

# COVID -19 A Once-in-a-Century Pandemic?

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**Abstract:** *Although WHO has yet to call the outbreak of SARS-CoV-2 infection a pandemic, it has confirmed that the virus is likely to spread to most, if not all, countries. Regardless of terminology, this latest coronavirus epidemic is now seeing larger increases in cases outside China. The novel coronavirus (2019-nCoV) outbreak, which initially began in China, has spread to many countries around the globe, with the number of confirmed cases increasing every day. With a death toll exceeding that of the SARS-CoV outbreak back in 2002 and 2003 in China, 2019-nCoV has led to a public health emergency of international concern, putting all health organizations on high alert. While providing optimal treatment for these patients, careful execution of infection control measures is necessary to prevent nosocomial transmission to other patients and to healthcare workers providing care. Herein, we present an overview of the currently available information on the pathogenesis, epidemiology, clinical presentation, diagnosis, and treatment of this virus.*

**Keywords:** COVID-19, Pandemic, Infection control

## 1. Introduction

The novel coronavirus (2019-nCoV) outbreak, which initially began in China, has spread to many countries around the globe, with the number of confirmed cases increasing every day. With a death toll exceeding that of the SARS-CoV outbreak back in 2002 and 2003 in China, 2019-nCoV has led to a public health emergency of international concern, putting all health organizations on high alert. The World Health Organisation has declared that the official new name for the virus that also formerly went by the names "2019 novel coronavirus" or "2019-nCoV" is now to be known as Covid-19. A global health emergency has been declared by the World Health Organization as the 2019-nCoV outbreak spreads across the world.

Patients infected with 2019-nCoV are at risk for developing respiratory failure and requiring admission to critical care units. While providing optimal treatment for these patients, careful execution of infection control measures is necessary to prevent nosocomial transmission to other patients and to healthcare workers providing care. Although the exact mechanisms of transmission are currently unclear, human-to-human transmission occurs, and the risk of airborne spread during aerosol-generating medical procedures remains a concern in specific circumstances.

### 1.1 Virology and Pathogenesis

Coronaviruses are enveloped positive-stranded RNA viruses that belong to the family Coronaviridae and the order Nidovirales. People around the globe are frequently infected with four human coronaviruses (229E, NL63, OC43, and HKU1 with the first two classified as antigenic group 1 and the latter two belonging to group 2) typically leading to an upper respiratory tract infection manifested by common cold symptoms. However, coronaviruses, which are zoonotic in origin, can evolve into a strain that can infect human beings leading to fatal illness. Examples are SARS-CoV, MERS-CoV, and the recently identified 2019-NCoV.

In the event of outbreaks of infectious diseases, the role of the nurse changes to adapt to the needs of the patient, their families, and the hospital. Articulating the changes in the nurses' role is helpful for communicating a plan to decrease the spread of disease and for implementing improved policies, procedures, and supplies. This epidemic is particularly important for nurses to be aware of as a high proportion of cases are among healthcare workers. Nurses and students can be highly vulnerable to MERS-CoV infection and often, the gaps in their knowledge around infection control are severe. Beyond the complexity of dealing with an increased demand for care due to the critical progression of the patients, transmission from patient-to-nurse and from patient-to-patient/visitor/other staff is also of concern.

The expansion of genetic diversity among coronaviruses and their consequent ability to cause disease in human beings is mainly achieved through infecting peridomestic animals, which serve as intermediate hosts, nurturing recombination and mutation events. The spike glycoprotein (S glycoprotein), which attaches the virion to the host cell membrane, is postulated to play a dominant role in host range restriction.

In general, coronaviruses first replicate in epithelial cells of the respiratory and enteric cells, which leads to cytopathic changes. Thorough studies have not yet been conducted to elucidate the molecular basis of the pathogenicity of 2019-NCoV. However, preliminary data obtained through whole-genome sequencing of the viral RNA extracted from host cell-depleted nasopharyngeal and sputum samples and subsequent bioinformatics analyses have shown that the novel virus is phylogenetically related to SARS-related coronaviruses first isolated in Chinese horseshoe bats during the period of 2015 to 2017. Unlike SARS-CoV or MERS-CoV, primary human airway epithelial cells provide better growth conditions for 2019-nCoV than standard tissue culture cells.

### Epidemiology

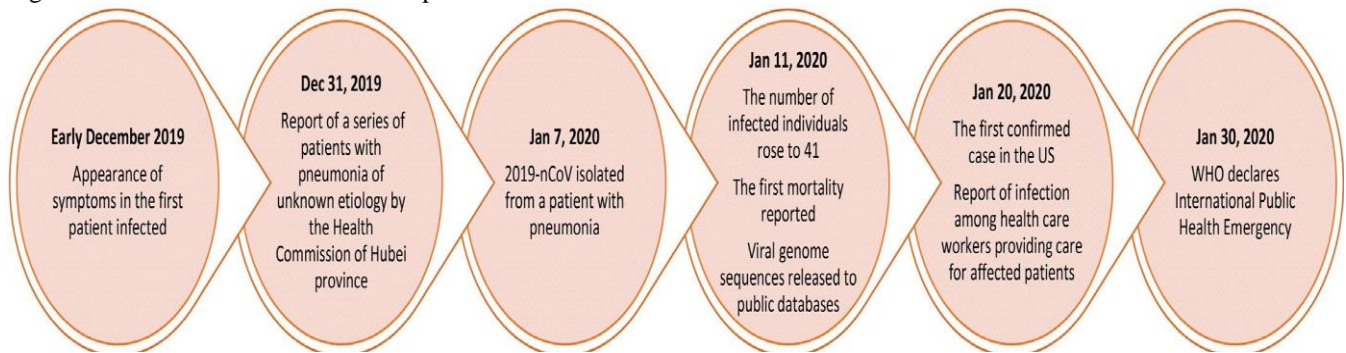
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A series of patients with pneumonia of unknown aetiology were initially reported by the Health Commission of Hubei province, China, on December 31, 2019. Although 27 patients were initially announced to be afflicted with this mysterious disease, the number rose to 41 with seven critically ill patients; one death was noted in the subsequent report on January 11, 2020. The Chinese authorities reporting to WHO stated that some of the patients were operating dealers or vendors in the Huanan seafood market, which was subsequently reported to be selling live and freshly slaughtered hunted animals. Several reports of clusters of

cases among families and infection of 16 health care workers pointed to human-to-human transmission of the virus. Despite recognition of the outbreak within a few weeks by the Chinese using their efficient surveillance network and laboratory infrastructure, efforts to prevent the spread of this virus were not sufficient; as of March 7, 2020, more than 100,000 confirmed cases with a death toll of 3,282 in more than 73 countries have been reported. Peak travel season due to the Chinese New Year was probably an important factor that led to the global spread of the infection.



Timeline of the key events in the early stages of the outbreak

In a study of 425 cases infected up to January 4, the basic reproductive number, of the virus was estimated to be approximately 2.2. This means that each patient can, on average, spread the infection to more than two healthy persons. This number was around 3 for the SARS-CoV outbreak, which was eventually contained as a result of efficient infection control measures.

Proper precautionary measures to prevent nosocomial transmission of the virus is mandatory; the majority of patients with SARS-CoV and MERS-CoV had become infected in health care settings. Considering the plethora of comorbid conditions present in hospital populations, dire complications could arise in the setting of an outbreak.

### Clinical Manifestations and Diagnosis

The infection caused by the 2019 nCoV shares many clinical similarities with infection caused by SARS-CoV. A typical human coronavirus has an incubation period of 2–4 days; it is estimated to be 3–6 days for the 2019-nCoV, and 4–6 days for SARS-CoV. Infection with 2019-nCoV, similar to SARS-CoV, presents with non-specific symptoms such as malaise, fever, and dry cough at the prodromal phase. On 41 confirmed cases of 2019-nCoV infection who were admitted to Wuhan Hospital indicated that fever (98%), cough (76%), dyspnea (55%), and myalgia or fatigue (44%) were the most common presenting signs and symptoms. Chest X-ray and computed tomography (CT) findings showed bilateral lung involvement in 114 (81%) of 140 confirmed patients.

### Treatment

There are no vaccines or specific antivirals for 2019-nCoV. Nonetheless, there are ongoing efforts for vaccine development. Remdesivir, an antiviral drug developed for the treatment of Ebola virus disease, was used for the treatment of the first US case of 2019-nCoV (Holshue, 2020). An ongoing randomized controlled trial evaluating

the efficacy and safety of lopinavir-ritonavir and interferon- $\alpha$  2B in patients infected with the novel coronavirus was launched on January 10, 2020. However, isolation and supportive care including oxygen therapy, fluid management, and administration of antimicrobials for treatment of secondary bacterial infections to alleviate the symptoms and prevent end-organ dysfunction is currently recommended by WHO for suspected and confirmed cases requiring hospital admission.

To achieve the highest level of effectiveness in the response to a 2019-nCoV outbreak using the strategies and practices recommended by WHO, an IPC (Infection Prevention and Control) programme with a dedicated and trained team or at least an IPC focal point should be in place and supported by the national and facility senior management.

IPC strategies to prevent or limit transmission in healthcare settings include the following:

- 1) Ensuring triage, early recognition, and source control (isolating patients with suspected nCoV infection)
- 2) Applying standard precautions for all patients.
- 3) Implementing empiric additional precautions (droplet and contact and, whenever applicable, airborne precautions) for suspected cases of nCoV infection.
- 4) Implementing administrative controls.
- 5) Using environmental and engineering controls.

## 2. Conclusion

The novel coronavirus, which comes from a viral family that was thought to be rather benign before the turn of the century, has led to a public health emergency of international concern according to WHO. Outbreaks like this highlight the importance of effective public health strategies to counteract the never-ending threats imposed by emerging pathogens.

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## Author Profile



**Mrs. Melba Elizabeth K**, graduated from Dr. MGR Medical University Chennai, gained master's degree in medical surgical nursing from RGUHS Bangalore and MBA in Hospital Administration from Bhartiya University Coimbatore. She got her clinical experience from AIMS Mumbai and Asvini Naval Hospital Colaba, Mumbai. She also worked as quality control Nurse in IQRAA International hospital, Calicut Kerala. Her experience in teaching commenced from Vinayaka college of Nursing, Wayanad and currently with Koshys college of Nursing from 2015 to till date as Assistant professor.



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