



Review

A Review of COVID-19 (Coronavirus Disease-2019) Diagnosis, Treatments and Prevention

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Abstract

There is a new world health crisis threatening the public with spread of COVID-19 (Coronavirus Disease-2019). Since December 2019, when Covid-19 emerged in Hunan seafood market at Wuhan, South China and rapidly spread throughout the world, the virus outbreak has been declared a public health emergency of International concern by World Health Organization (WHO). We here summarize the current clinical characteristics data to guide potential COVID-19 about Prevention, Diagnosis, Treatments and Prevention of COVID-19. In this review, we extracted data from various Research Report, WHO guidelines and other articles. It is important to caution the readers that new data updating nearly every hour regarding clinical characteristics, diagnosis, treatment strategies, and outcomes COVID-19.

Throughout the world the disease has caused varying degrees of illness. Patient shows various symptoms usually fever, cough, sore throat, breathlessness, fatigue, and malaise among others. The disease is being cured through general treatment, symptomatic treatment, by using antiviral drugs, oxygen therapy and by the immune system. It is necessary to identify the potential cases as soon as possible and isolate the suspected people from the confirmed cases of COVID-19, to prevent the potential transmission of infection to other patients and health care staff.

Keywords: Coronavirus disease-2019, COVID-19, respiratory syndrome, symptoms, SARAS, treatment

Cite This Article: Ahmad S, Hafeez A, Siddqui SA, Ahmad M, Mishra S. A Review of COVID-19 (Coronavirus Disease-2019) Diagnosis, Treatments and Prevention. *EJMO* 2020;4(2):116–125.

Coronaviruses are a large family of viruses which may cause disease in animals or humans.^[1] Seven coronaviruses can produce infection in people around the world but commonly people get infected with these four human coronaviruses: 229E, NL63, OC43, and HKU1. They usually cause a respiratory infection ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS) and the most recently discovered coronavirus (COVID-19) causes infectious disease.^[1] This zoonotic disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The WHO originally called this infectious disease Novel Coronavirus-Infected Pneumonia

(NCIP) and the virus had been named 2019 novel coronavirus (2019-nCoV). On 11th Feb 2020, the (WHO) officially renamed the clinical condition COVID-19 (a shortening of Corona Virus Disease-19), which was announced in a tweet. An outbreak of COVID-19 caused by the 2019 novel coronavirus (SARS-CoV-2) began in Wuhan, Hubei Province, China in December 2019, the current outbreak is officially a pandemic.^[2] Since knowledge about this virus is rapidly evolving, readers are urged to update themselves regularly (Fig. 1).^[3]

The virus is typically rapidly spread from one person to another via respiratory droplets produced during coughing

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Submitted Date: March 10, 2020 **Accepted Date:** April 12, 2020 **Available Online Date:** April 15, 2020

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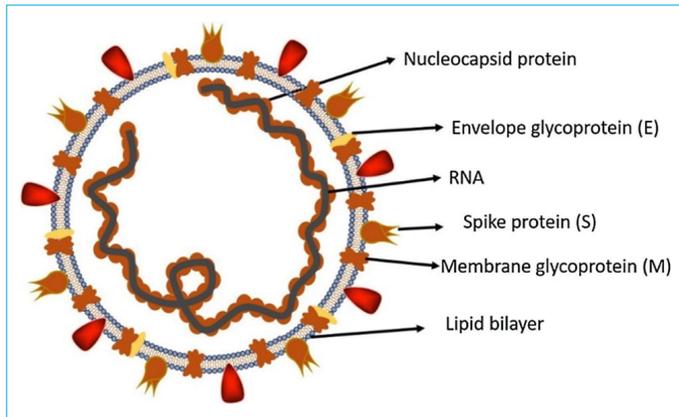


Figure 1. A structure of Respiratory Syndrome (SARS) coronavirus.

and sneezing. It is considered most contagious when people are symptomatic, although transmission may be possible before symptoms show in patients. Time from exposure and symptom onset is generally between two and 14 days, with an average of five days. Common symptoms include fever, cough, sneezing and shortness of breath. Complications may include pneumonia, throat pain and acute respiratory distress syndrome. Currently, there is no specific antiviral treatment or vaccine; efforts consist of symptom abolition supportive therapy. Recommended preventive measures include washing your hands with soap, covering the mouth when coughing, maintaining 1-meter distance from other people and monitoring and self-isolation for fourteen days for people who suspect they are infected.^[4] The standard tool of diagnosis is by reverse transcription-polymerase chain reaction (rRT-PCR) from a throat swab or nasopharyngeal swab. The infection can also be diagnosed from a combination of symptoms, risk factors and a chest CT scan showing features of pneumonia.^[5]

Epidemiology

As of 15 April 2020, 210 Countries and Territories around the world have reported over 1.998.111 confirmed cases and 126.604 deaths of COVID-19 and show the presence in six continents.

According to the medical journal hosted by Johns Hopkins University. Though the proportion of confirmed cases outside China is steadily increasing.^[2, 6] Most infected countries data of COVID-19 are summarised in the below chart Figure 2.

Death Rate Varies by Age, Health and Sex

World Health Organizations Director-General, Tedros Adhanom Ghebreyesus, said that globally, about 3.4% of reported Covid-19 cases have died. Matt Hancock Health Secretary of UK governments said a very best assessment was that the fatality rate was "2% or, likely, lower". However, it varies on a range of factors such as general health, age, sex, and the health system you are living in. In the first huge

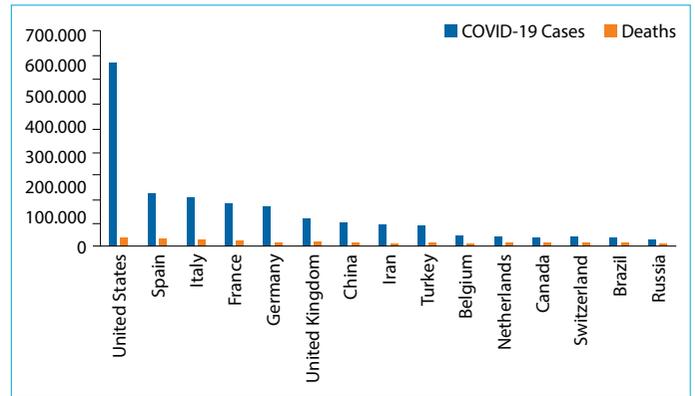


Figure 2. Covid-19 confirmed cases in different countries.

analysis of more than 44,000 cases from China, the death rate was ten times higher in the very elderly compared to the middle-aged.

The death rates were lowest for under the 30s there have been eight deaths in 4,500 cases. And deaths were at least five times more common among individuals with diabetes, high blood pressure or heart or breathing problems. There was even a rather higher number of deaths among men compared to women.^[7]

COVID-19 death Rate by Age Group: $\text{Death Rate} = \frac{\text{Number of deaths}}{\text{Number of cases}} = \text{Probability of dying if infected by the virus (\%)}$

Many studies increasingly clear that death rate increases with age Children under 9 years of age seem to be largely unaffected, either with no or mild symptoms or none have died due to COVID-19 infection. While people over the age of Eighty years and those with chronic diseases are the most vulnerable. For those cross 80, approximately 14.80% of those infected dies. Data show in Figure 3.

The fatality rate starts to increase for those over 50 years of age. Those under 50 years who are infected have a death rate of 0.40%, while for those 50-59 years it's 1.3%. For those 60-69 years it's 3.60%, for 70 to 79-year-olds it's 8.00% and for those over 80 years of age, it is 14.8%.^[8, 9]

Covid-19 death Rate by Sex Ratio: As the worldwide death toll from the COVID-19 increase, the evidence is growing that more men are becoming seriously ill or dying

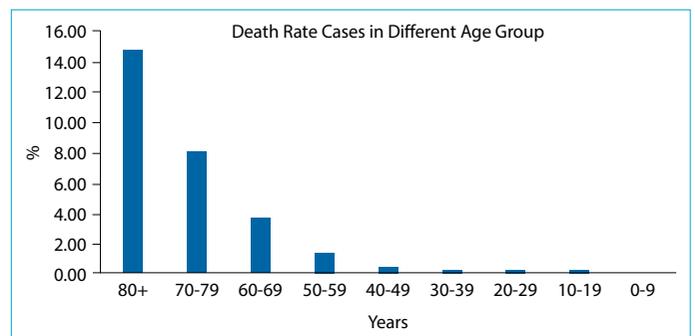


Figure 3. Covid-19 death Rate by different age group.

from the coronavirus than women. yet its numbers slightly vary country to country. it doesn't necessarily reflect differences in biology. Scientists are still not completely sure but maybe on average, men more involve in health-damaging habits such as drinking and smoking than women (Fig. 4.) Show fatality sex difference.^[8]

COVID-19 death Rate by Health Conditions: Information made by Centres for Disease Control and Prevention (CDC) and lots of other studies increasingly clear that risk of severe illness and death increases with age. Adults who are both older and not have better medical conditions have a greater risk to become infected. Among adults age 60 or older, more than half also have a serious medical condition rising to nearly two-thirds of people age 80 and older.^[2, 10] Older age people and younger adults with serious illness, such as diabetes, heart disease, and lungs disease, have a greater risk of becoming severely ill if they get infected with the coronavirus. The death rate for those who not have pre-existing conditions is approximately 1%. Centres for Disease Control and Prevention has issued specific guidance for people who fall into these categories.^[10]

For those with cardiovascular (heart) disease the death rate is 10.5%, for diabetes death rate is 7.3%, for Chronic respiratory disease (such as asthma and chronic obstructive pulmonary disease) it is 6.3%, for hypertension (high blood pressure) it's 6.0% and the cancer death rate is 5.6% data summarised in. (8,9) Figure 5.

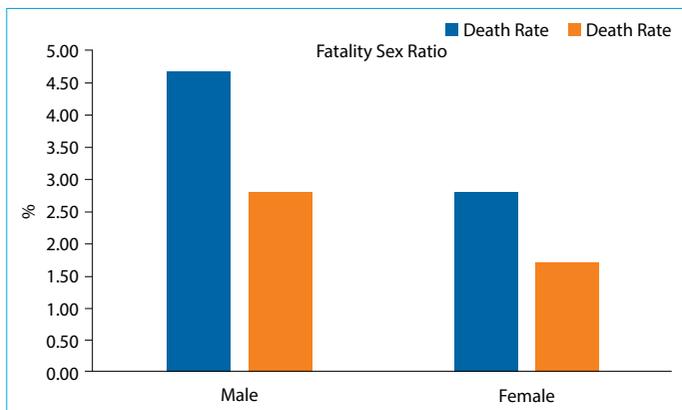


Figure 4. Covid-19 death Rate by Sex Ratio.

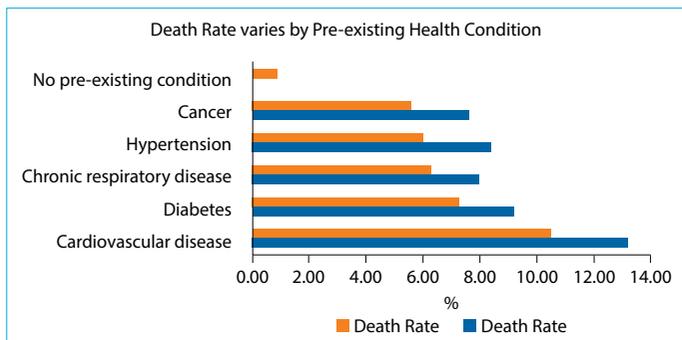


Figure 5. Covid-19 death Rate by Pre-Existing health conditions.

Origin and Transmission of COVID-19

The first cases of coronaviruses in human found in 1965 by Tyrrell and Bynoe. They observed that they could passage a virus named B814. It was observed in human embryonic tracheal organ cultures obtained from the respiratory tract of an adult with a common cold symptom. The first cases were seen in Wuhan City of Hubei Province China in December 2019, and have been linked to the Huanan Seafood Market (South China) and the infection has spread to several countries around the world.^[2]

The novel coronavirus originated from the Hunan seafood market at Wuhan, South China where raccoon dogs, bats, snakes, palm civets, and other animals are sold, and rapidly spread up to 109 countries. The zoonotic source of SARS-CoV-2 is not confirmed, however, the sequence-based analysis suggested bats as the main reservoir. The recombination of DNA was found to be involved at spike glycoprotein which assorted SARS-CoV (CoVZXC21 or CoVZC45) with the RBD of another Beta CoV, thus could be the reason for cross-species transmission and rapid infection.^[7]

The virus that causes coronavirus disease 19 (COVID-19) is a highly transmittable and pathogenic viral infection and mainly transmitted through contact with respiratory droplets rather than through the air.^[7, 11] Primarily people can catch coronavirus disease 19 (COVID-19) from others who are infected. A single cough can circulate up to 3,000 droplets. These droplets can land on other people, and covering surfaces around them, however, several smaller particles will stay within the air. the virus is also shed for extended in faecal matter, thus anyone who not washing their hands thoroughly after visiting the toilet, bathroom could contaminate anything they touch like many respiratory viruses, including flu, Covid-19 can be spread by close contact with small droplets released from infected individuals' upper respiratory tract secretions,^[12] e.g. sneezing, common cold or coughing from the nose and mouth.^[2] That is why to stay more than 1 meter (3 feet) away from a person who is sick. The virus can also be transmitted through surface contamination when these droplets land on objects and surfaces around the person and other individual touches these objects or surfaces and further touching their eyes, nose or mouth then these people catch COVID-19.^[11, 13] Transmission of COVID-19 show in Figure 6.

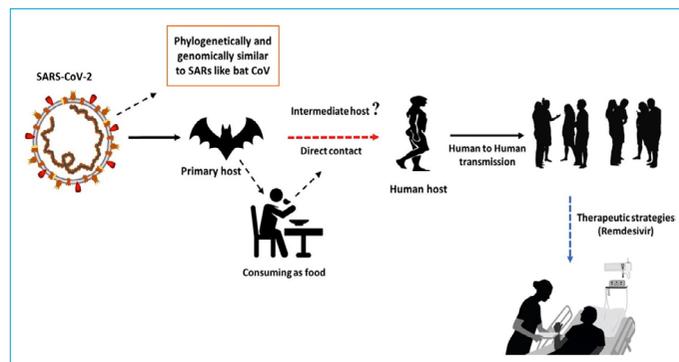


Figure 6. Transmission of COVID-19 to human host.

Replication

Infection begins when the virus enters the host cell, the virus particle is uncoated and the spike protein attaches to its complementary host cell receptor. After attachment, a proteolytic enzyme of the host cell cleaves and activates the receptor-attached spike macromolecule. Depending on the host cell proteolytic enzyme available, cleavage and activation enable cell entry through endocytosis or direct fusion of the viral envelope with the host membrane. (SA 16) The chemical structure of Coronavirus RNA consists of 5' methylated head and a 3' polyadenylated tail, through which the RNA attaches to the free ribosomes of the host cell. This lead to the process of translation and formation of a long polypeptide chain. This protein has its enzyme (Proteases) which break the polyprotein into multiple non-structure proteins.

Coronaviruses (CoVs), are the family of viruses that have prickly spikes that project from their surface. They have enveloped RNA viruses, are characterized by club-like spikes that project from their surface, they have a unique replicating process. These viruses are the cause of many types of diseases in mammals and birds leading to enteritis in cows and pigs and upper respiratory infection in humans which may be fatal. In the given review we have discussed a brief introduction to coronaviruses detailing its replication and pathogenic activity, preventive measures and treatment strategies. We will elaborate the discussion on the outbreaks of the highly pathogenic Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) and the recently discovered Middle Eastern Respiratory Syndrome Coronavirus (MERS-CoV) (Fig. 7).^[15]

Symptoms

Maximum of the patients infected with the virus will experience common cold and flu, while few of them remain

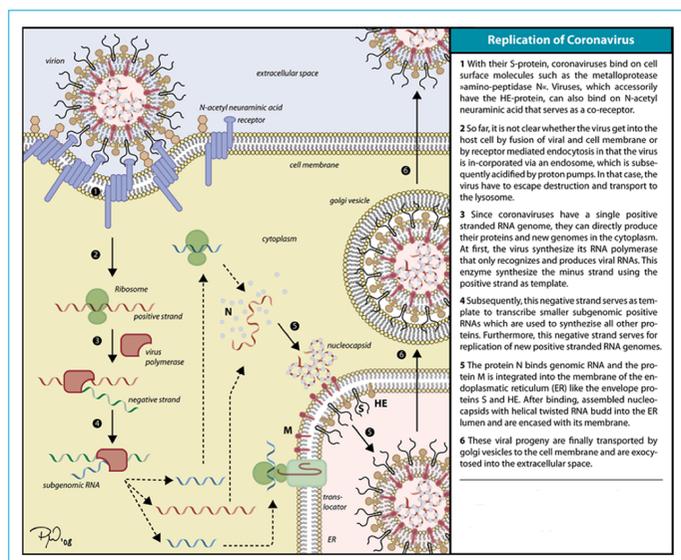


Figure 7. Replication process Coronaviruses.

asymptomatic. 80% of patient will show mild symptoms of the disease. Adults have the best immunity to fight against the infection but the demerit is that they are more likely to spread the infection

A recent study of nearly 140 patients at the Zhongnan Hospital of Wuhan University identified different types of symptom, which lead to a disease known as COVID-19. 99% of the patients developed a fever with extremely high temperature, while more than half experienced fatigue and a dry cough. One-third of the patient developed a dry cough and difficulty in breathing.^[16]

Research from the Chinese CDC observes that around 80% of coronavirus cases are mild, around 15% of patients have infected severe cases, and 5% have become critically ill. A day by day breakdown of coronavirus symptoms shows how symptoms progress among typical patients, how the disease, COVID-19, goes from bad to worse.^[16]

Day 1: In the starting day of the symptom, the patient suffers from fever along with fatigue, muscle pain, and a dry cough. Few of them may experience nausea and diarrhoea a few days before the arousal of symptoms.

Day 5: Patients may suffer from breathing problem especially if they are elderly or have some pre-existing health condition.

Day 7: According to the Wuhan University study, these are the symptoms of the patient that lead the patient to be admitted in the hospital.

Day 8: On the 8th day, patients (15%, according to the Chinese CDC) develop acute respiratory distress syndrome (ARDS), a condition where the fluid fills up in the lungs and this is mostly fatal. This usually happens in severe cases.

Day 10: The progression of the disease leads to worsening of the symptom and at this point the patient is shifted to ICU. Patients with milder symptoms probably have more abdominal pain and loss of appetite. Only a small fraction die. The current mortality rate is around 2%.

Day 17: On average, after two-and-a-half weeks patients who recover are discharged from the hospital.

However, it's difficult to find out the symptoms in the earlier days of the infection. This is usually seen after 5-6 days.^[16] Reported symptoms have ranged from mild to severe illness and death for confirmed coronavirus disease 2019 cases.

Emergency warning signs of COVID-19 needs medical attention immediately, continuous pain or pressure in the chest, include trouble in breathing, confusion and bluish lips or face. The progressed condition leads to Pneumonia^[4, 17] and the incubation period is yet to be determined as the virus is recently identified. As per the new information, symptoms could appear as soon as three days after exposure to as long as 13 days later. Recently published research found that on average, the incubation period is about five days.^[17]

Diagnosis of COVID-19

Diagnosis allows suspected people to understand that they are infected or not. Diagnosis can help them receive the care they need and it can help them take measures to cut back the probability of infecting others. People who don't know they are infected may not occupy at home and thereby risk infecting others. If the person develops symptoms of coronavirus disease 2019 and they have been exposed to the virus, he should consult to doctor. The doctor may decide whether to conduct tests for COVID-19 based on individual signs and symptoms. The doctor may also consider whether an individual had close contact with someone diagnosed with COVID-19 or travelled to or lived in any areas with ongoing community spread of COVID-19 within last 14 days.^[18]

Coronavirus Disease-2019 tracking and diagnostic testing are critical and also critical to understanding epidemiology, informing case management, and to suppressing transmission. The Coronavirus disease outbreak is additionally typical to prevent virus community transmission, including how testing might be rationalized when lack of reagents/ testing kit or testing capacity necessitates prioritization of certain populations group or individuals for testing." (MA 3) To test for COVID-19, doctor or health practitioner may take samples, including a sample of saliva (sputum), a nasal swab and a throat swab, to send to a lab for testing or follow the directions of your local health authority.^[18]

Paper-Based Test COVID-19

As Covid-19 cases increase around all over the world so that the requirement of fast diagnoses needs and easy to handle diagnostic test procedure is becoming ever more pressing. A startup company spun out from MIT is now working on a paper-based test that may deliver results in less than half an hour. Early detection of covid19 is extremely useful to prevent spreading covid19.

In this test a strip of paper is required that is coated with antibodies this is bind to a particular (COVID19) protein. A second antibody is attached to gold nanoparticles, and therefore the patient's sample is added to a solution of these particles. Then the test strip is dipped in this solution. If the viral protein is present in the sample, it will be attaches to the antibodies on the paper strip as well as the nanoparticle-bound antibodies, and a coloured spot appears on the strip within 20 minutes.

Currently, there are only two primary types of Covid-19 diagnostics method are available. First one is that test screens patient blood samples for antibodies against the virus. The drawback is that antibodies are often not detectable until a few days after symptoms begin. The second type of test looks for viral DNA in a sputum sample. It can detect the virus earlier in the infection, but they require polymerase chain reaction (PCR), to perform this method take more times (several hours) than screens patient blood test method.^[20]

RNA Vaccines

The Cambridge-based biotech company Moderna prepared an experimental vaccine to diagnose coronavirus. That speedy turnaround is because of the unique advantages of RNA vaccines, MIT professor of chemical engineering Daniel Anderson, says a key advantage of messenger RNA is that the speed with which you can identify a new sequence and use it to come up with a new vaccine.

Traditional vaccines consist of an inactivated form of a viral protein that induces an immune response. Usually, these vaccines take a longer time to manufacture, and they are too risky for a few diseases. Vaccines that consist of messenger RNA is an appealing alternative because they induce host cells to produce many copies of the proteins they encode, promoting a stronger immune response than proteins delivered on their own.

Messenger RNA can encode the viral antigens, but to work, we seek out the simplest way to deliver these antigens to a particular part of the body so that they generate an immune response. It also makes sure that the vaccine causes appropriate immune stimulation to get a strong response.

RNA vaccines can also be quickly target to different viral proteins, as long as the sequence encoding the protein is understood. The main object to developing such vaccines is that finding effective and safe ways to deliver them the site of action. The recent study showed that packing such vaccines into a special type of lipid nanoparticles can enhance the immune response that they produce.^[20]

Molecular Assays to Diagnose 2019-nCoV

Currently, several assays that detect the 2019-nCoV both in-house and commercially have been prepared or under development. Some assays may detect only the novel virus and a few can also detect other strains (e.g. SARS-CoV) that are genetically similar.^[19]

In-House Developed Molecular Assays

Some groups shared their protocols which are summarized in the below table. In some cases, the groups will be willing to send reagents or reagent mixers prepared in their laboratories, with or without associated fees. It is strongly recommended to contact the scientist. The list summarized below is not exhaustive and is being updated from time to time (Table 1).^[19]

Treatment Strategy of COVID 19

We here summarize the current data to guide potential COVID-19 treatment options. It is important to caution readers that new data updating nearly every hour regarding clinical characteristics, diagnose, treatment options, and outcomes for COVID-19. But optimized supportive care remains the backbone of therapy and the clinical efficacy for the subsequent agents is still under investigation or in

clinical trials.^[21] Most standing clinical and preclinical data on antiviral therapy is taken from other viruses, including SARS-CoV-1,^[22] Middle East Respiratory Syndrome,^[23] and non-coronaviruses (Ebola).^[24, 11]

General Treatment

A confirmed patient of COVID 19 needs complete bed rest and supportive treatment, ensuring adequate calorie and water intake to reduce the risk of dehydration. Water electrolyte balance and homeostasis need to maintain along with the of monitoring vital signs and oxygen saturation; keeping respiratory tract unobstructed and inhaling oxygen in more severe cases; measuring blood count, C-reactive protein, urine test, and other blood biochemical indexes including liver and kidney function, myocardial enzyme spectrum, and coagulation function according to patient's conditions. Chest imaging should be continuously re-examined and blood gas analysis should be performed when required.

Symptomatic Treatment

Control measures are needed for patients with a high fever. Antipyretic drug treatment should be performed in case the temperature exceeds 38.5 °C. Warm water bath and antipyretic patches are preferred as a preventive measure to

lower the temperature. Common drugs include ibuprofen orally, 5–10 mg/kg every time; acetaminophen orally, 10–15 mg/kg every time. Need to administer sedative arises in case the child suffers from convulsions or seizure.

Oxygen Therapy

The chances of hypoxia are increased as the virus targets the lungs. Nasal catheter, mask oxygen should be immediately provided to the patient. In emergency conditions, Non-invasive or invasive mechanical ventilation should be provided to the patient.^[26]

Antiviral Drugs

Group of antiviral drugs including interferon α (IFN- α), lopinavir/ritonavir, chloroquine phosphate, ribavirin, and arbidol are therapeutically useful for the Prevention, Diagnosis, and Treatment of Novel Coronavirus-induced Pneumonia by the National Health Commission (NHC) of the People's Republic of China for tentative treatment of COVID-19 (Table 2).

IFN- α is administered in the form of vapour inhalation at a dose of 5 million U (and 2 mL of sterile water for injection) for adults, 2 times/day. The dosage of lopinavir/ritonavir is 400 mg/100 mg for adults, 2 times/day. Ribavirin should be administered via intravenous infusion at a dose of 500 mg for adults, 2 to 3 times/day in combination with IFN- α or lopinavir/ritonavir. Chloroquine phosphate is orally administered at a dose of 500 mg (300 mg for chloroquine) for adults, 2 times/day. Arbidol is orally administered at a dose of 200 mg for adults, 3 times/day. The duration of treatment is no more than 10 days.

Favipiravir is a new drug that is under clinical trial for treating COVID-19. On February 15, 2020, China approved it to be a useful drug for treating Novel Influenza. It acts by inhibiting the enzyme RNA dependent RNA Polymerase. Apart from being effective for anti-influenza virus, the drug is capable of blocking the replication of flavi-, alpha-, filo-, bunya-, arena-, noro-, and other RNA viruses. Favipiravir is converted into an active phosphoribosylated form (favipiravir-RTP) in cells and is recognized as a substrate by viral

Table 1. Table of available protocols

Country	Institute	Gene targets
China	China CDC	ORF1ab and N
Germany	Charité	RdRP, E, N
Hong Kong SAR	HKU	ORF1b-nsp14, N
Japan	National Institute of Infectious Diseases, Department of Virology III	Pancorona and multiple targets, Spike protein
Thailand	National Institute of Health	N
US	US CDC	Three targets in N gene
France	Institut Pasteur, Paris	Two targets in RdRP

Table 2. Drug with their dosage and duration of treatment

Drug	Dosage	Method of administration	Duration of treatment
IFN- α	5 million U or equivalent dose each time, 2 times/day	Vapor inhalation	No more than 10 days
Lopinavir/ritonavir	200 mg/50 mg/capsule, 2 capsules each time, 2 times/day	Oral	No more than 10 days
Ribavirin	500 mg each time, 2 to 3 times/day in combination with IFN- α or lopinavir/ritonavir	Intravenous infusion	No more than 10 days
Chloroquine phosphate	500 mg (300 mg for chloroquine) each time, 2 times/day	Oral	No more than 10 days
Arbidol	200 mg each time, 3 times/day	Oral	No more than 10 days

RNA polymerase, thus inhibiting RNA polymerase activity. Therefore, favipiravir may have potential antiviral action on SARS-CoV-2, which is an RNA virus.

Remdesivir is another investigational drug under clinical trial for the treatment of COVID-19. Remdesivir is a nucleoside analogue and a broad-spectrum antiviral. Animal experiments indicated that remdesivir can effectively reduce the viral load in lung tissue of mice infected with MERS-CoV, improve lung function, and alleviate pathological damage to lung tissue.

A team of researchers from Shanghai Institute of Materia Medica and Shanghai Tech University performed drug screening in silicon and an enzyme activity test, and they reported 30 agents with potential antiviral activity against SARS-CoV-2 on January 25, 2020. These agents are indinavir, saquinavir, lopinavir, carfilzomib, ritonavir, remdesivir, atazanavir, darunavir, tipranavir, fosamprenavir, enzaplatovir, presatovir, abacavir, bortezomib, elvitegravir, maribavir, raltegravir, montelukast, deoxyrhapontin, polydatin, chalcone, disulfiram, carmofur, shikonin, ebselen, tideglusib, PX-12, TDZD-8, cyclosporin A, and cinanserin. Certain Chinese herbal medicines such as *RhizomaPolygoniCuspidati* and *Radix SophoraeTonkinensis* were also found to contain certain active constituents that were effective against SARS-COV-2.^[27]

Recently, Wang and colleagues (Wang et al., 2020) evaluated in vitro five FDA-approved drugs and two broad-spectrum antivirals against a clinical isolate of SARS-CoV-2. One of their conclusions was that "chloroquine is highly effective in the control of 2019-nCoV infection in vitro" and that its "safety track record suggests that it should be assessed in human patients suffering from the novel coronavirus disease".

At least 16 different trials for SARS-CoV-2 already registered in the Chinese Clinical Trial Registry (ChiCTR2000029939, ChiCTR2000029935, ChiCTR2000029899, ChiCTR2000029898, ChiCTR2000029868, ChiCTR2000029837, ChiCTR2000029826, ChiCTR2000029803, ChiCTR2000029762, ChiCTR2000029761, ChiCTR2000029760, ChiCTR2000029741, ChiCTR2000029740, ChiCTR2000029609, ChiCTR2000029559, ChiCTR2000029542) propose to use chloroquine or hydroxychloroquine in the treatment of COVID-19 ("Chinese Clinical Trial Register" (ChiCTR)). In a recent publication Gao and colleagues evaluated that, "According to the new survey it is discovered that Chloroquine Phosphate is more effective in control treatment in inhibiting the progression of pneumonia, improving lung imaging findings, promoting a virus-negative conversion, and shortening the disease course". This anti-malarial molecule would represent to be a successful drug and good news in the treatment of acute viral infection since the drug is quite cheap and easily available. However, still, a large number of research data needs to be collected before drawing any conclusion.^[28]

Boost Your Immune System

On top of basic illness prevention and real defense against disease is a strong immune system. People body is better able to fight off disease when the immune system is humming and people should put to get their perfect body shape. This is a time to focus on all the health habits people may have been putting off, Dr. Tom Moorcroft, an osteopathic doctor who specializes in infectious disease says, start daily activities and food choices that support people's health and turn them into habits that will lead to life-long improvements in health. During this critical situation, get adequate sleep and some fresh air and sunlight daily.

People also, stay hydrated, minimize overly processed foods and make sure to eat enough micronutrients when they can try their best with what they can find at grocery stores right now.^[29]

Prevention & Precaution of COVID-19

People should stay aware of the latest information on the COVID-19 outbreak provided by WHO and Follow the directions of your local health authority and prevent secondary infections, interrupt human-to-human transmission to your close contacts, health care workers and prevent further international spread. most of the people who infected, experience mild illness and recover it, but its infection can be more severe for other individuals. To take care of your health and protect others take the subsequent steps:^[30, 31]

Take steps to protect yourself

- Wash your hands regularly and thoroughly with soap and water for at least 20 seconds or with an alcohol-based hand rub (hand sanitizer that contains at least 60% alcohol) completely cover your hands and rub them together until they do not dry especially after you have been visited a public place, or after blowing your nose, sneezing or coughing.
- Hands touch many surfaces and pick up viruses and these contaminated hands, can transfer the virus to your nose, eyes or mouth So, avoid touching these organs with unwashed hands. Because from there, the virus can enter the body and may cause persons to sick.
- Maintain social distancing (maintain at least 1 metre or 3 feet distance between yourself and anyone) and avoid close contact with people who are sick (who is coughing or sneezing). When infected individuals cough or sneezes, they spray small droplets from their nose or mouth which may contain COVID-19 virus. The person can breathe in these droplets.^[31, 32]
- Avoid large events and mass gatherings

Take steps to protect others

- Stay home if you are feeling unwell, unless you're going to get medical care.
- If you have a cough, fever and difficulty breathing, seek

- medical attention consult online to your doctor.
- If you're sick avoid taking public transportation.
 - Whenever you cough or sneeze cover your mouth and nose with a tissue paper.
 - Throw used tissues in the trash and wash your hands immediately with antiseptic soap and water.
 - If possible, stay isolated in a separate room from family and pets and wear a facemask when you are around other people (e.g., sharing a room or vehicle). If you are unable to wear a facemask (due to its causes trouble breathing or other reason) then you should cover your coughs and sneezes, and but when the people who are caring for you enter your room they should wear a facemask (Facemasks may be in short supply and they should be saved for caregivers).
 - Stay home for a duration of time and follow your doctor's instructions.
 - If you're sick, avoid sharing bedding, dishes, glasses and other household items
 - If possible, use a separate bathroom and toilets from the family.
 - If surfaces are dirty, clean them, and use detergent or antiseptic soap & water before disinfection apply,
 - Apply disinfectant daily on frequently touched surfaces. This includes desks, phones, keyboards, toilets, faucets, tables, doorknobs, light switches, countertops, handles, and sinks.^[32, 33]
 - Identify and Isolate Suspected Cases
 - Before clinical care is started, Identify the potential cases as soon as possible and isolate the suspected people separately from those who confirmed cases of the virus COVID-19, to Prevent the potential transmission of infection to other patients and health care staff.
 - Avoid direct physical contact (including physical examination and exposure) to respiratory and other body secretions. For instance, move potentially infectious people to isolation rooms and close the doors. In a working place, make the distance in workers, customers, and other visitors, especially from potentially infectious individuals' location
 - In case of need to isolate a patient or patient group, pharmacies should designate and prepare a suitable space
 - Most patients presenting in community pharmacies are unlikely to have COVID-19. If they have coughs, colds or flu-like symptoms but not relevant to COVID-19, travel or contact history, pharmacies should proceed in line with their best practice and routine management of the cross-infection risks to staff and other patients.
 - Restrict the number of individuals entering isolation areas, including the room of a patient with suspected and confirmed COVID-19.

- For safe work practice, protect workers to close contact with the infected person by using additional engineering and administrative control.^[33]

Conclusion

Through this review, we conclude that the disease profile of COVID-19 is dynamic and continues to rapidly evolve. There are still many open questions that are pending about COVID-19. As it is evident through our literature survey, there are cases where patients confirmed with COVID-19 infection have no chest CT abnormalities, contrasting with subclinical infection presenting with positive imaging findings on CT. It is crucial that the clinical impacts of screening asymptomatic patients with chest CT be determined. A more thorough analysis about the existence of any potential benefit on clinical outcomes needs to be addressed against the known financial costs and exposure to ionizing radiation associated with CT scanning.

As more and more suspected cases of COVID 19 infection arises, crisis chance of RT-PCR kits may also be increased. This has led to chest CT being utilized to aid diagnosis in the absence of RT-PCR, as demonstrated in a recent case reported from China and all over world. The progression of the lung changes of COVID-19 on CT imaging is also similar to SARS, with the ground-glass and consolidation getting worse or better over several days. This would be expected, as the two infectious agents are part of the coronavirus family.

SARS had a mortality rate of 9.5%, whilst the current novel coronavirus appears to have a mortality rate around 2%, based on the number of confirmed cases and deaths. Our study has several limitations, such limitations preclude the possibility of any deep analysis about potential prognostic imaging variables that could aid in the prediction of worse outcomes. Moreover, it does not address the role of imaging in guiding or monitoring medical therapy in the infected individuals. Notwithstanding, our study continues to add knowledge about the disease in a growing number of centres apart from the epicentre of the outbreak in Wuhan. Lastly, it also presents CXR findings in a small number of patients, information that has been lacking in most of the recent imaging reports of the disease. In conclusion, COVID 19 has a vast effect on society, where proper medication, sanitization and social distancing will help us.

Acknowledgement

Since the global pandemic of COVID-19 began, scientists and clinician's researcher have rushed to understand and mitigate the threat, sharing their view with others. In this series, we academician have took the step to collect the recent information and have submitted a manuscript for publication.

Disclosures

Peer-review: Externally peer-reviewed.

Conflict of Interest: None declared.

Authorship Contributions: Concept – S.A., S.A.S.; Design – M.A., S.M.; Supervision – A.H.; Materials – S.A.S., M.A.; Data collection &/or processing – S.A.; Analysis and/or interpretation – S.M.; Literature search – S.A.S.; Writing – S.A., S.A.S.; Critical review – A.H.

References

1. WHO Q&A on coronaviruses (COVID-19) March 2020, <https://www.who.int/news-room/q-a-detail/q-a-coronaviruses>.
2. Murphy A, and Bell D.J, et al. COVID-19, Radiopaedia. <https://radiopaedia.org/articles/covid-19-2?lang=us>.
3. Singhal, T. A Review of Coronavirus Disease-2019 (COVID-19). *Indian J Pediatr* (2020). <https://doi.org/10.1007/s12098-020-03263-6>. [CrossRef]
4. Center for disease control and prevention, coronavirus disease 2019 (COVID-19). <https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/symptoms.html>.
5. Velavan TP, Meyer CG. The COVID-19 epidemic. *Trop Med Int Health*. 2020;25(3):278–280. doi:10.1111/tmi.13383 <https://pubmed.ncbi.nlm.nih.gov/32052514/>. [CrossRef]
6. Countries where COVID-19 has spread, Worldometers, 26 March 2020. <https://www.worldometers.info/coronavirus/countries-where-coronavirus-has-spread/>.
7. Shereen M.A, Khan S, COVID-19 infection: origin, transmission, and characteristics of human coronaviruses *Journal of Advanced Research*, 16 March 2020. <https://www.sciencedirect.com/science/article/pii/S2090123220300540>. [CrossRef]
8. Age, Sex, Existing Conditions of COVID-19 Cases and Deaths. <https://www.worldometers.info/coronavirus/coronavirus-age-sex-demographics/>.
9. Vally H, The Conversion, La Trobe University. <https://theconversation.com/why-are-older-people-more-at-risk-of-coronavirus-133770>.
10. Koma W, Neuman T, How Many Adults Are at Risk of Serious Illness If Infected with Coronavirus? March 2020 | Data Note <http://files.kff.org/attachment/Data-Note-How-Many-Adults-Are-at-Risk-of-Serious-Illness-If-Infected-with-Coronavirus.pdf>
11. WHO Q&A on coronaviruses (COVID-19). <https://www.who.int/news-room/q-a-detail/q-a-coronaviruses>
12. Gray R, Covid-19: How long does the coronavirus last on surfaces? BBC 17 March 2020. <https://www.bbc.com/future/article/20200317-covid-19-how-long-does-the-coronavirus-last-on-surfaces>
13. Alaska department of Health and Social services ,Human Coronaviruses, <http://dhss.alaska.gov/dph/Epi/id/Pages/Human-Coronavirus.aspx>
14. Simmons G, Zmora P, Gierer S, Heurich A, Pöhlmann S. Proteolytic activation of the SARS-coronavirus spike protein: cutting enzymes at the cutting edge of antiviral research. *Antiviral Res*. 2013;100(3):605–614. doi:10.1016/j.antiviral.2013.09.028 <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3889862/> [CrossRef]
15. Fehr AR, Perlman S. Coronaviruses: an overview of their replication and pathogenesis. *Methods Mol Biol*. 2015;1282:1–23. doi:10.1007/978-1-4939-2438-7_1 [CrossRef]
16. Bendix A, A day-by-day breakdown of coronavirus symptoms shows how the disease, COVID-19, goes from bad to worse, *Business Insider* Feb 2020. <https://www.businessinsider.in/science/news/a-day-by-day-breakdown-of-coronavirus-symptoms-shows-how-the-disease-covid-19-goes-from-bad-to-worse/articleshow/74257460.cms>
17. Coronavirus Resource Center, Harvard Medical School, Harvard Health Publishing, Mar 2020. <https://www.health.harvard.edu/diseases-and-conditions/coronavirus-resource-center#COVID>
18. Coronavirus disease 2019 (COVID-19) *Mayoclinic* <https://www.mayoclinic.org/diseases-conditions/coronavirus/diagnosis-treatment/drc-20479976>
19. WHO Coronavirus disease (COVID-19) technical guidance: Laboratory testing for 2019-nCoV in humans. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/laboratory-guidance>
20. Trafton A, Chu J, Covid-19 diagnostic based on MIT technology might be tested on patient samples soon, | MIT News Office March, 2020. <http://news.mit.edu/2020/covid-19-diagnostic-test-prevention-0312>
21. Erin K. McCreary E.K, and Pogue J.M, COVID-19 Treatment: A Review of Early and Emerging Options, on behalf of the Society of Infectious Diseases Pharmacists. <https://watermark.silverchair.com/>
22. O'Keefe BR, Giomarelli B, Barnard DL, et al. Broad-spectrum in vitro activity and in vivo efficacy of the antiviral protein griffithsin against emerging viruses of the family Coronaviridae. *Journal of virology*. 2010;84(5):2511–2521. [CrossRef]
23. Arabi YM, Shalhoub S, Mandourah Y, et al. Ribavirin and Interferon Therapy for Critically Ill Patients With Middle East Respiratory Syndrome: A Multicenter Observational Study. *Clinical infectious diseases : an official publication of the Infectious Diseases Society of America*. 2019. [CrossRef]
24. Siegel D, Hui HC, Doerffler E, et al. Discovery and Synthesis of a Phosphoramidate Prodrug of a Pyrrolo[2,1-f][triazin-4-amino] Adenine C-Nucleoside (GS-5734) for the Treatment of Ebola and Emerging Viruses. *Journal of medicinal chemistry*. 2017;60(5):1648–1661. [CrossRef]
25. Mulangu S, Dodd LE, Davey RT, Jr., et al. A Randomized, Controlled Trial of Ebola Virus Disease Therapeutics. *The New England journal of medicine*. 2019;381(24):2293–2303. [CrossRef]
26. Shen K, Yang Y. Diagnosis, treatment, and prevention of 2019 novel coronavirus infection in children: experts' *World Journal of Paediatrics*, February 2020. <https://doi.org/10.1007/s12519-020-00343-7>. [CrossRef]
27. Liying Dong, Shasha Hu, Jianjun Gao, Discovering drugs to treat coronavirus disease 2019 (COVID-19), *Drug Discoveries*

- and Therapeutics 2020 DOI: 10.5582/ddt.2020.0102
28. Franck Touret, Xavier de Lamballerie, Commentary Of chloroquine and COVID-19, www.elsevier.com/locate/antiviral
 29. Amanda Capritto How to protect yourself from the coronavirus March 19, 2020. <https://www.cnet.com/how-to/how-to-protect-yourself-from-coronavirus/>
 30. WHO Coronavirus disease 2019 (COVID-19) Situation Report – 53, MARCH 2020 https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200313-sitrep-53-covid-19.pdf?sfvrsn=adb3f72_2
 31. WHO Coronavirus disease (COVID-19) advice for the public. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>
 32. How to Protect Yourself, Coronavirus Disease 2019 (COVID-19), Centre for disease control and prevention. <https://www.cdc.gov/coronavirus/2019-ncov/prepare/prevention.html>
 33. COVID-19, Occupational Safety and Health Administration, United State Department of labour, <https://www.osha.gov/SLTC/covid-19/controlprevention.html>