

Strategy to Contain COVID-19

Ashok Kumar Tiwari, Professor, Department of Pharmaceutical and Drug Research and
Lakhwinder Singh, Professor and Cordinator, CDEIS, Punjabi University, Patiala

The pandemic of COVID-19 that started from Wuhan, China is continuing unabated transgressing continents, race, gender and social strata. Social disintegration and economic devastation caused by this 'biological havoc' will only be known after things become normal. Currently, the only concern is to save human life.

The disease has been named 2019-nCoV as it is caused by a novel corona virus (CoV). The virus responsible for this pandemic is novel in the sense that it has not infected human race earlier and is the seventh CoV identified to infect humans and cause respiratory diseases like the previously reported six CoVs. The genomic constitution of this novel corona virus belongs to the genera of beta corona virus that are known to possess the capability of infecting mammals. This virus is less lethal (2-3.4% mortality) than the earlier reported SARS-CoV (10% mortality) and MERS-CoV (37% mortality). However, it is aggressively virulent and contagious with extreme ability to spread from human-to-human contact and exposure. Reports suggest that it can survive on plastic sheets, metal surfaces, glass, cardboard and clothes ranging from 2 hours to 2 to 3 days depending on the humidity and temperature because it is composed of an assembly of RNA.

A detailed genomic analysis indicates that 2019-nCoV resembles 96% to the genome of a bat CoV. The spike proteins of 2019-nCoV responsible for infecting human have been studied and computational analysis data have not revealed any mutations that could make it adaptive

to attach to ACE2 enzyme of civet cats as was earlier thought. Though its genomic character resembles that of a particular strain of bats, chances of bats coming in direct contact with human are very low. Recently, detailed analysis has revealed that 2019-nCoV isolated from pangolins (a shy, sightless termite eater) resembles 99% in genomic sequence with that isolated from patients. However, questions also arise about the extravagant culinary interests of inhabitants of Wuhan where many varieties of sea food and wild animals are available for human consumption. Therefore, the role of other animals in contributing to this viral infection still remains to be established. Nevertheless, with the data in hand, it would not be out of context at least presently, to apprehend that the route of this viral infection was bats-to-pangolins-to-humans. However, it is still a matter of rigorous investigation to pin point the source and intermediary host for 2019-nCoV.

2019-nCoV infected people experience symptoms typical of CoV invasion initiating from dry cough, sore throat, sneezing, mild to high fever, chest congestion, difficulty in breathing, diarrhoea and eventually cessation of respiration. The most intriguing aspect of this infection unlike SARS and MERS-CoV is that the 2019-nCoV patients develop severe symptoms requiring medical attention only after 10 days (2-14 days average) of catching the infection. Therefore, during this period the patient easily passes on infection to persons coming in contact and there is no lead time available to segregate the patient in order to prevent the infection from spreading. Hence, control of situation begins when it has already taken the form of an epidemic. This was evident in Italy, Spain, Iran and Germany.

2019-nCoV positive patients have been found to have high concentration of all biochemical's indicative of inflammation. Progress of the infection also leads to lung damage and is tested though chest CT scan. Sophisticated techniques involving RT-PCR confirm the presence of virus in blood of patient.

A noteworthy fact is that this virus has infected humans for the first time. Thus, there is no specific drug or vaccine available currently for its treatment. The development of new drugs and vaccines are very costly, involves time consuming processes and thus not viable for such emergency situations. Therefore, as the immediate option, existing drugs have to be tested against this virus.

The National Health Commission of the People's Republic of China has recommended a combination of drugs ritonavir and lopinavir to be used against Wuhan pneumonia. Few results also suggest combination of anti-viral drug remdesivir and anti-malarial drug chloroquine to be effective. Another anti-viral drug flavilavir has shown significant improvement in congested chest condition due to this viral infection in Shenzhen. Vaccine development at various institutions of higher learning and research including the University of Pittsburgh's Center for Vaccine Research (CVR) of the USA is also underway. However, these trials have a long way to go before treatments could be approved for universal use.

In view of the intensity of spread and devastation in terms of human deaths and currently limited treatment options available, the first line of action therefore desired is to prevent the viral infection from spreading to other people. Physical/social distancing of people and hygiene is the first step in order to prevent carriers of virus (asymptomatic patients) or infected people from contacting other people in the vicinity. In addition, it is essential to apply extensive testing involving biochemical and radiographic techniques and segregate the person suspected of having contacted this viral infection. Early containment of suspected patients will not only prevent the spread but also result in decreasing the need of high tech equipment for saving the precious lives of patients.

The most successful control mechanism has been displayed by South Korea. The Korean model of containing COVID-19 and minimum damage of both human and economic is

widely acclaimed and recognized. The leading powers in the Europe and the North America have been seeking advice from the South Korean president as was done in 2007 financial crisis from the then Indian Prime Minister Manmohan Singh. However, the South Korean experience is backed by an excellent public health care and responsive governance institutional system. The swift development of portable testing kits and harnessing information communication technologies were based on sound capabilities generated in the public research system. It indicates that adequate capability building to deal with exigencies depend on national innovation and research system. South Korea is leading in investing highest proportion of GDP in research, innovation and development system. India can learn lessons from the successful containment of COVID-19 in terms of upgrading the health care system and long term capacity building in innovation and research system while investing at least 2 percent of GDP compared to current level of 0.8 per cent in R&D.