

Challenges and Lessons from Novel Coronavirus Infection

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SARS-CoV-2 virus

A recently identified novel coronavirus (SARS-CoV-2 virus), which causes coronavirus disease 2019 (COVID-19), is spreading quickly across the globe, becoming global health and economic threat. As of 20 March 2020, COVID-19 has spread to over 157 countries worldwide. The outbreak seems to have begun at the Huanan seafood market in Wuhan, China because 66 percent of 41 initially infected patients had contact with the seafood market [1]. The novel coronavirus is genetically related to two other coronaviruses responsible for sudden acute respiratory syndromes-Middle East respiratory syndrome (MERS) and severe acute respiratory syndrome (SARS).

The coronavirus infection may have passed from animals to humans, such as bats are thought to be the original host of both SARS and MERS. It does not seem to be as deadly as SARS and MERS [2]. The mortality rate of this novel coronavirus is around 2 percent and is highly associated with older age and male gender. The mortality rate is much higher in people 80 years of age or older (14.8%). COVID-19's disease severity and fatality rate are also strongly linked to other chronic diseases, including cancer, chronic respiratory disease, diabetes, cardiovascular disease, and hypertension. Interestingly young children seem to be resistant to novel coronavirus infection. The mortality rate of male patients appears to be higher due to the high prevalence of smoking in men in China and perhaps biological factors [3].

The main route of transmission is air droplets from an infected person and close contact with a contaminated surface or infected person. However, it also seems to spread from asymptomatic infected persons during the incubation period before developing clinical symptoms. Another important issue is that coronavirus could be transmitted by pets, including dogs and cats. The WHO recommends that countries taking action to avoid spreading infection for the following three scenarios – first case, first cluster, and first evidence of community transmission [4].

The basic reproduction number is believed to be 1.5 to 3.0, depending on isolation and quarantine efforts [3-5]. At this moment, the standard method of diagnosis is by reverse transcription-polymerase chain reaction (rRT-PCR) from oral, anal, nasopharyngeal swab, blood, and sputum samples. This method is expensive and time-consuming and laborious with low sensitivity. The good news is the development of a rapid test against anti-coronavirus IgM and IgG from several countries, including China and Japan [6].

The major clinical features of COVID-19 are fever, headache, conjunctivitis, fatigue, myalgia, wet or dry cough, sore throat, and in some cases, shortness of breath. Severe cases are reported to occur in 14 percent of people who develop pneumonia, shortness of breath, respiratory failure, septic shock, and multi-organ failure [3-5].

There are several cases of reinfection reported from China and Japan. It could be explained by infection with different coronavirus strains. Another possible reason may be the development of quasispecies of coronavirus that are produced in the mutant storm of virus particles associated with RNA virus replication.

According to researchers at Peking University, the virus has evolved into two major strains—the 'L' and 'S' types. They reported in the National Science Review journal that "The L type was more prevalent (~70%) in the early stages of the outbreak in Wuhan, the frequency of the L type decreased after early January 2020". The original 'S-type' was milder and less contagious, while the mutated 'L-type' is more infectious and aggressive [7]. Due to the highly infectious nature of the virus and that airborne disease transmission has occurred in confined occupied spaces resulting in clusters of cases, quarantine and air quality management is essential for halting coronavirus spread. Improving hand washing and personal hygiene is also recommended by the World Health Organization [4].

This coronavirus outbreak continues to teach us lessons in the management of new and emerging infectious diseases, including how to prevent, prepare, and handle it. Widespread use of social networks without censorship also caused an infodemic of fake news, scapegoats, and misinformation similar to that which occurred during the SARS epidemic fueling panic, racism, and speculation that has spread around the world population at unprecedented speed. This requires us to develop better public health leadership systems and improve the education of society and enhanced disaster management training for citizens. The outbreak of the coronavirus COVID-19 has illuminated many other challenges associated with globalization. With globalized supply chains and just in time deliveries, our lifestyles and livelihoods are now very much dependent on each other at a global level. This is a big reason the virus outbreak has been global.

The negative impact of COVID-19 on financial markets, small business, racism (racial discrimination), and long-term quarantines will influence mental health. Anxiety, fear, depression, panic, defiance and other stress disorders detrimentally affect the immune system. To prevent mental illness and improve our immune systems, we need good deep sleep, fresh air, stress management, meditation, proper exercise, and a healthy perspective on our situation. Strict public health measures (quarantine etc) and evidence-based information from reliable sources, effective and rapid communication can help reduce stress [8]. Psychiatrists advise us that a positive attitude, family and societal support, and positive tone coverage from the media are indispensable measures for psychological wellbeing during the coronavirus outbreak.

It has been 102 two years since the influenza pandemic of 1918, which infected a third of the world's population within months, killing more than 50 million people worldwide [9]. A clear lesson to learn from this experience is the importance of leadership. In the U.S. during the pandemic, President Woodrow Wilson was so focused on winning World War I that he largely ignored the advice of many public health officials, his military leaders, and personal physician regarding the influenza pandemic. The United States ended up losing 675,000 people to influenza compared to 53,000 killed during combat in World War I. The city government of Saint Louis, Missouri, in the U.S. implemented an isolation policy that led to death rates 50% lower than in Philadelphia, which did not. The pandemic began a national discussion on health leadership in the U.S., which led to the formation of the National Institutes of Health a decade later in 1928 [9].

In the summer of 1666, the University of Cambridge was closed due to the plague that had engulfed England. Dr. Isaac Newton, lying under the apple tree in his estate, had an apple drop on his head, leading to his discovery of the law of gravity that opened our understanding of the astronomy and the physics of mechanics and motion. As every cloud has a silver lining, during 2020, please think of ways of making scientific progress during this COVID-19 quarantine.

Wash your hands! Use facemask and gloves. Keep calm. Stay home. Stay informed. Build your immune system. Sunshine is good!

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