The Coronavirus Disease 2019: A Pandemic on the Horizon?

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Coronavirus Disease 2019: A Novel Threat

Coronavirus disease 2019 (COVID-19) is a respiratory viral disease that was first reported during an investigation into an outbreak in Wuhan, Hubei province, China.[1,2] Starting from Dec 8, 2019, several cases of pneumonia of unknown etiology began to be reported in Wuhan, China. In the early stages of this pneumonia, severe acute respiratory infection symptoms occurred, with some patients rapidly developing acute respiratory distress syndrome (ARDS), acute respiratory failure, and other serious complications. On Jan 7, the Chinese Center for Disease Control and Prevention (CDC) identified a novel coronavirus from the throat swab sample of a patient; subsequently, the World Health Organization (WHO) named it 2019-nCoV.[1] The 2019-nCoV is a beta-CoV similar in sequence (80%) with the severe acute respiratory syndrome coronavirus (SARS-CoV), the coronavirus strain implicated in the 2002 SARS outbreak, but even more closely related to several bat coronaviruses.[3]

Symptoms of COVID-19

- For confirmed COVID-19 cases, reported illnesses have ranged from mild symptoms to severe illness and death. Symptoms can include:[4]
  - » **Fever**
  - » **Cough**
  - » **Shortness of breath**
- Less common symptoms may include the following:
  - » Headache, dizziness, abdominal pain, diarrhea, nausea, and vomiting.[5]
- The CDC, based on previous experiences with the incubation period of middle east respiratory syndrome viruses (MERS-CoV), suggests that the symptoms of COVID-19 may appear in as few as 2 days or as long as 14 days after exposure.[4]

Severity of 2019-nCoV Infection

Since the outbreak of COVID-19 began in December, a question at the forefront has been its mortality rate.[6] Case-fatality rate (CFR) is defined as the number of reported deaths per number of reported cases.[7] Although the 2019-nCoV strain has apparent increased infectivity (R0=2.2), suggesting that each patient has been spreading the infection to 2.2 other people, the CFR of COVID-19 appears to be lower than SARS-CoV (CFR=9.5%) and MERS-CoV (CFR=34.4%).[2,3,8] Between countries, CFRs vary significantly, and over time, which suggests considerable uncertainty over the exact CFRs.[7] The CFR for COVID-19 in Italy is among the highest in the world and was reported to be 12.8% as of 14th April 2020. Likewise, the CFR in China and India were reported to be 4.06% and 3.40%, respectively.[7]

Risk of 2019-nCoV Infection

The 2019-nCoV infection is of clustering onset, and it is more likely to affect older males, particularly those with underlying conditions, such as hypertension, heart disorders, diabetes, liver disorders, and respiratory disease. It can result in severe and even fatal respiratory diseases such as acute respiratory distress syndrome.[1,9]

Criteria for Evaluation of Patients

The CDC clinical criteria for COVID-19 persons under investigation (PUIs) have been developed based on

Table 1: The CDC clinical criteria for COVID-19 Persons Under Investigation		
Clinical features	**&**	**Epidemiologic risk**
Fever (100.4°F [38°C]) **OR** signs/symptoms of a lower respiratory illness, such as cough or dyspnea	AND	Any person, including healthcare workers, who has had close contact with a laboratory-confirmed COVID-19 patient within 14 days of symptom onset
Fever (100.4°F [38°C]) **AND** signs/symptoms of a lower respiratory illness, such as cough or dyspnea requiring hospitalization	AND	A history of travel from affected geographic areas within 14 days of symptom onset
Fever (100.4°F [38°C]) with severe acute lower respiratory illness, such as pneumonia, ARDS requiring hospitalization and without alternative explanatory diagnosis, such as influenza	AND	No source of exposure has been identified

available information about this novel virus, as well as what is known about SARS and MERS (Table 1).[10,11]

How does COVID-19 Spread?

Arguably, the 2019-nCoV, the virus that causes COVID-19, emerged from an animal source, but now there is evidence that human-to-human transmission has occurred among close contacts since the middle of December 2019.[2,8] Herein, it should be noted that person-to-person spread can happen on a continuum. Some diseases are highly contagious (like measles), while other diseases are less so.[2] At present, the 2019-nCoV seems to be spreading easily and sustainably from person to person in the community (community spread) in some geographic areas, such as China, Iran, Italy, Japan, and South Korea.[12]

Community spread means people have been infected with the virus in an area, including some who are not sure how or where they became infected. Mode of spread for 2019-nCoV can broadly be categorized as follows:[8,12]

- Person-to-person spread
- Between people who are in close contact with one another (within about 6 feet), through respiratory droplets produced when an infected person coughs or sneezes
- Spread from contact with infected surfaces or objects.

Prevention and Treatment for the COVID-19 Disease

Thus far, there is no specific antiviral treatment available for COVID-19.[2,5] Therefore, the approach used to treat patients with COVID-19 is meticulous supportive care and to treat the clinical symptoms, such as fever and dyspnea.[2,5,9] Supportive therapy and monitoring including oxygen therapy, fluid management and antivirals can be highly effective for those infected.[9] Also, the focus is to control the source of infection and use of personal protection precaution to reduce the risk of transmission.[5] The CDC has suggested some measures that should be followed to avoid getting infected (Box 2).[13]

Beginning of the Outbreak: Public Health Emergency

Taking into account the constant increase in the numbers of confirmed cases escalating within China, along with rising deaths, and along with the potential pandemic spread of 2019-CoV, the WHO reconvened on January 30, 2020 and the International Health Regulations Emergency Committee of the WHO designated the novel coronavirus outbreak as a "public health emergency of international concern" (PHEIC).[11,13,15] The same day, the United States issued a level 4 (do not travel) alert for China.[11] On January 31, 2020, a public health emergency (PHE) was declared for the United States to aid the nation's healthcare community in responding to COVID-19.[14] Box 3 presents the COVID-19 situation report by the WHO that has increased the assessment of the risk of spread and risk of impact of COVID-19 to very high at the global level.[16,17]

A Pandemic on the Horizon?

Zoonotic spillover, which is the transmission of a pathogen from a vertebrate animal to a human, presents a global

Box 1: Measures to avoid getting infected

- Close contact with sick people should be avoided
- Touching of eyes, nose, and mouth should be avoided
- A sick person should stay at home
- Cough or sneeze should be covered with a tissue that should later be disposed of properly
- A facemask should be used as per CDC's recommendations
  - » CDC does not recommend that people who are well wear a facemask to protect themselves from respiratory diseases, including COVID-19
  - » Facemasks should be used by people who show symptoms of COVID-19 to help prevent the spread of the disease to others
  - » The use of facemasks is also crucial for health workers and people who are taking care of someone in close settings (at home or in a health care facility)
- Hands should be washed often with soap and water for at least 20 seconds, particularly after going to the bathroom; before eating; and after blowing nose, coughing, or sneezing
- If soap and water are not readily available, an alcohol-based hand sanitizer with at least 60% alcohol should be used.
- Visibly dirty hands should always be washed with soap and water.

Box 2: COVID-19 Situation Report*

Situation in numbers (total and new cases in last 24 hours)	
Globally	1773084 confirmed (76 498)
	111652 deaths (5702)
European Region	913349 confirmed (33 243)
	77419 deaths (3183)
Region of the Americas	610742 confirmed (36 804)
	23759 deaths (2228)
Western Pacific Region	121426 confirmed (1310)
	4125 deaths (67) Eastern
Mediterranean Region	99713 confirmed (3768)
	5107 deaths (164)
South-East Asia Region	16883 confirmed (842)
	766 deaths (38)
African Region	10259 confirmed (531)
	464 deaths (21)
WHO RISK ASSESSMENT	Global Level
	Very High

* Data as received by WHO by 13 April 2020.

public health burden. With the increasing frequency of zoonotic spillovers leading to human infections and transmission, it is apparent that pandemic preparedness has become a priority for the global health agenda.[15,18]

An important aspect of whether or not 2019-nCoV will ultimately cause a global pandemic is its ability to become established upon its importation to a new geographical region. Herein, it should be noted that a lack of severe disease manifestations affects the ability to contain the spread of the virus. If infection does not cause serious illness, infected people most likely will not seek medical care and continue with their daily routine, thus potentially spreading the virus to new regions. Identification of chains of transmission and subsequent contact tracing are much more complicated if a large pool of infected people with potential to transmit the virus remain asymptomatic or mildly symptomatic. More pathogenic viruses that transmit well between humans can usually be contained effectively through syndromic (fever) surveillance and contact tracing, as demonstrated by SARS-CoV and, more recently, Ebola virus.[19,20]

Cases of 2019-nCoV infection have so far been reported in more than 24 countries, however little human-to-human transmission outside of China has occurred. Assuming that if this virus transmits efficiently, its seemingly lower pathogenicity as opposed to SARS, likely coupled with super-spreader events in specific cases, could allow large-scale spread. As follows, a virus with a low health threat on the individual level can pose an increased risk on the population level, with the potential to cause disruptions of global public health systems and economic losses. This possibility warrants the current aggressive response aimed at tracing and diagnosing every infected patient followed by fast isolation of symptomatic individuals, including self-isolation of those with mild symptoms and thus breaking the transmission chain of 2019-nCoV.[19,20]

When and how to use masks[19]

- **Putting on a mask:** A healthy person should wear a mask only in case of taking care of a person with suspected 2019-nCoV infection
- A person who is coughing or sneezing should wear a mask
- Masks are effective only when used along with frequent hand-cleaning with alcohol-based hand rub or soap and water
- It is important to know the proper way to wear a mask and dispose it of
- Before putting on a mask, hands should be cleaned with alcohol-based hand rub or soap and water
- The mask should cover mouth and nose and there should be no gaps between face and the mask
- **Wearing a mask:** A mask, while being used, should not be touched. If it is touched, one should clean the hands with alcohol-based hand rub or soap and water.
- The mask should be replaced with a new one as soon as it gets damp
- Single-use masks should not be re-used
- **Removing a mask:** Mask should be removed from behind (the front of mask should not be touched); it should be discarded immediately in a closed bin; hands should be cleaned with alcohol-based hand rub or soap and water.

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