COVID-19: What we know and don't know and what to do

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Imagine finding your way out of a forested swamp at night, not knowing if your next step leads you closer to the swamp's edge or deeper into the morass. That's what officials dealing with COVID-19 must feel. It reminds me of the months I led a UN team to fight the Ebola outbreak in Africa in 2014-2015. In the field of public health, trying to make the best decisions from a pile of often confusing data and an even larger stack of unknowns is a matter of course, but when faced with a global health emergency it is a heavy burden.

With every passing week, we gather new data on the 2019 coronavirus disease (COVID-19 for short; previously called 2019 novel coronavirus or 2019-nCoV) although faulty and conflicting information abound. What do we know so far and how can you protect yourself? Let's start with the basics.

The COVID-19 is a virus first detected last December in Wuhan, China. For many people, the virus causes mild symptoms (cough, runny nose, sore throat and fever) but it can be severe for others (breathing difficulties, shortness of breath, pneumonia, acute respiratory distress syndrome) and fatal to some. It appears that the elderly and those with pre-existing conditions such as diabetes and heart disease are more susceptible to severe illness.

Stopping the Transmission

As far as we know, COVID-19 is transmitted person-to-person mostly when tiny droplets are ejected by an infected person who coughs or sneezes and those droplets land in someone's nose, mouth or eyes, or are inhaled into the lungs. If we assume COVID-19 is typical of most respiratory viruses then people are most contagious when they show symptoms. This leads me to the first thing you can do to protect yourself: *maintain a social distance of at least one meter between yourself and others, avoid shaking hands, and move at least two meters away from people coughing and sneezing*.

Most respiratory viruses can also be transmitted when persons touch surfaces contaminated with the virus and subsequently touch their mouths, noses, or eyes. So here is the second thing you can do to protect yourself: *wash your hands often with soap and water, or use an alcohol-based sanitizer* (at least 60% alcohol). Be sure to use enough sanitizer to cover the hands and rub for about 25 seconds or until dry. Remember that sanitizers do not work well if the hands are greasy or soiled—wash dirty hands first.

Frequent hand hygiene is important especially in public places. When I trained doctors and nurses in Africa during the Ebola crisis, I put a harmless fluorescent powder on a pen and handed the pen out with the sign-in sheets. I then used blacklight—which causes the powder to glow—to show how quickly and unconsciously people transferred the powder to their mouths and noses. By using the powder, I also showed government officials how shaking my hands transferred the powder to them and how a cursory hand wash was ineffective.

Table 1: National Capacities for Detection and Response of COVID-10 (Adapted from "National capacities review tool for a novel coronavirus (nCoV)," draft, World Health Organization, 10 January 2020.)

CAPACITIES	MAIN ELEMENTS	EXAMPLES
Detection	National Laboratory System	Laboratories capable of conducting PCR specific for COVID-19
		Standardized procedures for specimen collection, packaging and transport
		Guidelines and protocols for quality management
	Surveillance and Risk Assessment	Event-based surveillance system
		Capacity of public health staff at local, regional and national levels to analyze surveillance data to detect outbreaks
		Capacity to conduct risk assessments
	Public Health Rapid Response Team	Training of rapid response teams in contract tracing and biological sample collection
		Availability of guidelines, procedures and contact tracing forms
		Training in the use and availability of personal protective equipment
		Surge capacity for contact tracing
Response	Command and Coordination	Public health emergency preparedness and response planning
		Emergency Operation Center / Incident Management System
		Multisectoral emergency response committee
		Dedicated financial support for surveillance, preparedness and response
	Risk Communication	Professionals trained in risk communication
		Mechanism for rapid clearance of timely and transparent communication messaging and materials
		System to detect and respond to misinformation, rumors and questions
	Point of Entry	Plans at each designated point of entry
		Means to provide information to travelers
	Case Management	Medical and ambulance teams trained on COVID case management
		Health facilities designated for patients with COVID
		Provisions for mechanical ventilation, N95 masks, gloves, etc.
	Infection Prevention and Control (IPC)	Functioning IPC program at health facilities where suspected or identified cases are found
		Triage system for acute respiratory illness
		Standard and/or droplet precautions for suspected or confirmed cases
		Airborne precautions for aerosol-generating procedures
		Isolation facilities for COVID patients
		Protocols for environmental cleaning and disinfection
	Logistics, Procurement and Supply Management	Logistics and supply focal points, procurement mechanisms
		Sufficient storage capacity, transport and distribution system

To prevent the spread of germs, I recommend that you wet your hands, apply soap, clean and rinse the faucet handle, then apply more soap. Lather well, not just the palms but also the backs of the hands, between and around the fingers, and finger tips for 20 seconds. (Here's a tip: singing the "Happy Birthday" song TWICE in your head while you lather takes about 20 seconds.) Then rinse well and dry with a clean towel or air dry.

These two common-sense precautions—maintaining social distance and frequent hand hygiene—will go a long way to protect you not just from COVID-19 but respiratory infections in general.

What about masks? First some basics. Diseases, such as the flu, SARS and COVID-19, can be transmitted by droplets that settle quickly out of the air within 1 to 2 meters. The World Health Organization (WHO) recommends using precautions for droplet transmission: that means a regular medical mask. However, for health professionals conducting procedures that could release aerosols, an N95 mask and a face shield or goggles are recommended. Unless you are doing a tracheal intubation, use a regular facemask and leave the N95 masks for those that need them the most: our frontline health workers.

Also, when it comes to masks, use common sense. Some use masks loosely or lower the masks to cover only their mouths leaving the noses unprotected. I

have also seen people who frequently pulled down or removed the uncomfortable masks without washing their hands, or reused cloth masks (less effective than medical masks) without washing them well between use. In these examples, the masks were problematic since any COVID-19 on the outside of the masks would have transferred to their hands and eventually the respiratory tract. Unless you work in crowded quarters and among people who might have respiratory infections, the face mask may provide only minimal added protection especially by keeping you from touching your nose and mouth. At worst, they could give a false sense of security if improperly used or removed without hand hygiene.

Disrupting the Contagion

What can you do personally to halt the spread of COVID-19? If you have a cough and mild respiratory symptoms, stay home until you are better. Wear a mask if you go out so as to protect others. If you have fever or difficulty breathing, you may have a respiratory infection and should seek medical attention promptly. Let the health worker know if you traveled recently to an area where COVID-19 has been reported or if you were in close contact with someone who did and may be experiencing respiratory symptoms.

Another way to disrupt the spread of COVID-19 is by practicing good cough and sneezing etiquette. WHO recommends coughing and sneezing into a tissue covering the nose and mouth, immediately discarding the tissue into a closed trash bin, and cleaning your hands as I described above. If you do not have a tissue, another recommendation is to bend your arm, place it in front of your mouth, and cough or sneeze into the crook of your elbow. Although studies show that these procedures only partially block the dispersal of droplets, they are considered by many health officials as better than coughing or sneezing into your bare hands and then touching door knobs, light switches, handrails, and other frequently touched items. Not covering up at all is the worst … and bad manners too.

This begs the question: after sneezing or coughing, how long does COVID-19 remain infectious in the environment? The short answer is: we don't know. Again, some basics. A virus is an infectious agent that needs the cell of a living host such as an animal to replicate. Outside the cell a virus exists as a particle of genetic material protected by a coat of protein. One often reads that some viruses can "survive" for days in the environment, but "survive" may simply mean that the genetic material can still be identifiable even though the virus may no longer be infectious.

The ability for viruses to remain infectious in the environment depends a lot on the concentration of the virus, the type of surface it is on, temperature, relative humidity and time. For example, the SARS coronavirus quickly loses its ability to infect at high temperatures (e.g., 38°C) and high relative humidity (80% or more). The flu and other respiratory viruses could survive for many hours on hard surfaces like plastic or steel compared to several minutes to an hour on porous surfaces like fabrics and tissue. In general, thorough cleaning with soap and water will remove most microbes. For schools and public facilities, clean hard surfaces daily and wipe door handles, railings, faucets, computer keyboards and other frequently touched items with alcohol for added safety.

Other Questions

There are a few more things worth mentioning. In the last few weeks, various estimates have been published of R_0, the basic reproduction number. Put simply, R_0 is a gauge of how contagious a disease is. Its interpretation is often presented simply: if R_0 is less than 1 the disease will decline and die out, but if R_0 is greater than 1 the outbreak will spread. Higher values of R_0 indicate a bigger outbreak or epidemic. The methods of estimating R_0 depend on the computer models, assumptions and data used. The preliminary estimates of R_0 for COVID-19 are between 1.4 to 3.9. This suggests that COVID-19 may be more contagious than Ebola in 2015 (R_0 = 1.5 to 2.5), perhaps similar to SARS in 2003 (R_0 = 2 to 5), and much less contagious than polio (R_0 = 5 to 7) or measles (R_0 = 12 to 18).

We also want to know the incubation time, i.e., how long does it take to cause symptoms? The incubation time for COVID-19 is still unknown although the US Centers for Disease Control and Prevention estimates it could be between 2 to 14 days.

What is the case fatality rate of COVID-19? In other words, just how deadly is it? That is yet another unknown. Computing the case fatality rate is not simple when an epidemic is ongoing since the real number of cases is often underestimated as mild cases are under-reported. One also has to account for delays in reporting, the time it takes between diagnosis and either recovery or death, as well as variations in how countries track cases and differences in the quality of medical care. The initial

Figure 1: DOH Infographic on COVID-19 regarding the virus (Retrieved February 24, 2020: https://www.doh.gov.ph/sites/default/files/basic-page/MKT%20%282%20Ano%20ang%20corona%29.jpg)

estimates of case fatality rates for COVID-19 as reported by the National Health Commission of China vary from 4.9% in Wuhan to 0.16% in other provinces of China. One study gives a tentative estimate of 3% for overall case fatality rate. Early estimates by WHO and others suggest 2% or lower. In either case, COVID-19 appears to be more fatal than swine flu or seasonal flu but less fatal than SARS (9.6%), MERS (34%) or Ebola (about 50%). Still it is too early to tell for sure.

A note on vaccines and treatment drugs: there are currently no vaccines or drugs proven effective against COVID-19. Much has been written about efforts to have vaccines ready for testing in several weeks and how antiviral drugs previously developed for SARS, MERS, Ebola and HIV are being re-purposed. Lest you think a vaccine or drug is just around the corner, be aware that even after accelerated lab testing to identify candidates, they must yet undergo at least three phases of clinical trials to prove their effectiveness and to determine appropriate doses and methods of administration, side effects and safety. China has begun phase 1 clinical trials of some drugs and plans to test a total of 30 therapies. An ambitious timeline for Phase 1 trials is two to four months. After candidates pass Phase 2 and 3 trials, they still have to be manufactured in huge quantities and made widely available. Antiviral agents and vaccines are urgently needed but it may be a while.

Response of Governments

One major challenge to government officials is how to present COVID-19 to the public. Communicating on a regular basis what is known, what is unknown, what is being done, and what people can do is an essential public health response. People have a right to be informed. Officials should proactively dispel misinformation and myths while being frank about the lack of data or degree of uncertainty of information. The public should be encouraged to take precautions and be provided with timely advice. The goal is to address people's concerns while preventing panic or complacency and at the same time gaining the trust and cooperation of the public.

I am reminded of Taiwan's Minister of Health and Welfare Chen Shih-chung. In addition to daily press briefings, he has repeatedly exhorted citizens to adopt protective measures and even donned a protective suit to personally escort Taiwanese evacuees from China to quarantine centers. During a press conference on February 4, he was visibly moved as he announced Taiwan's 11th confirmed case. When local media revealed that he had gone without sleep for 48 hours due to his intense schedule, many people rallied behind him. That level of public support will undoubtedly serve the country well as it struggles to contain the burgeoning epidemic.

Risk communication is only part of a larger strategy. Governments must expand national and local capabilities for diagnostic testing, surveillance

Figure 2: DOH Infographic on COVID-19 regarding symptoms upon contracting the virus (Retrieved on February 24, 2020: https://www.doh.gov.ph/node/19124

including case reporting and contact tracing, risk assessment, rapid response, health emergency planning including medical incident command structures, contingency planning at points of entry, COVID-19 case management training, logistics and supply management, and infection prevention and control, among others. There is much that the academic community can do to help build local and national capacities.

Facing the Future

Finally, let me leave you with some thoughts about the future. COVID-19 is a zoonotic virus, meaning that the disease spreads between animals and humans. Whether COVID-19 originated in bats, pangolins, snakes, or other animals is not yet clear, but it apparently spread to humans in the seafood market in Wuhan where wildlife was illegally traded. For this reason, WHO recommends avoiding wet markets where illegal wildlife is sold and following general food safety practices, such as cooking food thoroughly. Examples of other zoonotic viruses are the SARS coronavirus, which may have originated in bats then jumped to civet cats to humans; MERS coronavirus which was transmitted by camels; Ebola filovirus found in bats, forest antelopes, and infected monkeys; and H5N1 flu virus in birds.

If there are reservoirs of COVID-19, SARS, Ebola and H5N1 in the wild, does it mean they could again be re-transmitted to humans? Sadly, just as Ebola is making its tenth comeback in 40 years in the Democratic Republic of the Congo and a new outbreak of H5N1 has been reported in Shaiyang, China, epidemics of zoonotic diseases could become the new normal. COVID-19 may return periodically just like the four common coronaviruses already circulating in humans or like the seasonal influenza virus that we have gotten used to even though it sickens millions and kills around half a million people a year.

Intensification of agricultural practices and loss of habitats are pushing wildlife species together into smaller spaces, facilitating the transfer of new microorganisms to susceptible native species. The illegal international trade in wildlife, a multibillion-dollar industry, is undergoing a resurgence. Climate change is altering the geographic distribution of diseases transmitted by vectors such as mosquitoes or flies. Many developing countries have poor health infrastructures unable to cope with disease outbreaks. Add to this mix the ease of domestic and international travel through transport hubs swarming with people from many places and you have the "perfect storm" for more epidemics in the future.

During my work on Ebola in west Africa, I warned officials that Ebola outbreaks will recur so they should invest in strengthening their health systems. For the Philippines, whether it's SARS, measles, polio, dengue, or now the 2019-COVID-19, an

epidemic is a reminder and an opportunity to further enhance our health emergency response capabilities at all levels. In this way, we can minimize suffering and loss of life as we slog through future swamps of contagion.

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