19 are developed, I will update the guide with their recommendations.

Therapies and vaccines are being developed at a breakneck pace, but still need to be tested for safety before wide release. The first vaccine against SARS-CoV-2 went into human testing on 3/16, the fastest a vaccine has ever been developed after the discovery of a new infectious disease in the history of mankind.

--I tested positive for SARS-CoV-2, when can I return to work?

The main issue is we are not sure yet how long someone can transmit the virus after getting exposed. The guidance may be different for those in the healthcare field who would be needed to return sooner

to take care of sick patients and can wear a mask and are trained in preventing spread of the virus. The best answer for most people is from the NIH, and that is 2 negative coronavirus tests separated by at least 24 hours before returning to work.

--Can I spread the disease before I have symptoms?

Current evidence suggests that yes, this is possible. Virus shedding has been detected 24-48 hours before symptom onset and the infectiousness of SARS-CoV-2 is highest early in the disease course. There are currently at least 2 clusters of persons that have COVID-19 that point strongly to them obtaining the disease from an individual that carried the virus and did not have symptoms. This is called asymptomatic transmission, and enforces why preventing large social gathering with close contact to individuals is important even if you feel OK. Asymptomatic transmission is thought to only be responsible for a small amount of the COVID-19 cases, and the majority of spread occurs when someone has symptoms.

--Is there a reservoir for infection for SARS-CoV-2 like there is in HIV.

There is no evidence at this time to suggest that SARS-CoV-2 has a latent phase or reservoir for infection at this time.

--I heard children don't get sick with this, is that true?

For reasons that are still being worked out, children do not appear to be progressing to severe disease and dying at this time. Most children who get this seem to have mild flu-like illness. However, children are just as likely as adults to get infected and transmit it to others, including those with weakened immune systems. Additionally, the data on children's outcomes may be slightly skewed because the symptoms were so mild many children were not being brought in for testing. The outcome in children may change over time as more cases become recognized.

--Is there evidence that SARS-CoV-2 can be passed in utero and infect my developing baby?

Right now there is no evidence for something we in the infectious disease field call "vertical transmission" from mothers who were infected and later delivered babies. However, if a mother is sick with the disease, she can transmit it after birth. One very important caveat, because this disease has

only been recognized since December 2019, data only exists for mothers in the 3rd trimester with more data to come in the weeks and months to come.

--Is SARS-CoV-2 transmitted via feces/stool?

While the virus has been detected in the stool in those with severe disease, it has not been shown to be a method of transmission. This may be due to the virus in the stool being inactivated or the numbers shed being too low to cause infection. For right now, the majority of spread appears to be via respiratory droplets or contact with infected surfaces and touching your mouth, nose, or eyes. Regardless,washing your hands with soap and water is essential when contacting any potentially contaminated body fluids or surfaces.

--Are there any natural or complementary remedies I can use for COVID-19?

From the NIH “There is no scientific evidence that any of these alternative remedies can prevent or cure the illness caused by this virus (SARS-CoV-2)”

--Can I get infected again after having COVID-19?

Early data in monkeys re-challenged with the virus show that monkeys didn't get sick on a second exposure to SARS-CoV-2, provided it was soon after their first infection and they had protective antibodies in their blood. If this applies to humans and the duration and efficacy the antibodies we develop is currently not known, but being actively researched.

Here are some pragmatic things you can do that can save lives:

--Donate blood: Due to the coronavirus pandemic, many hospitals are facing severe blood shortages as their usual donors are no longer showing up. The facilities where you can donate blood have taken special precautions to keep you safe from coronavirus exposure. Despite the virus being found in the blood in a small percentage of severely ill patients, there have been NO cases of blood transfusion as a cause of COVID-19. Please consider donating blood so others do not die from transfusion-preventable illnesses.

--Practice social distancing. When around groups of people, try to keep a 6 foot distance from them in case they are coughing.

If you are sick and not wearing a mask, cough in the inside of your shirt or inside of your elbow. This is important even if you are alone, so the surfaces in your environment are not contaminated with the virus. The virus can remain infectious on some surfaces for 12 hours. If you are at home sick, put on a mask anytime a caretaker is within 6 feet of you.

--Make your voice heard: encourage locations that cause people to congregate close for prolonged periods of time (churches, concert venues, bars etc) to suspend activities or use webcasts. We as individuals need to be responsible for reducing the spread of SARS-CoV-2. Do more than just not show up, stop the spread in the community through direct activism.

--Be a calm, rational, leader with your social media posts. Do not spread photos of empty store shelves on social media. What starts as someone posting a photo of an empty toilet paper shelf, prompts scores to simultaneously go out and wipe store shelves clean in fear. Posting the photos creates a self-fulfilling prophecy. The grocery supply chain has not been disrupted and shortages are simply due to unnecessary overbuying exceeding expected demand. Get and share your information from trusted sources:I recommend the CDC, NIH, and WHO. Tony Fauci, in charge of the NIH and the US response to coronavirus is an excellent resource.

--Pay attention to kill times for disinfectants. Everyone now is aware of washing your hands (remember to get between your fingers!) for 20 seconds, but when you are cleaning surfaces which may be contaminated pay attention to the chemical kill time of the product you are using. The chemical kill time is on the product label and describes the amount of time that chemical must be on the surface before the virus would be considered ineffective at causing infection. A good example is bleach's kill time is 3 minutes. That means if you are wiping down a grocery cart with a bleach wipe, you should wait 3 minutes before contacting the surface. When in doubt about if you contacted a contaminated surface, wash your hands as soon as possible and don't touch your mouth, nose, or eyes.

--Don't focus on the number of cases and death rate. The number of cases WILL increase in this country as testing becomes more readily available and we identify those with milder disease. Since we focus our resources on testing the sickest when testing supplies are limited, the death rate will appear to be higher than it actually is. As we test more people with milder illness, the death rate will likely decrease.

--Don't panic about the lack of hand sanitizer, use soap and water instead! Don't worry about stores not having hand sanitizer or bother making your own. Soap works as well or better because this virus has a lipid (fatty) envelope to protect its easily-destroyed RNA. Soap breaks apart that virus envelope, making

the virus ineffective at spreading, and then you remove the remaining virus particles from your hands with running water and drying on a single-use paper towel.

--Did you horde N95 masks?

If the boxes haven't been opened, see if your local hospital will accept them. We are experiencing severe shortages and your donation can absolutely save lives.

This guide is for educational purposes and is designed to be a primer on SARS-CoV-2/COVID-19 for the average person. I prioritized clarity of language and brevity, while still providing actionable items. More details can be found on the WHO, NIH, and CDC websites, as well as by visiting the website of your local health department. Feel free to share this guide with friends and please leave comments on things you think would be helpful to include in future revisions. Hopefully, this guide will save lives.

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