

Coronavirus Pandemic

Coronavirus Pandemic: a major public health crisis for the developed and developing world

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Abstract

Pandemic of novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) infections in China is now become global public health crisis. At present 87.64% of the world is infected by this deadly illness. The risk from this epidemic depends on the nature of the virus, including how well it transmits from person to person, and the complications resulting from this current illness. The novel coronavirus has killed thousands of people in China and other countries as well; its rate of mortality is increasing day by day. There is an urgent need to control the virus by developing vaccine or any other antiviral drugs to save the world from this deadly viral infection.

Key words: COVID-19; pandemic; public health crisis.

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During 8 December 2019, several cases of pneumonia of unknown etiology have been reported in Wuhan, Hubei province, China [1]. On 7 Jan 2020 a novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) was identified by the Chinese Center for Disease Control and Prevention (CDC) from the throat swab sample of a patient, and was subsequently named 2019-nCoV by WHO [2]. SARS-COV-2 name has been given by International Committee on Taxonomy of Viruses (ICTV) and disease is named Coronavirus disease 19 (COVID-19) by WHO. The new deadly SARS-COV-2 has been spreading. As of 7 May 2020 more than 3,836,209 confirmed cases have been reported world-wide including 265,366 fatal cases with case fatality rate (CFR) of 7.01% while 1,307,737 patients have been recovered from the infection. In addition, SARS-COV-2 has now been affected more than 212 countries and territories around the world with USA being at the top [3]. Updates from China, and other countries indicate that the disease associated with SARS-CoV-2 appears to be relatively more contagious and rapidly spreading as compared with Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) CoVs [4] (Figure 1).

Both SARS and MERS CoVs are zoonotic and epidemiologically similar. Symptomatic cases of both

viruses usually present with moderate-to-severe respiratory symptoms that often progress to severe pneumonia [5]. Both SARS and MERS CoVs were believed to originate in bats [6]. The majority of SARS and MERS CoVs cases were associated with nosocomial transmission in hospitals [7], resulting at least in part from the use of aerosol generating procedures in patients with respiratory disease. Nosocomial super-spreader events appear to have driven large outbreaks within and between health care settings. For example, travel from Hong Kong to Toronto by one person with SARS CoV resulted in 128 SARS cases in a local hospital. Similarly, the introduction of a single patient with MERS CoV from Saudi Arabia into the South Korea health care system resulted in 186 MERS cases [4].

Large proportion of viral pathogens have recently emerged in humans and are considered to have originated from various animal species. This is shown by several recent epidemics such as, Avian flu, Ebola, Monkey pox, Congo, and Hanta viruses [8]. For the third time in as many decades, a zoonotic (SARS-COV-2) has crossed species barrier to infect human populations.[9] SARS-COV-2 is the third coronavirus to emerge in the human population, an emergence that has put global public health institutions on high alert

[4]. The first, discovered in 2003 and named SARS-CoV, caused SARS, a serious and atypical pneumonia. The second, MERS-CoV, emerged a decade later in the Middle East and caused a similar respiratory ailment called Middle East respiratory syndrome (MERS).

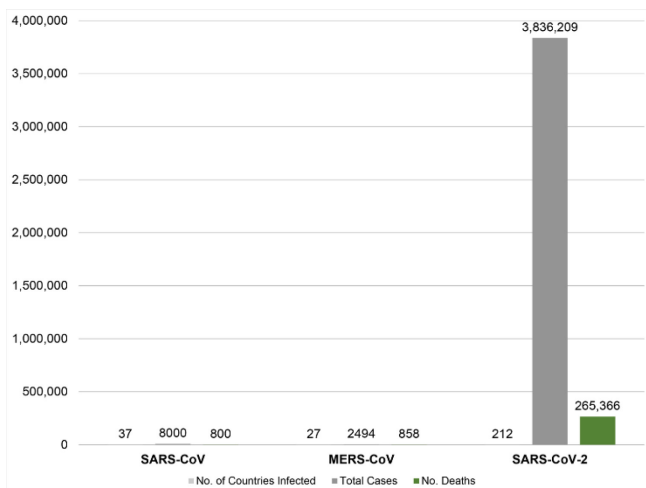
Consequently, the SARS-COV-2 outbreak has led to implementation of extraordinary public health measures to reduce further spread of the virus within China and elsewhere. On 30 January 2020, SARS-COV-2 was declared as global health emergency and 11 March 2020 it is declared as a global pandemic by the World Health Organization (WHO) [10]. The local government in Wuhan also announced on 23 January 2020, the suspension of public transportation, with closure of airports, railway stations, and highways in the city, to prevent further disease transmission [11].

Infections in medical workers and family clusters were also reported and human-to-human transmission has been confirmed [12]. Most of the infected patients had a high fever and some had dyspnea, with chest radiographs revealing invasive lesions in both lungs [13]. Human to human transmission of coronaviruses is primarily thought to occur among close contacts via respiratory droplets generated by sneezing and coughing [14]. Rapid information disclosure is a top priority for disease control and prevention. A daily press release system has been established worldwide to ensure effective and efficient disclosure of epidemic information. Public awareness campaigns should be launched for disease control and prevention to promote precautions for travelers, including frequent handwashing, hand sanitizer, cough etiquette, and use of personal protection equipment (e.g., masks) when visiting public places. Also, the general public should

be motivated to report fever and other risk factors for coronavirus infection, including travel history to affected area and close contacts with confirmed or suspected cases [11]. Thermal scanners are effective in detecting people who have developed a fever because of infection with the SARS-COV-2. However, it cannot detect asymptomatic cases which are a very serious hurdle in the control of virus transmission. This is because it takes between 2 and 14 days before people who are infected become sick and develop a fever (WHO 2020). As reported in *The New England Journal of Medicine (NEJM)* by Rothe *et al.* in Germany that the transmission of SARS-COV-2 from asymptomatic case has already been reported [15]. As already performed for other important DNA/RNA viruses [16, 17], a number of SARS-COV-2 detection tests/kits have been recently developed [18]. These kits included both molecular and immunological protocols, for the detection of SARS-COV-2 RNA [19] and circulating anti-SARS-COV-2 antibodies [20], respectively. In addition, particular attention has been given to the droplet-digital PCR assay for the detection of SARS-COV-2 RNA which shows a significantly better performance in detecting low viral load samples compared to other methods currently employed for clinical purposes [21].

For prevention of nosocomial transmission it is necessary for Public health agencies to educate front line medical staff regarding the clinical characteristics of the SARS-COV-2 and to conduct biosafety and biosecurity trainings for hospital staff, epidemiologist and virologist because majority of SARS and MERS CoVs cases were associated with nosocomial transmission. Developed countries have the capability to tackle the situation now but it will be very difficult if medical staff is not fully aware about the disease then it will be a very difficult situation for developing countries like Pakistan, India, Afghanistan, Mongolia etc. One issue is how prepared the world’s health infrastructures are to respond to an outbreak of this scale. It’s clear the large number of cases of COVID-19 is testing in the health infrastructure in China. Yet, China was able to build a hospital for affected patients in a matter of days. No other country except china could mobilize resources and manpower at such speed. While health systems in high-income countries like America and other European countries would be able to tackle the outbreak, the most shocking effects would be in countries with poor health infrastructure, political unitability or pre-existing infectious diseases. In these countries, it is dire need for rapidly identification of the

Figure 1. Number of infected countries with SARS, MERS and SARS-CoV-2, number of cases and number of deaths.



virus and to contain the infection at the points of entry to prevent local transmission.

Pakistan is one of the endemic countries for various infectious diseases and has experienced many outbreaks and epidemics every year. Approximately, 50,000 of Chinese working in Pakistan and 28,000 of the Pakistani students are there in China; over 500 students are in Wuhan City. So, there is frequent moment from China to Pakistan and viceversa. However not a single case of coronavirus has been imported from China to Pakistan due to the extra-ordinary management of Chinese health authorities. The cases of Coronavirus have been reported from more than 212 countries and territories; however, 24,073 cases with 564 deaths (CFR 2.34%) have been reported officially in Pakistan. All 24,073 confirmed cases in Pakistan include both travelers from Islamic Republic of Iran, Syria, London, England, Doha and Dubai and local transmission. Out of these 24,073 patients 6,464 have been fully recovered and 17,609 are still active cases and admitted in isolation wards of different health care settings. A total of 15,995 travelers from Iran, have so far been quarantined at different quarantine center and Taftan border. Pakistan shared a porous border with Iran and Afghanistan and hundreds of people move here and there on daily bases. According to the current outbreak situation the control and prevention of the infection need very strict and well-planned procedure and protocols to contain the viral transmission.

Pakistan has the capacity to diagnose the virus but there are no any specific precautionary measures as for as the prevention of this virus is concern. Strong preparations and stringent measures for early detection of potential cases and control measures must be implemented. A number of researchers reported the need of rapid and low-cost kits for the detection of SARS-CoV-2 [22-24]. These rapid and low-cost tests could be employed in Pakistan as well as in other low-income countries thus improving their healthcare systems.

Currently, there is no specific antiviral or vaccine against SARS-COV-2 available. Therefore, identifying effective antiviral agents or vaccine, to combat the disease is urgently needed. However, a number of clinical trials have been started during last months which includes anti-SARS-CoV-2 convalescent plasma, SARS-CoV-2 Specific T Cells etc.[25]

In conclusion, keeping in mind that virus is spreading very fast infecting many countries of the world, in this situation it is suggested that every infected country must establish diagnostic facilities at district level to tackle the outbreak/epidemic within shorter

period. However, the overall health infrastructure of Pakistan, Afghanistan, India, Nepal and Bangladesh is very poor. These countries already experienced the outbreaks and epidemics of many infectious diseases including Dengue, Measles, Chickenpox, HIV, TB and Typhoid. In this regards these countries needs well planned preparedness for the control and prevention of Coronavirus epidemic.

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Authors' Contributions

RU and MSR conceived and design the study. RU, MSR, and MQ analyzed data. RU, MSR and NA wrote the manuscript. All authors read and approved the final version of the manuscript,

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