



## Coronavirus outbreak in the world

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### Abstract

Coronavirus is causing an outbreak first identified in Wuhan City, Hubei Province, China. Chinese health authorities have reported that patients have experienced fever, cough, difficulty breathing and pneumonia. Coronaviruses are named for the spikes that protrude from their membranes, like the sun's corona. Such viruses cause several illnesses of the respiratory tract, ranging from the common cold to severe diseases <sup>[1]</sup> like SARS. According to the World Health Organization, common signs of infection include fever, cough, and respiratory difficulties like shortness of breath. Serious cases can lead to pneumonia, kidney failure and even death <sup>[2]</sup>. The recent severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2, previously known as 2019-nCoV) outbreak has engulfed an unprepared world amidst a festive season. The zoonotic SARS-CoV-2, believed to have originated from infected bats, is the seventh member of enveloped RNA coronavirus. Specifically, the overall genome sequence of the SARS-CoV-2 is 96.2% identical to that of bat coronavirus termed BatCoV RaTG13. Although the current mortality rate of 2% is significantly lower than that of SARS (9.6%) and Middle East respiratory syndrome (MERS) (35%), SARS-CoV-2 is highly contagious and transmissible from human to human with an incubation period of up to 24 days. Some statistical studies have shown that, on average, one infected patient may lead to a subsequent 5.7 confirmed cases. Since the first reported case of coronavirus disease 2019 (COVID-19) caused by the SARS-CoV-2 on December 1, 2019, in Wuhan, China, there has been a total of 60,412 confirmed cases with 1370 fatalities reported in 25 different countries as of February 13, 2020. The outbreak has led to severe impacts on social health and the economy at various levels. This paper is a review of the significant, continuous global effort that was made to respond to the outbreak in the first 75 days. Although no vaccines have been discovered yet, a series of containment measures have been implemented by various governments, especially in China, in the effort to prevent further outbreak, whilst various medical treatment approaches have been used to successfully treat infected patients. On the basis of current studies, it would appear that the combined antiviral treatment has shown the highest success rate. This review aims to critically summarize the most recent advances in understanding the coronavirus, as well as the strategies in prevention and treatment <sup>[3]</sup>.

**Keywords:** introduction, symptoms, types, transmission, treatment

### Introduction

Coronaviruses are types of viruses that typically affect the respiratory tract of mammals, including humans <sup>[4]</sup>. They are associated with the common cold, pneumonia, and severe acute respiratory syndrome (SARS) and can also affect the gut <sup>[4]</sup>. A coronavirus was first isolated in 1937 from an infectious bronchitis virus in birds that has the ability to seriously devastate poultry stocks <sup>[4]</sup>. These viruses are responsible for between 15 and 30 percent of common colds <sup>[4]</sup>. Over the last 70 years, scientists have found that <sup>[5]</sup>. coronaviruses can infect mice, rats, dogs, cats, turkeys, horses, pigs, and cattle. This MNT Knowledge Center article will focus on the different types of human coronaviruses, their symptoms, how they are transmitted, and two particularly dangerous diseases that can be caused by coronaviruses: SARS and MERS <sup>[4]</sup>.

### Fast facts on coronaviruses

There is no cure for the common cold. A coronavirus causes both SARS and MERS. Coronaviruses infect many different species <sup>[4]</sup>. There are six known human coronaviruses. SARS spread from China to cause infection in 37 countries, killing 774 people <sup>[4]</sup>. 18 years ago, in 2002, the world was astonished

by the appearance of Severe Acute Respiratory Syndrome (SARS), supported by a zoonotic coronavirus, called SARS-CoV, from the Guangdong Province of southern China. After about 10 years, in 2012, another similar coronavirus triggered the Middle East Respiratory Syndrome (MERS-CoV) in Saudi Arabia. Both caused severe pneumonia killing 774 and 858 people with 8700 cases of confirmed infection for the former, and 2494 for the latter, causing significant economic losses. 8 years later, despite the MERS outbreak remaining in certain parts of the world, at the end of 2019, a new zoonotic coronavirus (SARS-CoV-2) and responsible of coronavirus Disease (COVID-19), arose from Wuhan, Hubei Province, China. It spread rapidly and to date has killed 3,242 persons with more than 81,000 cases of infection in China and causing over 126,000 global cases and 5,414 deaths in 166 other countries around the world, especially Italy. SARS-CoV-2 would seem to have come from a bat, but the intermediate reservoir continues to be unknown. Nonetheless, as for SARS-CoV and MERS CoV, the Spillover effect linked to animal-human promiscuity, human activities including deforestation, illegal bush-trafficking and bushmeat, cannot be excluded. Recently, however, evidence of inter-human only transmission

of SARS-CoV-2 has been accumulated and thus, the outbreak seems to be spreading by human-to-human transmission throughout a large part of the world. Herein we will provide with an update on the main features of COVID-19 and suggest possible solutions how to halt the expansion of this novel pandemic [6].

### Coronaviruses

Human coronaviruses (HCoV) were first identified in the 1960s in the noses of patients with the common cold. Two human coronaviruses are responsible for a large proportion of common colds OC43 and 229E. Coronaviruses were given their name based on the crown-like projections on their surfaces. "Corona" in Latin means "halo" or "crown." Among humans, infection most often occurs during the winter months as well as early spring. It is not uncommon for a person to become ill with a cold that is caused by a coronavirus and then catch it again about four months later. This is because coronavirus antibodies do not last for a very long time [7]. Also, the antibodies for one strain of coronavirus may be useless against other strains [8]. Human infections with zoonotic coronavirus contain emerging and reemerging pathogenic characteristics which have raised great public health concern. This study aimed at investigating the global prevalence, biological and clinical characteristics of novel coronavirus, Wuhan China (2019-nCoV), Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), and Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection outbreaks [9].

### Symptoms

Common human coronaviruses, including types 229E, NL63, OC43, and HKU1, usually cause mild to moderate upper-respiratory tract illnesses, like the common cold. Most people get infected with these viruses at some point in their lives. These illnesses usually only last for a short amount of time [4]. Symptoms may include Runny nose Headache Cough Sore throat Fever A general feeling of being unwell Human coronaviruses can sometimes cause lower-respiratory tract illnesses, such as pneumonia or bronchitis. This is more common in people with cardiopulmonary disease, people with weakened immune systems, infants, and older adults[6]. Two other human coronaviruses, MERS- CoV and SARS-CoV have been known to frequently cause severe symptoms. MERS symptoms usually include fever, cough, and shortness of breath which often progress to pneumonia. About 3 or 4 out of every 10 patients reported with MERS have died [4]. MERS cases continue to occur, primarily in the Arabian Peninsula [4]. SARS symptoms often included fever, chills, and body aches which usually progressed to pneumonia [4]. No human cases of SARS have been reported anywhere in the world since 2004.

### Transmission

Human coronaviruses most commonly spread from an infected person to others through The air by coughing and sneezing Close personal contact, such as touching or shaking hands Touching an object or surface with the virus on it, then touching your mouth, nose, or eyes before washing your hands Rarely, fecal contamination In the United States, people usually get infected

with common human coronaviruses in the fall and winter. However, get infected at any time of the year. Most people will get infected with one or more of the common human coronaviruses in their lifetime. Young children are most likely to get infected. However, people can have multiple infections in their lifetime [10]. Mutation and adaptation have driven the co-evolution of coronaviruses (CoVs) and their hosts, including human beings, for thousands of years. Before 2003, two human CoVs (HCoVs) were known to cause mild illness, such as common cold. The outbreaks of severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS) have flipped the coin to reveal how devastating and life-threatening an HCoV infection could be. The emergence of SARS-CoV-2 in central China at the end of 2019 has thrust CoVs into the spotlight again and surprised us with its high transmissibility but reduced pathogenicity compared to its sister SARS-CoV. HCoV infection is a zoonosis and understanding the zoonotic origins of HCoVs would serve us well. Most HCoVs originated from bats where they are non-pathogenic. The intermediate reservoir hosts of some HCoVs are also known. Identifying the animal hosts has direct implications in the prevention of human diseases. Investigating CoV-host interactions in animals might also derive important insight on CoV pathogenesis in humans. In this review, we present an overview of the existing knowledge about the seven HCoVs, with a focus on the history of their discovery as well as their zoonotic origins and interspecies transmission. Importantly, we compare and contrast the different HCoVs from a perspective of virus evolution and genome recombination. The current CoV disease 2019 (COVID-19) epidemic is discussed in this context. In addition, the requirements for successful host switches and the implications of virus evolution on disease severity are also highlighted [11].

### Prevention and Treatment

There are currently no vaccines available to protect against human coronavirus infection. Wash hands often with soap and water for at least 20 seconds[4]. Avoid touching eyes, nose, or mouth with unwashed hands[12]. 019-nCoV epidemic was firstly reported at late December of 2019 and has caused a global outbreak of COVID-19 now. Saliva, a biofluid largely generated from salivary glands in oral cavity, has been reported 2019-nCoV nucleic acid positive. Besides lungs, salivary glands and tongue are possibly another hosts of 2019-nCoV due to expression of ACE2. Close contact or short-range transmission of infectious saliva droplets is a primary mode for 2019-nCoV to disseminate as claimed by WHO, while long-distance saliva aerosol transmission is highly environment dependent within indoor space with aerosol-generating procedures such as dental practice. So far, no direct evidence has been found that 2019-nCoV is vital in air flow for long time. Therefore, to prevent formation of infectious saliva droplets, to thoroughly disinfect indoor air and to block acquisition of saliva droplets could slow down 2019-nCoV dissemination. This review summarizes diagnostic value of saliva for 2019-nCoV, possibly direct invasion into oral tissues, and close contact transmission of 2019-nCoV by saliva droplets, expecting to contribute to 2019-nCoV epidemic control [13].

## Protection

Stay home while are sick Avoid close contact with others Cover mouth and nose with a tissue when you cough or sneeze, then throw the tissue in the trash <sup>[4]</sup> and wash your hands Clean and disinfect objects and surfaces <sup>[4]</sup>. Coronavirus disease 2019 (COVID-19), has spread over 210 countries and territories beyond China shortly. On February 29, 2020, the World Health Organization (WHO) denoted it in a high-risk category, and on March 11, 2020, this virus was designated pandemic, after its declaration being a Public Health International Emergency on January 30, 2020. World over high efforts are being made to counter and contain this virus. The COVID-19 outbreak once again proves the potential of the animal-human interface to act as the primary source of emerging zoonotic diseases. Even though the circumstantial evidence suggests the possibility of an initial zoonotic emergence, it is too early to confirm the role of intermediate hosts such as snakes, pangolins, turtles, and other wild animals in the origin of SARS-CoV-2, in addition to bats, the natural hosts of multiple coronaviruses such as SARS-CoV and MERS-CoV. The lessons learned from past episodes of MERS-CoV and SARS-CoV are being exploited to retort this virus. Best efforts are being taken up by worldwide nations to implement effective diagnosis, strict vigilance, heightened surveillance, and monitoring, along with adopting appropriate preventive and control strategies. Identifying the possible zoonotic emergence and the exact mechanism responsible for its initial transmission will help us to design and implement appropriate preventive barriers against the further transmission of SARS-CoV-2. This review discusses in brief about the COVID-19/SARS-CoV-2 with a particular focus on the role of animals, the veterinary and associated zoonotic links along with prevention and control strategies based on One-health approaches <sup>[14]</sup>.

## Treatment

There are no specific treatments for illnesses caused by human coronaviruses. Most people with common human coronavirus illness will recover on their own <sup>[15]</sup>. Take pain and fever medications (Caution: do not give Aspirin to children) Use a room <sup>[16]</sup>. humidifier or take a hot shower to help ease a sore throat and cough Drink plenty of liquids Stay home and rest <sup>[8]</sup>. Radiologic characteristics of 2019 novel coronavirus (2019-nCoV) infected pneumonia (NCIP) which had not been fully understood are especially important for diagnosing and predicting prognosis. We retrospective studied 27 consecutive patients who were confirmed NCIP, the clinical characteristics and CT image findings were collected, and the association of radiologic findings with mortality of patients was evaluated. 27 patients included 12 men and 15 women, with median age of 60 years (IQR 47-69). 17 patients discharged in recovered condition and 10 patients died in hospital. The median age of mortality group was higher compared to survival group (68 (IQR 63-73) vs 55 (IQR 35-60),  $P = 0.003$ ). The comorbidity rate in mortality group was significantly higher than in survival group (80% vs 29%,  $P = 0.018$ ). The predominant CT characteristics consisted of ground glass opacity (67%), bilateral sides involved (86%), both peripheral and central distribution (74%), and lower zone involvement (96%). The median CT score of mortality group was higher compared to

survival group (30 (IQR 7-13) vs 12 (IQR 11-43),  $P = 0.021$ ), with more frequency of consolidation (40% vs 6%,  $P = 0.047$ ) and air bronchogram (60% vs 12%,  $P = 0.025$ ). An optimal cutoff value of a CT score of 24.5 had a sensitivity of 85.6% and a specificity of 84.5% for the prediction of mortality. 2019-nCoV was more likely to infect elderly people with chronic comorbidities. CT findings of NCIP were featured by predominant ground glass opacities mixed with consolidations, mainly peripheral or combined peripheral and central distributions, bilateral and lower lung zones being mostly involved. A simple CT scoring method was capable to predict mortality <sup>[17]</sup>.

## Conclusion

Corona viruses cause common cold, and infections caused by corona viruses are generally self-resolving. During the last 4 years, corona viruses have become the most important viruses worldwide because of the occurrence of several recent deaths caused by corona viruses in Saudi Arabia. Spread of the infection occurred worldwide; however, most cases of mortality have occurred in the Middle East. Owing to the predominance of outbreaks in the Middle Eastern countries, the virus was renamed a Middle East respiratory syndrome corona virus (MERS-CoV) by the Corona virus Study Group. The Center for Diseases Control and Prevention and World Health Organization maintain a website that is updated frequently with new cases of MERS-CoV infection. In this review, we describe the history and epidemiology of this novel virus. Studies of the genetics and molecular mechanisms of this virus are expected to facilitate the development of vaccines in the future <sup>[18]</sup>.

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