

# Strategies to Control and Prevent Novel Coronavirus 2019: A Quick Overview

Anees Muhammad, Johar Ali, Abdul Manan, Hidayat Khan, Muhammad Owais

## ABSTRACT

The emergence of Novel Coronavirus (2019-nCoV) in the Wuhan City of China and its rapid shedding among countries, which reminded the history of Severe Acute Respiratory Syndrome (SARS) happened almost two decades ago. However, the genome sequence of 2019-nCoV shared within few days of outbreak shows the better response of China and the world against the virus, perhaps due to the availability of advanced technology and lesson learned from previous epidemics. The researchers trying to determine the virulence, pathogenicity and transmission of 2019-nCoV. It is believed that disease reporting and data sharing about the emerged Coronavirus with international researchers are important steps to reduce the spread of the virus to the rest of the world. This report is aimed to understand the current status of the 2019-nCoV, problems related to it and possible measures for prevention. The infection may spread through wildlife and asymptomatic patients. People in underdeveloped countries having no basic facilities are at higher risk. Ban on wildlife trade and avoiding unnecessary traveling for a certain period is required to minimize the spread of the disease. The use of face masks, keeping away from the public gathering are other possible means of precautions, capacity building of health workers and provided relevant facilities (equipment, kits, etc.) to underdeveloped countries will further help to contain the pandemic. In the current scenario, it is concluded that 2019-nCoV is spreading irrespective of the borders and become pandemic. Extensive research is a cry of the day to contain the virus and curtail human losses.

**Keywords:** Control, Prevention, transmission, 2019-nCoV, Corona and Covid-19.

*This article may be cited as:* Muhammad A, Ali J, Manan A, Khan H, Owais M. Strategies to Control and Prevent Novel Coronavirus 2019: A Quick Overview. J Liaquat Uni Med Health Sci. 2020;19(01):01-05. doi: 10.22442/jlumhs.201910651

## INTRODUCTION

Coronaviruses (CoVs) are a single positive-stranded RNA virus belonging to family Coronavirinae. CoVs are the largest RNA virus having a 26-32 kilo bases genome<sup>1,2</sup>. Previously CoVs were reported with six strains and were categorized in low (OC43, 229E, NL63, and HKU) and highly pathogenic (SARS and Middle East Respiratory Syndrome (MERS) CoVs. Low pathogenic CoVs are responsible for mild respiratory tract infections whereas highly pathogenic CoVs mostly target lower respiratory tract leading to severe and fatal pneumonia<sup>2,3</sup>. SARs-CoV developed in 2002-2003, infected approximately 8,000 individuals with 9.6% mortality,<sup>4</sup> whereas MERS-CoV infected 2,500 people with 34.4% mortality since 2012<sup>5</sup>.

### History of Outbreaks

In mid of December 2019, various cases reported causing SARS like illness with unknown etiology in Wuhan city, Hubei province of China<sup>6</sup>. In the beginning, pneumonia like symptoms appeared followed by acute respiratory syndrome and other serious situations. On January 7, 2020, the pathogen collected through a throat swab was identified as 2019

-nCoV by World Health Organization (WHO)<sup>7</sup>.

### General Characteristic

The 2019-nCoV is highly infectious having a survival time of about 2 hours in the air and incubation period from 4 to 8 days. The main source of infection is asymptomatic patient period and primary individuals. All age individuals are equally prone to infections<sup>7,8</sup>. Till now, the major route of transmission is respiratory droplets. Vertical transmission is another plausible way of transmission as a newborn baby of 30 hours old was confirmed with COVID-19 infection in Wuhan Children's Hospital<sup>9</sup>. Besides, contact with the ocular surface, contaminated infectious body fluids and droplets are the means of disease spreading amongst the population<sup>10</sup>.

### Possible Transmission

From the initial investigation, cases of COVID-19 infections were linked to Wuhan's Huanan seafood wholesale market as most of the patients were living around or working at the market and were trading varieties of live animals such as snakes, bamboo rats, marmots, raccoons, bats and poultry<sup>7</sup>. The phylogenetic analysis revealed that 2019-nCoV genome is linked with SARS spread by a bat<sup>11,12</sup>. However, the definitive host is unknown but likely

similar to that of SARS and MERS-CoV between bats and humans. Furthermore, pangolins are also suspected intermediate hosts for COVID-19 infection<sup>9</sup>. Various reports show animals to human and human to human transmission. Human to human transmission was confirmed by the infection of health care workers who were in close contact with infected persons in Wuhan hospital<sup>13</sup>. A report from China revealed that 15 health care workers were infected with COVID-19<sup>14</sup>.

The genomic sequences of nCoVs show greater than 99.9% sequence similarity to each other indicating a single source origin<sup>15,16</sup>. However, the probability of mutations is high after its transmission from one person to another.

#### **Current Status**

Till March 11, 2020, about 109,577 cases were confirmed in 104 different countries of the world in which 73.8% cases (n = 80,904) and 3,123 deaths were reported from China. In the rest of the countries, 28,673 confirmed cases have been reported with 3,948 deaths. Three new countries including Albania, Bangladesh and Paraguay reported their first cases of 2019-nCoV. The outbreak of 2019-nCoV is also reported in the Republic of Korea (7,382 cases and 51 deaths), Italy (7,375 cases and 366 deaths) and Iran (6,566 cases and 194 deaths) having a mortality rate of 0.69%, 4.96%, and 2.95%, respectively.

A total of six cases has been reported in Pakistan and is estimated that reported cases in Pakistan are imported from Iran<sup>17</sup>. On February 27, 2020, two cases were confirmed, one from Islamabad and other in Karachi. A female patient from Gilgit Baltistan was also confirmed with COVID-19 and her history shows traveling to Iran in past week. Unofficial news from health authorities reported nine new cases in Pakistan till March 10, 2020, in which majority cases identified from populated and industrial region, Karachi.

#### **Clinical Manifestation**

The symptoms of the disease reported are myalgia, dry cough, fatigue, and fever. Few patients were also noted with hypoxemia and dyspnea, which further leads to respiratory distress, septic shock, coagulation dysfunction and metabolic acidosis<sup>8,11</sup>.

#### **Diagnosis and Treatment**

Specific serological and rapid immunochromatography tests are yet not available, therefore, diagnosis is based on clinical features and epidemiological risks along with chest computerized tomography (CT)<sup>11,18</sup>. Moreover, patients' close contact history with suspected or confirmed patient(s) of COVID-19 or traveling history to Wuhan city in the past few days is suspected. Besides, patients with fever or respiratory issues between the incubation period can be suspected. Suspected cases can be confirmed by real

-time polymerase chain reactions (RT-PCR) from serum and/or specimen of the respiratory tract<sup>16</sup>. No specific treatment is available for the COVID-19 however, HIV-protease inhibitors are effective to some extent as 2019-nCoV may have similar functional proteins like HIV (RNA virus)<sup>19</sup>.

#### **Control and Prevention**

The Rapid and efficient identification of a 2019-nCoV by China prevented the world from severe pandemic. The Chinese scientist reported the genetic sequence of 2019-nCoV within 14 days after a cluster of cases received by the hospital on 27th December 2019<sup>20</sup>. The quick response by China shows its scientific strength and advancement in public health<sup>21</sup>. However, this COVID-19 spread rapidly through infected patients who travel inside China and worldwide. Joint global efforts are required to control and prevent the transmission of 2019-nCoV. The Chinese government took extra-ordinary precautionary measures to halt transmission including travel restrictions, which decreased new cases inside the country<sup>22</sup>.

#### **Issues related to 2019-nCoV and their possible solutions**

The outbreak was suspected having an association with bats, snakes and wild animals trade market. For a quick outcome, a ban on wild animal trade must be imposed temporarily while for long-lasting effects, policymakers of public health experts need to regulate wild animal trade and its consumption<sup>23</sup>.

The asymptomatic patients have similar viral load like symptomatic individuals, which further transmit disease among healthy community making the COVID-19 more challenging than other diseases<sup>22</sup>. Immunocompetent patients like adults spread 2019-nCoV more than immunocompromised due to mild and asymptomatic nature<sup>24</sup>. Furthermore, the highest risk period of viral shedding begins during mild symptoms and studies reported asymptomatic transmission<sup>25,26</sup>. This mask killer needs to be diagnosed in early stages for which early detection diagnostic kits are required to reduce the infection.

Open borders among different countries may increase the chances of a pandemic. It is necessary to close the borders for any type of trade and public movement till the end of the epidemic; otherwise, it may lead to pandemic through various routes including airports. The threats can be reduced by decrease traveling to the regions with elevated risk. Airlines should be suspended till the end of the outbreak and local screening systems should be arranged at airports as recommended by WHO<sup>27</sup>.

The developing countries having poor lifestyles, weak health settings and inefficient diagnostic capability may be more prone to severe epidemics<sup>22</sup>. In the

emerging scenario, it is urged to focus on underdeveloped countries including the African regions, where even basic facilities do not exist. Therefore, WHO and local health organizations need to provide the basic equipment in such regions to prevent and control the virus before any disaster at the global level.

Corona virus is a respiratory virus; therefore, a surgical face mask is a primary protective component in the personnel protective equipment. Face masks are the important elements in health care settings and also recommended for a person having an infection or taking care of the infected person in the community. Moreover, proper hand washing is also among the important precautionary measures. Personnel hygiene and sanitation facilities can reduce the risk in an individual as well as in population.

Person to person transmission is already reported by various studies; hence, it is required to contact with clinicians after symptoms become appeared. In the other case, patients should be isolated inside their houses.

The 2019-nCoV has similar phylogenetic lineage like SARS and MERS however, no specific laboratory test has been designed for detection of 2019-nCoV except the only option of real-time PCR. Therefore, the rapid identification of 2019-nCoV at the molecular level is recommended. Besides, risk assessment, development of diagnostics kits, effective vaccines and treatment against 2019-nCoV are the demands of the current situation.

The health care facilities in developing regions of China and the rest of the world should be checked properly and timely. Further spread of 2019-nCoV can be reduced by avoiding traveling to high-risk areas, contact with suspected patients of COVID-19 and reduced consumption of raw meat and meat products<sup>28</sup>.

The development of isolated health care settings on an emergency basis is required in each elevated risk area, which needs financial support. The Chinese government released ¥1 billion funds to control the further spread and is used to facilitate the newly constructed hospitals for the COVID-19 outbreak<sup>29</sup>. More funds will be required for hospitals to increase health facilities for patients as well as health care providers throughout the world.

## CONCLUSION & RECOMMENDATIONS

It is concluded that China and the rest of the world is facing a newly emerging enemy in the form of 2019-nCoV. The COVID-19 cases and its mortality little decreased in China but still continuously spreading and cases are increasing day by day throughout the world. Every individual in the world is at high risk and

nobody is safe. The people look panic but victory is not far against COVID-19.

It is necessary to modify our public health organizations in sense of detection, diagnosis, and treatment to avoid the spreading of 2019-nCoV. Globally and regionally, it is the collective responsibility of all stakeholders to develop guidelines and create awareness across the globe to avoid further spread of the virus. A collaborative future action plan is proposed under the umbrella of WHO to bring together all health care organizations and come up with an emergency action plan against the unseen enemy (2019-nCoV). In addition, more data regarding the virus transmissibility and pathogenicity is required at a molecular level. It is also necessary to develop anti-coronaviral drugs and vaccines on urgent bases. Awareness among the communities and strengthening the public safety protocol are crucial on emergency base for control of the 2019-nCoV transmission. Moreover, COVID-19 infection is recoverable but the virus needs to be contained. The collaboration among scientists across the world would be helpful to plan additional strategies to prevent the current outbreak and curtail future epidemics in the world.

## ACKNOWLEDGMENT

Thanks to health care workers and researchers who fight against the COVID-19 outbreak on the frontline.

## REFERENCES

1. Fehr AR, Perlman S. (2015). Coronaviruses: an overview of their replication and pathogenesis. In: Maier H., Bickerton E., Britton P. (eds) Coronaviruses. Methods in Molecular Biology, vol 1282. Humana Press, New York, NY.
2. Li G, Fan Y, Lai Y, Han T, Li Z, Zhou P, et al. Coronavirus infections and immune responses. *J Med Virol.* 2020; 92(4): 424-32. doi: 10.1002/jmv.25685.
3. Channappanavar R, Perlman S. Pathogenic human coronavirus infections: causes and consequences of cytokine storm and immunopathology. *Semin Immunopathol.* 2017; 39(5): 529-39. doi:10.1007/s00281-017-0629-x.
4. Drosten C, Günther S, Preiser W, van der Werf S, Brodt HR, Becker S, et al. Identification of a novel coronavirus in patients with severe acute respiratory syndrome. *New Engl J Med.* 2003; 348(20): 1967-76.
5. Organization WH. Middle East respiratory syndrome coronavirus (MERS-CoV). The United Arab Emirates. Disease Outbreak News: Update. 8 January, 2020. Available from: <https://www.who.int/csr/don/08-january-2020-mers-uae/en/>

6. Lu H, Stratton CW, Tang YW. Outbreak of Pneumonia of Unknown Etiology in Wuhan China: the Mystery and the Miracle. *J Med Virol*. 2020;92(4): 401-2. doi: 10.1002/jmv.25678.
7. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020; 395(10223): 497-506. doi: 10.1016/S0140-6736(20)30183-5.
8. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 Novel Coronavirus–infected Pneumonia in Wuhan, China. *JAMA*. 2020; e201585. doi: 10.1001/jama.2020.1585. Online ahead of print.
9. Han Q, Lin Q, Jin S, You L. Recent insights into 2019-nCoV: a brief but comprehensive review. *J Infect*. 2020; pii: S0163-4453(20)30087-6. doi: 10.1016/j.jinf.2020.02.010. [Epub ahead of print].
10. Lu CW, Liu XF, Jia ZF. 2019-nCoV transmission through the ocular surface must not be ignored. *Lancet*. 2020; 395(10224): PE39. doi:10.1016/S0140-6736(20)30313-5.
11. Paraskevis D, Kostaki EG, Magiorkinis G, Panayiotakopoulos G, Sourvinos G, Tsiodras S. Full-genome evolutionary analysis of the novel coronavirus (2019-nCoV) rejects the hypothesis of emergence as a result of a recent recombination event. *Infect Genet Evol*. 2020; 79: 104212. doi: 10.1016/j.meegid.2020.104212.
12. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. Discovery of a novel coronavirus associated with the recent pneumonia outbreak in humans and its potential bat origin. *BioRxiv*. 2020. 01.22.914952. doi:10.1101/2020.01.22.914952.
13. Wang R, Zhang X, Irwin DM, Shen Y. The emergence of SARS-like Coronavirus poses a new challenge in China. *J Infect*. 2020; 80(3): 350-71. doi: 10.1016/j.jinf.2020.01.017.
14. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet*. 2020; 395(10223): 507-13. doi: 10.1016/S0140-6736(20)30211-7.
15. Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, et al. Genomic characterization and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet*. 2020; 395(10224): 565-74. doi:10.1016/S0140-6736(20)30251-8.
16. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*. 2020; 579(7798): 270-73. doi: 10.1038/s41586-020-2012-7.
17. Organization WH. Coronavirus disease 2019 (COVID-19). Situation Report – 49. 10th March 2020. Available from: [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200309-sitrep-49-covid-19.pdf?sfvrsn=70dabe61\\_4](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200309-sitrep-49-covid-19.pdf?sfvrsn=70dabe61_4).
18. Carlos WG, Dela Cruz C, Cao B, Pasnick S, Jamil S. Novel Wuhan (2019-nCoV) Coronavirus. *Am J Respir Crit Care Med*. 2020; 201(4): P7-P8.
19. Chu C, Cheng V, Hung I, Wong M, Chan K, Chan K, et al. Role of lopinavir/ritonavir in the treatment of SARS: initial virological and clinical findings. *Thorax*. 2004; 59(3): 252-6. doi: 10.1136/thorax.2003.012658.
20. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *New Engl J Med*. 2020; 382(8): 727-33. doi: 10.1056/NEJMoa2001017.
21. Han M, Gu J, Gao GF, Liu WJ. China in action: national strategies to combat emerging infectious diseases. *Sci China Life Sci*. 2017; 60(12): 1383-5. doi: 10.1007/s11427-017-9141-3.
22. MacIntyre CR. The global spread of COVID-19 and pandemic potential. *Global Biosecurity*. 2020;1(3). doi:10.31646/gbio.55.
23. Daszak P, Olival KJ, Li H. A strategy to prevent future epidemics similar to the 2019-nCoV outbreak. *Biosafety Health*. 2020; 2(1): 6-8. doi:10.1016/j.bsheat.2020.01.003.
24. Chan JF, Yuan S, Kok K, To KK, Chu H, Yang J, et al. A familial cluster of pneumonia associated with the 2019 novel coronavirus indicating person-to-person transmission: a study of a family cluster. *Lancet*. 2020; 395(10223): 514-23. doi:10.1016/S0140-6736(20)30154-9.
25. Zou L, Ruan F, Huang M, Liang L, Huang H, Hong Z, et al. SARS-CoV-2 viral load in upper respiratory specimens of infected patients. *New Engl J Med*. 2020; 382(12): 1177-9. doi: 10.1056/NEJMc2001737.
26. Bai Y, Yao L, Wei T, Tian F, Jin DY, Chen L, et al. Presumed asymptomatic carrier transmission of COVID-19. *JAMA*. 2020; 323(14): 1406-7. doi:10.1001/jama.2020.2565.
27. Organization WH. Statement on the second meeting of the International Health Regulations (2005) Emergency Committee regarding the outbreak of novel coronavirus (2019-nCoV). January 23, 2020 Geneva, Switzerland. Available from: [https://www.who.int/news-room/detail/23-01-2020-statement-on-the-meeting-of-the-international-health-regulations-\(2005\)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-\(2019-ncov\)](https://www.who.int/news-room/detail/23-01-2020-statement-on-the-meeting-of-the-international-health-regulations-(2005)-emergency-committee-regarding-the-outbreak-of-novel-coronavirus-(2019-ncov)).

28. Olival KJ, Hosseini PR, Zambrana-Torrel C, Ross N, Bogich TL, Daszak P. Host, and viral traits predict zoonotic spillover from mammals. *Nature*. 2017;546(7660):646-50. doi: 10.1038/nature22975.
29. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares Global Emergency: A review of the 2019 Novel Coronavirus (COVID-19). *Int J Surg*. 2020; 76: 71-76. doi:10.1016/j.ijsu.2020. 02.034.



*AUTHOR AFFILIATION:*

**Anees Muhammad**

Department of Medical Laboratory Technology  
College of Medical Technology, Medical Teaching Institution  
Bacha Khan Medical College, Mardan, KPK-Pakistan.

**Johar Ali**

Center for Genomic Sciences  
Rehman Medical Institute, Hayatabad, Peshawar-Pakistan.

**Abdul Manan**

Veterinary Officer  
Directorate of Livestock and Dairy Development  
Merged Areas Warsak Road Peshawar, Pakistan.

**Hidayat Khan**

Department of Medical Laboratory Technology  
College of Medical Technology, Medical Teaching Institution  
Bacha Khan Medical College, Mardan, KPK-Pakistan.

**Muhammad Owais** (*Corresponding Author*)

Lecturer, Department of Medical Laboratory Technology  
College of Medical Technology, Medical Teaching Institution  
Bacha Khan Medical College, Mardan, KPK-Pakistan.  
Email: mowais792@gmail.com