A review of Corona Virus Disease 2019 (COVID-19)

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Abstract: Covid-19 is a novel infectious disease caused by coronavirus with symptoms of fever and cough. It is caused by a novel coronavirus (SARS-CoV-2) in Wuhan, China, in December 2019. There are already some medical records in most countries in the world, which has greatly affected the development of the domestic and international economy and social order. The World Health Organization (WHO) has declared a continuous outbreak as a global public health emergency. Since research on it is still in its infancy, no treatment has been found to treat the disease. In this review, we will summarize the clinical manifestations, transmission routes, detection methods, treatment and prevention methods of COVID-19 and future development trends, and may provide some reference for the treatment of the disease.

1. Introduction
Infectious diseases are mainly diseases caused by pathogenic microorganisms. It can be classified as infectious and non-infectious and what can be transmitted between people or animals is called an infectious disease. There are many kinds of infectious diseases, such as influenza, SARS and other viruses that we know well. Infectious diseases have three specific characteristics, the source of infection, transmission routes and susceptible populations.

The source of transmission is the pathogen in which the virus is located, which is transmitted to other animals or humans through the carrier's carry. There are many ways to spread the virus, such as air transmission, blood transmission, etc. People who are susceptible are people who lack immunity to some kind of infection. Infectious diseases are harmful in the world, such as the Black Death outbreak in the Middle Ages in Europe, which has killed tens of millions of people. The World Health Organization is also closely concerned about infectious diseases. In the event of a serious outbreak of infectious diseases, control and vaccine development must be done[1, 2].

The tiny structure of a virus is the simplest microbe without a cellular structure, which can only live in the host and can be independent of the host mutation (evolution). The virus is very small, as small as 20nm, required an electron microscope to observe it. The process of virus replication involves infecting the host cell (live cell) and then sending its genetic material into the cell, allowing the raw material from the host cell to replicate the synthesis of the virus's genetic material and proteins (through transcription and translation). The sub-viral genome and new proteins are then produced and then assembled into sub-toxic particles to release out of the cells. Finally, the virus will repeat the process until the host cell dies[2, 3].

Viruses can also be divided into viruses with cladding and viruses without cladding. The virus with cladding can help protect the virus and initiate the virus infection. Some of the cladding has protrusions that form a coronavirus. Mature coronaviruses are shown in a circular or elliptical shape under an electron microscope, with some glycoproteins on them, much like the crowns of ancient European...
emperors, so this type of virus is called coronavirus. Coronaviruses are small, typically between 60-220 nanometers. The outer part of this virus consists of different glycoproteins, namely spike protein, small coated glycoprotein and membrane glycoprotein. Spike protein is used to fix the location of the virus and exchange information, small coated glycoprotein can be combined with the envelope to transmit the virus genetic material, and membrane glycoprotein is used for nutrition transmembrane transport. Like the SARS virus of 2003, a typical RNA coronavirus, it is mainly a type of pneumonia that affects the respiratory tract and can be transmitted from saliva faces. The SARS virus does not have RNA polymerases of its own, so they rely on synthetic RNA polymerases within the host cell to replicate RNA. The detection method now used for coronavirus is nucleic acid detection. Because it is a respiratory disease, the virus can be extracted from the mouth or nose to inactivate and detect whether it is a coronavirus[1]. The main prevention for the virus is to gather less, wash your hands frequently, and ventilate frequently[2].

The novel coronavirus was first discovered in Wuhan as early as December 2019 (Figure 1)[4]. The earliest source was the south China seafood market in Wuhan, which was partly responsible for the outbreak. Most of China was covered with novel coronavirus and then spread abroad, but the source of the outbreak has not yet been thoroughly investigated. In this review, we will mention some information about the prevention of COVID-19, some information on pneumonia which may provide some reference for the treatment of diseases.

![Figure 1. The structure of 2019-nCoV.](image)

2. Transmission of SARS-CoV-2
In December 2019, SARS-CoV-2 patients were found to have high fever, cough, fatigue, pneumonia and other imaging symptoms[5-8]. According to the epidemiological findings, it is likely that some animals exposed to the seafood market caused the virus to infect the body, causing a series of transmission. The world health organization calls the disease caused by the virus SARS-CoV-2.

So far, there are many explanations as to the source of transmission of SARS-CoV-2. The first is that it has 76 percent genetic homology to the SARS virus that broke out in 2003, so it could be a mutation of a SARS virus. SARS-CoV-2 shares 96 percent of the same origin with a coronavirus carried by bats, suggesting that bats may be a natural carrier of the virus[9]. Finally, SARS-CoV-2 has 99 percent homology with the virus carried by snakes and pangolins, so they are the intermediate hosts of SARS-
The first batch of Covid-19 patients had a history of exposure to wild animals in a seafood market in Wuhan. Since then, some people who had not been in contact with wild animals in the seafood market but were in contact with patients were found to be infected with the virus, indicating that the virus had the characteristics of human-to-human transmission. Because the interpersonal communication is very much, which leads to the rapid spread of the disease.

Based on the information available, SARS-CoV-2 can be transmitted in many ways. The first is contact transmission. If a patient with a SARS-CoV-2 touches an object, the virus may remain on that object. Once the person touches the object, they may have the virus on their hands, and once they touch their mouth, nose or eyes, they may get infected[11]. The second is droplet transmission, which usually occurs when a person sneezes, coughs or talks. The virus can spread to a slightly distant location, where it can be breathed in by others and become infected. The third is aerosol transmission. These viruses may remain in the atmosphere and will not disappear in a short time. Once people breathe the air containing the virus, they may cause infection[12]. Current research shows that there are no examples of mother-to-child transmission, but because of the small number of samples, the possibility of mother-to-child transmission cannot be completely ruled out[13].

Since SARS-CoV-2 is a newly discovered pathogen, common people are susceptible. Through the research shows that the elderly or patients with underlying infection are more serious when they are infected with SARS-CoV-2 (Table 1).

Table 1. Transmission of 2019-nCoV

| Infectious source | Natural host: maybe bats Intermediate hosts: pangolins and snakes |
|-------------------|---------------------------------------------------------------|
| Route of transmission | Close contact, aerosol transmission and so on |
| Crowd susceptibility | Common people |

3. Prevalence of SARS-CoV-2

The incubation period of infection is the period after the onset of symptoms after infection. The incubation period became an important basis for medical observation and isolation. The incubation period of SARS is about 4 days[14], while SARS-CoV-2 is about 1-14 days, most of which are 3-7 days[15, 16]. SARS-CoV-2 has a long incubation period. Currently 14 days is a guideline for becoming a test that requires medical observation and isolation. Most of the elderly have a shorter period of onset and more serious injury to the elderly, so more attention should be paid to suspected cases of the elderly[9, 10, 17].

The base number of infections (R0) is the average number of infections a patient can transmit to others without intervention and without immunity for all[18]. The stronger the primary infection, the more difficult it is to control. The basic infection number of SARS is between 2.2 and 3.6[19]. There are two models for SARS-CoV-2, one is SEIR model, the other is IEDA model. The SEIR model of SARS-CoV-2 is between 2.47-2.86[20], while the IEDA model is between 2.0-3.3[21].

Asymptomatic infected persons are found without clinical symptoms, but the method of respiratory tract virus detection is positive. Asymptomatic infected persons are of strong concealment and are one of the important sources of infection. So far, many asymptomatic infected persons have been found[17].

Super spreaders are highly infectious. Compared with ordinary spreaders, super spreaders can infect a large number of people in a short period of time, with a wider range. It is not yet known whether there is an exact super spreader[5, 22].

4. Detection methods of SARS-CoV-2

CT testing is currently an important method of detection, but it also has some advantages and disadvantages. The advantage is that it can directly observe the extent of lung damage to determine whether pneumonia is caused, so as to determine whether the patient is an infected person. Secondly, the whole process of CT is relatively rapid, and the results can be obtained quickly, which is more convenient for detection. Sometimes if a throat swab doesn't pick up pneumonia, and a CT does, you can isolate the patient just in case. The disadvantage is that some areas may not be as good as the
prevalence of throat swabs, so there is no way to do CT testing in those areas. Sometimes the CT results show no pneumonia, but it is possible that the patient has no symptoms and is missed. What's more, if the patient suffers from pneumonia not caused by novel coronavirus, there will be a mistake, which may cause some unnecessary trouble[5, 7, 13].

Nucleic acid testing is an important test, called a throat swab, and is now common practice to determine if a patient has been diagnosed. In this way, the nucleic acid extracted from the saliva of the patient is compared, so as to more accurately confirm whether there is a patient diagnosed with coronavirus (SARS-CoV-2). However, in the whole process of nucleic acid testing, it is likely to encounter some false negative errors, because the RNA may be degraded in the process, or because the saliva with the presence of the virus is not extracted, resulting in false negative. It could be because of operator error, or it could be because the resolution of the test is not high enough to detect it, and then there is false negative, which makes the virus spread[23].

Current third detection method is antigen/antibody detection. The coronavirus has many structural proteins on its surface, which are epitopes of antigens, showing its specificity. In immunology, the ability of antigen and antibody to specifically bind can be used to determine whether there is virus in the sample. Generally, the antigen can be extracted from the pharyngeal swab as the sample[16, 23].

Antibody detection is the detection of antibodies to determine whether there is a virus. Because once the virus enters the body, it stimulates B-lymphocyte differentiation through immunological mechanisms to produce plasma cells that produce antibodies. The use of antigen antibody specific binding properties to indirectly determine whether there is a virus. The samples for antibody detection are generally blood, and the detection antibodies are divided into IgM and IgG. Generally, IgM occurs at an early stage and lasts for a short time as an indicator of early detection, while IgG antibodies are produced later and last a long time. The positive results of the above two antibodies can be used as an indicator of virus infection.

The most important step of antigen-antibody detection is to adopt highly sensitive and specific antigens and antibodies. Moreover, the process of antibody production and disappearance is a dynamic process, so it is very important to choose a reasonable sampling time. Combined with the above two disadvantages, antigen and antibody detection cannot be used as the only direct detection method, so conclusions should be drawn together with other detection methods.

5. Treatment and prevention of COVID-19
Suspected and confirmed cases require treatment at isolation points in hospitals under specific and effective conditions. Suspected cases require medical observation in single-room wards to avoid infection from contact with confirmed patients.

Western medicine treatment: patients need to rest in bed to maintain a good internal environment and nutrition. Health care workers need to monitor patients with vital signs to maintain oxygen saturation. Give the patient a high-flow oxygen mask when needed, and if the patient is unable to breathe autonomously, an endotracheal intubation is required to maintain the patient's breathing. In a few conditional hospitals can use the blood of a few convalescent patient to undertake blood cure, but should notice the match of blood type. In the course of symptomatic treatment, we should pay attention to the occurrence of complications and pay close attention to the internal characteristics of patients. In terms of antiviral therapy, Remdesiver is currently considered as a relatively useful drug[24-26], as well as interferon and Chloroquine, but no effective antiviral method has been confirmed[26].

Chinese medicine treatment: For thousands of years, China has experienced many plagues, and traditional Chinese medicine (TCM) has rich experience in the prevention and control of viral infections[27]. For example, when the SARS virus broke out in 2003, TCM took effective measures to treat it. Chinese medicine is actually to improve their own immunity to improve their own conditions to reduce the disease to avoid complications. The recently popular Lianhuaqingwen can only inhibit the virus in vitro and reduce the inflammatory response, but there is no evidence that it can be used in the treatment of novel coronavirus[28, 29].
The standard of discharge was that the patient returned to normal body temperature. Within 3 consecutive days, respiratory symptoms and lung imaging showed significant improvement, and nucleic acid test was negative twice in a row. Upon completion of the above conditions, the patient will be discharged from the hospital. However, they should be quarantined for 14 days after discharge to avoid recurrence. After 2 weeks, they need to return to the hospital for further review to achieve a state of full recovery[8, 16].

Prevention can be done in the following ways: people need to wear masks outside their homes and avoid crowded areas. Wash your hands and ventilate frequently, keep a healthy schedule, and do effective physical exercises[28, 30].

6. Conclusion
Covid-19 is a novel infectious disease caused by coronavirus with symptoms of fever and cough. Bats are thought to be the main source of infection. There are many ways to avoid infection, such as frequent hand washing and ventilation, maintaining good living habits and avoiding gathering with the public. The detection methods for this virus are mainly pharyngeal swab detection, CT detection and antigen antibody detection. No effective vaccine or drug has been developed for specific treatment, but timely isolation, ECMO, and ventilator can be used to keep patients alive. Due to timely control, the disease was quickly controlled, and many citizens have recovered from the hospital. Since there is no effective way to prevent pneumonia at present, it is impossible to accurately predict the epidemic trend of pneumonia. The following are the development trends of Covid-19 in the future:
1. Stop the spread of the virus through public health measures. The SARS virus, similar to the one that ended in 2003, may still be in wild animals but has not spread to humans.
2. The virus has been spread to all susceptible populations, eventually achieving a herd immunity effect that prevents it from infecting other populations.
3. The world has developed effective antiviral vaccine and related drugs, novel coronavirus is no longer a threat, and has become a common virus.

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