Review Article

International Journal of Research in Pharmaceutical Sciences

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.pharmascope.org/ijrps

Understanding COVID-19 – The Pandemic of 2020

Prasaath Sastha K R, Balasubramanian Arul*, Ramalingam Kothai

Department of Pharmacy Practice, Vinayaka Mission's College of Pharmacy, Vinayaka Mission's Research Foundation (Deemed to be University) Salem – 636008 Tamil Nadu, India

Article History:

Received on: 20 Mar 2020
Revised on: 24 Apr 2020
Accepted on: 29 Apr 2020

Keywords:

Covid-19,
Transmission,
Pathogenesis,
Risk factors,
Symptoms

Abstract

It all started in December 2019, a seafood market in Wuhan, China, with a series of neumonia alike cases admitted with severe acute respiratory depression. Since they were unable to detect the precise cau se, they named it "Pneumonia of unknown etiology". Later it was identified as SARS COV 2 (Severe Acute Respiratory Syndrome – coronavirus 2). At first, the disease spread locally affecting the people of Wuhan, and then started spreading throughout China, creating a worldwide panic. The World Health Organization (WHO) declared COVID-19 in China as a Public Health Emergency of International Concern. The Center for Disease Control and Prevention (CDC) from China and local healthcare units organized an intensive outbreak investigation program. The causative organism of this infection is a new virus that belongs to the "coronavirus (CoV)" family. After which the disease was called nCoV-19 (Novel coronavirus – 19). On February 11, 2020, the WHO Director General, Dr. Tedros Adhanom Ghebreyesus, renamed the disease as "COVID-19," which is the acronym of "coronavirus disease 2019". Viral epidemics like SARS-CoV in 2002, H1N1 influenza in 2009, and the most recent one the MERS-CoV Middle East Respiratory Distress Syndrome Coronavirus (first identified in Saudi Arabia) in 2012 threatened the health of mankind in the past two decades. All of these were successfully prevented by systematically approaching the problem to solve it. Healthcare professionals around the world are well trained to manage any type of health crisis. On March 11, 2020, the WHO declared COVID-19 as a "PANDEMIC" pointing to over 118,000 cases and 80,000 dead in 110 countries or more. In a media briefing, the WHO Director General said: "This is not just a public health crisis, it is a crisis that will touch every sector, so every sector and every individual must be involved in the fight."

*Corresponding Author

Name: Balasubramanian Arul
Phone: +91-9944117022
Email: arul1971@yahoo.com

ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v11iSPL1.2228

Production and Hosted by

Pharmascope.org

INTRODUCTION

From December 2019, a mysterious disease with pneumonia-like symptoms with unknown etiology started spreading in Wuhan, China (Zu *et al.*, 2020). When the situation got serious and started to gain more attention, the nature of the illness was also revealed. Because the people in China were unable to identify the cause of the disease, they named it "Pneumonia of unknown etiology", which was later found to be caused by a novel virus from the family coronavirus. Now the disease is termed as COVID-19, which is the acronym for "Coronavirus disease 2019". COVID-19 is caused by Severe Acute Respiratory Distress Syndrome Coronavirus-2 (SARS-CoV-

2), which is similar to viruses found in bats. The virus was first detected in China and started spreading to other countries. On March 11, 2020, the WHO declared COVID-19 as a "PANDEMIC" pointing to over 118,000 cases and 80,000 dead in 110 countries or above. An epidemic refers to the spread of a specific illness or disease within a particular region or a community. In contrast, the WHO defines Pandemic as the global spread of new infection. This term is often used when a new Influenza strain strikes the planet, and the Center for Disease Control and Prevention (CDC) quotes "viruses can infect people easily and spread from person to person in an efficient and sustained way in multiple regions." This declaration points to the spread of the disease rather than the severity of the illness it causes. Previous viral epidemics caused by influenza viruses such as SARS CoV (2002), H1N1 Virus (2009), and MERS CoV (2012) were all successfully eradicated by properly coordinating the healthcare measures (Peeri *et al.*, 2020). Reviews on considering similar measures to control the spread of the SARS CoV 2 to prevent cataclysmic effects in the future. This time the entire world is affected by this illness and various health organizations all around the world are coordinating their efforts to contain the infection. The genome of SARS COV 2 is 86% similar to that of SARS COV, and both the viruses contain a high degree of homology of microorganisms found in Bats, i.e. SARS-like coronaviruses, suggesting bats are the probable carriers of the viruses (de Wit *et al.*, 2016). The SARS COV epidemic in 2002 was effectively managed by completely isolating ill patients from healthy people, social distancing, self-quarantining, and proper supportive measures. Since there is a lack of a certain vaccine or a drug to prevent or treat the infection, the best way to prevent viral transmission is social distancing. It may sound not so hard, but the earth is a home for almost 5.5 billion people. Social distancing may not be easy for people living in countries like China and India, only if everyone understands the nature of the threat mankind faces today and takes it seriously to support the efforts of the government. As of today, the world fights against COVID-19 at its best to save all those infected and completely eradicate the disease. World governments are under fierce operations to establish countermeasures to prevent cataclysmic events and save their citizens from despair. Research scholars, scientists, and various research institutes are working tirelessly to analyze and determine the viral transmission patterns, clinical spectrum of the disease, various diagnostic approaches, and safe and effective therapeutic strategies to counter the effects of the infection and save the world from the cruelty of the COVID 19 Pandemic. Currently, the best strategy to stay safe is only preventive and supportive measures to reduce transmission. Drastic isolation measures in china reduced the viral transmissions significantly, and the WHO urges all the people to stay at home to keep safe until permanent measures are enacted.

The coronavirus tale

Coronaviruses are the largest family of RNA viruses. Coronaviruses are further divided into four groups: α-CoVs, β-CoVs, γ-CoVs, and δ-CoVs, of which the α- and β-CoVs are capable of infecting mammals, and the other genera can infect both birds and mammals. Seven coronaviruses have the potential to infect humans and could cause respiratory diseases. Among the seven Human Coronaviruses (HCoV), HCoV-229E, HCoV-OC43, HCoV-NL63, and HCoV-HKU1 usually cause upper respiratory disease and can occasionally cause serious illness in children and geriatric and immunocompromised patients. The first two viruses are known since the 1960s, and the novel β coronavirus in 2002 followed by HCoV-NL63 and HCoV-HKU1 were identified in 2004 and 2005, respectively. The MERS – CoV was identified in 2012, which is also similar to SARS CoV because both cause severe respiratory syndromes (Al-Omari *et al.*, 2019). The SARS-CoV-2 was recently isolated from the epithelial cells present in the respiratory tract, identified to be β coronavirus. The SARS-CoV-2 infects both upper and lower respiratory tracts but less aggressively than the SARS-CoV and MERS-CoV.

SARS-CoV

The virus was first identified during November 2002, following an outbreak in Guangdong Province, China (Anderson *et al.*, 2004). In 5 months, the virus spread to some major cities and countries, including Beijing, Hong Kong, Vietnam, Singapore, and Canada. The virus was highly infectious and had a high transmission rate through air droplets. The host was not infectious during the period of incubation (usually 3-5 days). Studies indicated the presence of the virus even in plasma, though it was a respiratory infection. The SARS CoV infection causes fever, headache, diarrhoea, malaise, myalgia, along with severe respiratory depression. The SARS epidemic was identified in 26 countries, and over 8,000 cases were reported in 2003. The SARS CoV was successfully eradicated by controlling person to person transmission (isolation, quarantine, social distancing, and other community containment measures).

MERS-CoV

The first case of MERS CoV was identified in Saudi

Arabia in a 60-year-old man who had acute pneumonia and renal failure. MERS has a higher fatality rate than SARS. Major outbreaks were in Jeddah, Kingdom of Saudi Arabia, in 2014 and the Republic of Korea in 2015 (Kim *et al.*, 2017). MERS CoV is a zoonotic virus, i.e. the virus can be transmitted from animals to humans. Non-human transmission is not completely clear, but dromedary camels are the primary reservoir host for MERS CoV and can act as a source for human transmission. MERS can present with no symptoms of severe acute respiratory disease and death. MERS typically presents with shortness of breath, cough, and fever. This virus is not transmitted person to person easily unless there is close contact. No specific vaccine or treatment is available for MERS; only supportive measures are followed to manage the infected patients. Human to human transmission can be prevented by maintaining good personal hygiene.

SARS-CoV-2. – Etiology of COVID-19.

From Wuhan, China, several cases with pneumonia-like symptoms were reported in December 2019, following rapid transmission of the illness around China. The source of the infection was traced back to a seafood market in Wuhan. The researchers identified the agent of the mysterious disease, a new β-coronavirus, with 86.9% of genome similarity to previously identified SARS-CoV found in bats and MERS-CoV. This transmission was very rapid as it infected a large number of people in more than 150 countries within three months. Compared to the spreading rate of SARS and MERS, COVID-19 has infected more people in a short duration due to increased globalization and various other factors (Habibzadeh and Stoneman, 2020). This new threat is termed as COVID-19. Today, more than 18 lakh people are infected and 1.2 lakh people are dead in the entire planet. Patients with COIVID-19 infection have fever and lower respiratory tract symptoms and the incubation period is 14 days (Wu and Mcgoogan, 2020). Serious cases can lead to severe respiratory disease, pneumonia, loss of kidney function, and can be fatal. The WHO has advised people to prevent unprotected contact with animals, proper cooking of poultry and eggs, and avoid close contact with anyone presenting with cold or flu-like symptoms. As the number of COVID-19 positive cases started distributing widely over the course of weeks, the situation was clearly not under control as the governments instated quarantine-lockdown as a safety measure to prevent human to human transmission.

Transmission

Initially, the first cases from the seafood wholesale market in Wuhan, China, were presumed to be animal to human transmission. Later, when the infection started to spread like Wi-Fi, it can be concluded that the virus can be transmitted person to person (Chang *et al.*, 2020). It is assumed that symptomatic people are more probable to transmit the virus than the asymptomatic ones, but it may not be sufficient to draw any conclusions. Since the SARS-CoV-2 is primarily a respiratory pathogen, it is usually dispersed in the respiratory droplets from the infected patients. The people in close contact with the infected person like family members and co-workers are more prone to acquire the infection. The risk of healthcare professionals exposing to the pathogen is substantially higher. It is essential to follow precautionary procedures before and after interacting with the patient to prevent exposure. Transmission through contamination of frequently touched surfaces is highly probable.

According to investigations conducted by the China CDC on their first cases, the incubation period is generally between three and seven days and may extend up to 14 days (Huang *et al.*, 2020). The data shows that the epidemic can double in every two weeks. The previous data claims that the basic reproduction number (R0) for COVID-19 to be 3.28 (i.e. each infected individual transmits the infection to additional 3.28 people) according to China, Sweden, and Germany, which is higher than the WHO estimate of 2.5. But recent studies conducted in China after the WHO declared the pandemic suggests that the disease spreads twice as fast as the predicted rate, so the R0 is between 3-5.7.

Pathogenesis

Coronaviruses are positive-stranded RNA viruses with nucleocapsid. These viruses threaten the host very seriously. We must understand their offensive tactics and learn about their viral structure and genome. They have positive-single stranded RNAs (+ssRNAs), and they are the largest RNA viruses with approximately 30kb RNA length. The viral RNA synthesizes structural proteins and polyproteins 1a/1ab (pp1a/pp1ab) in the host. The transcription process is carried out by Replication Transcription Complex (RCT). Among the various structural components of the virus, there are glycoproteins composed of two sub-units S1 and S2.

The beta-coronavirus SARS-CoV-2 enters the host primarily through the respiratory tract. It can also infect the host by entering through eyes and mouth. Once the virus enters the host, it interacts with various cellular components to invade the host environment. The coronavirus S-protein has been signified to enable the virus to enter host cells. Sim-

ilar to its prior family member SARS-CoV, SARS-CoV-2 utilizes the Angiotensin-Converting Enzyme-2 (ACE-2) Receptor to invade the host cell (Weiss and Navas-Martin, 2005). The s-protein in the viral surface membrane binds with the ACE-2 receptor, and the entry is accomplished by direct membrane fusion. After the viral proteins mix with the host cellular components, the viral genome is translated into polyproteins followed by replication of the viral genome. The newly synthesized viral polyproteins and structural proteins interact with the host cellular components such as the endoplasmic reticulum and Golgi. The exact pathogenic mechanism through which the virus produces pneumonia in complex and debatable. But generally, when the infection is detected by the host immune system, it defends the host by producing a cascade of immune reactions to terminate the threat. The immune system fights by synthesizing huge amounts of cytokines, which are vital in the inflammatory mediation cascade. As a result of excessive inflammatory mediators, the collateral host tissue damage is inevitable. In cases of immune-compromised individuals, the immune system is not potent enough to fend off the invaders, creating severe, sometimes, fatal clinical outcomes as a consequence. If the immune system fights off the infection before the viral count reaches beyond control, then the host survives the illness and recovers. Usually, within 14 days, a healthy, competent immune system suppresses the infection without any external help, and that is why it is important to self-quarantine if the infection is suspected. If the symptoms start to exaggerate, it is best to seek professional help.

Risk factors

Evidence that suggests definitive risk factors are still under investigation, and there are still no precise findings regarding the risk factors for the disease. However, the Chinese CDC suggests that the geriatric population and people with previous medical histories such as coronary defects, Chronic Obstructive Pulmonary Disease (COPD), or other forms of respiratory illness such as asthma Diabetes Mellitus have a higher risk for developing serious illness due to SARS-CoV-2 infection. Evidence from a Chinese review article on "Tobacco-Use Disparity in Gene Expression of ACE2, the Receptor of 2019-nCov" suggests smokers are more susceptible to COVID-19 infection (Cai, 2020). Another Chinese study claims that there is a link between type A blood and COVID-19 susceptibility (Zhao *et al.*, 2020). CDC has included that elderly people (age>65years) and immunocompromised individuals are at higher risk for severe illness (CDC, 2020).

Symptoms and presentation of SARS-CoV-2 infection

The symptoms of infection start to appear after the supposed incubation period of 5 to 14 days. The infection starts to take effect when there is an increase in body temperature (fever) followed by mild cold and other flu-like symptoms (Zhang *et al.*, 2020). The commonly observed symptoms of COVID-19 are fever (83–99%), cough (59–82%), fatigue (44–70%), anorexia (40–84%), shortness of breath (31–40%), sputum production (28–33%), myalgias (11–35%), throat soreness, and headache (Kothai and Arul, 2020). Some COVID-19 patients have experienced gastrointestinal symptoms such as diarrhoea and nausea before developing fever and respiratory symptoms. As the disease progresses, the involvement of the respiratory system takes place with pneumonia-like symptoms. The virus can affect both the upper and lower respiratory tract, and in severe cases, the respiratory system can wholly or partially lose its function leading to severe acute respiratory depression. Clinical manifestation of the illness is observed as findings in CT like pneumonia, acute respiratory distress syndrome, multiple opacities in the subpleural region, rhinorrhea, sore throat, and sneezing. It's valid to mention that symptoms of COVID-19 are similar to that of other infections caused by beta-coronaviruses. The disease presents in various forms ranging from asymptomatic or partially symptomatic to severe respiratory failures requiring mechanical ventilation support.

Disease progression among patients who developed severe disease according to CDC, dyspnea with a median time of 5-8 days, ARDS with 8-12 days, and to ICU admission in 10-12 days (CDC, 2020). Infection also aggravates the clinical status of certain patients in terms of shock and multiple organ failures. But the infection starts with mild symptoms such as fever, unproductive cough, fatigue, myalgia, malaise, and dyspnea. If the immune system is not successful in managing the infection, then the infection creates more serious problems.

According to the Chinese CDC report, the authors classified COVID-19 by their severity as mild disease (mild symptoms with no pneumonia/mild pneumonia), severe disease (breathing difficulty, respiration rate $\geq$ 30/min, oxygen saturation (SpO2) $\leq$ 93%, and/or lung infiltrates > 50% within 24 to 48 hours), and critical disease (respiratory failure, shock, and/or multiple organ dysfunction) (CDC, 2020).

Diagnostics and evaluation of the illness

Everyone who presumes may have been infected

should isolate themselves and monitor their symptoms. If anyone contacts the authorities regarding their severity of symptoms then, according to the CDC, the person must be categorized as PUI-Person Under Investigation, and necessary measures must be taken to prevent close contact with the person. Evaluation of the PUI for any other respiratory illness or any other infection is essential for effective decision making. Incorporating various epidemiological methods such as analyzing the places visited, people contacted by the PUI over 14 days, and or date of onset of symptoms would help to detect any possible transmissions and who to test. CDC recommends collecting the upper respiratory tract specimen by nasopharyngeal swabs. The CDC also recommends collecting lower respiratory specimens (sputum), if the patient has a productive cough and test for COVID-19. SARS-CoV-2 RNA has also been detected in stool and blood (CDC, 2020). According to the CDC, detection of the virus in blood may be a marker of severe illness.

Real-Time Reverse Transcriptase-Polymerase Chain reaction (RT-PCR) is a diagnostic procedure used to diagnose COVID-19 (CDC, 2020). RT-PCR works by qualitative detection of nucleic acid from SARS-CoV-2 and any other viral proteins in the specimen collected from the upper respiratory tract or the lower respiratory tract (Corman *et al.*, 2020). Positive results confirm the presence of SARS-CoV-2 RNA in the specimen. And negative results do not necessarily mean the absence of the infection, so the test must not be used as the sole tool for diagnosis of COVID-19 (CDC, 2020).

Laboratory and radiologic findings

Laboratory findings

Lymphopenia is observed in almost 86% of hospitalized COVID-19 patients. Other findings are neutropenia, elevated serum glutamic-oxaloacetic transaminase, and serum glutamic pyruvic transaminase, and few patients have high CRP and Ferritin levels. A study in China reported that the Pt, activated Prothrombin time (aPTT), and d-dimer levels were higher in severe patients while compared to the mild patients (Wan *et al.*, 2020). Myocardial injury markers like creatine kinase, glutamic oxaloacetylase, lactate dehydrogenase (LDH), and C-Reactive protein (CRP) were elevated in severe cases. The study also indicated that there were no significant changes in Alanine transaminase (ALT) and total bilirubin levels, but the albumin levels were moderately lower in severe patients.

Radiographic findings

The chest radiographic findings showed bilateral air-space consolidation as the disease got severe. Chest CT revealed interstitial pneumonia, and typical pulmonary changes were bilateral, patchy, flocculent, and peripheral ground-glass opacities in both upper and lower lobe of lungs. The study from China also reported findings of pleural effusion and consolidation of the lungs when the disease was serious (Wan *et al.*, 2020).

Global scenario

The first case of COVID-19 outside China was reported from Thailand on 13th January 2020, followed by Japan (16th January) and South Korea (19th January 2020) (Kothai and Arul, 2020). From that point forward, the confirmed infection count started climbing steeply, and on 24^{th} Apr 2020 within three months, COVID-19 has spread to more than 150 countries affecting 2.7 million people. The United States has confirmed 8,90,027 cases and currently has 7,56,812 active cases with 50,372 dead and 82,843 recovered. Spain, Italy, Germany, France, China, Iran, the UK, and many other countries still identify and report new cases every day. The United States has the highest number of confirmed and active cases, followed by Spain, Italy, Germany, UK, France, Turkey, China, and Iran. It is so evident that even well-developed countries like the USA are struggling very hard to contain the infection even after enacting complete lockdown measures. It seems the virulence of the infection has more to it than it looks. Almost two-thirds of the world is crippled due to the devastation caused by the COVID-19. The rate of new cases per day is still on the rise. In China (mainland), the infection spread is gradually contained with strict and extensive isolation measures. The world believes that stopping the spread and containing the infection is the way to bring the situation under control. Every case confirmed is reported to the CDC and every piece of information discovered by any healthcare organization is circulated and analyzed to make the best use of it. Such coordination among multiple healthcare organizations and various governments has proven productive in the development of guidelines and infection control measures to manage COVID-19.

Indian scenario

India is home for 1.3 billion people and is the second most populated country in this planet. The SARS-CoV-2 virus surfaced in India on 31^{st} Jan 2019, in the state Kerala (Kothai and Arul, 2020). The state fought the Nipah virus with its full potential and completely eradicated it. Therefore, it's no surprise that the state health department managed the outbreak effectively. The healthcare department of

India has stayed vigilant and prepared to contain any more rising threats. On 24 Apr 2020, India had 23,140 confirmed cases and 17,360 active cases with 772 dead and 5,058 recovered. Maharashtra has the highest number of COVID-19 cases with 6,427 confirmed and 5304 active cases followed by Gujarat with 2,624 confirmed and 2,254 active cases. The healthcare system of India fights COVID-19 with its best resources determined to annihilate the infection. The government of India enforced strict quarantine and isolation measures to prevent the spread of the infection and to suppress the rise in new cases.

Treatment and management of covid-19

There are no specific vaccines or drugs to prevent or treat COVID-19. Governments across the planet have declared quarantine intending to stop human to human transmission. For those who suffer from COVID-19, treatment is entirely supportive. Mechanical ventilation is used to manage respiratory failures, oxygen therapy is the treatment option for patients with severe infection, and hemodynamic support is essential to manage septic shock (CDC, 2020).

Medications

ACE inhibitors and angiotensin receptor blockers (ARBs) are hypothesized to increase the risk of infection as they increase the expression of ACE-2 (CDC, 2020). SARS-CoV-2 uses the ACE-2 receptor in the host cell to inject the viral proteins. But no evidence suggest ACE inhibitors and ARBs worsen the COVID-19 outcomes.

There are no FDA approved drugs to treat COVID-19 (Baden and Rubin, 2020). However, off-label use of antivirals such as Remdesivir, Lopinavir and ritonavir, Favipiravir, and the anti-malarial drug Chloroquine phosphate and Hydroxychloroquine sulfate has risen. Still, extensive clinical trial data are not available to establish definitive effectiveness (Gao *et al.*, 2020). Drugs like Ivermectin and Leronlimab are being studied to determine the efficacy and safety in the management of COVID-19.

Guidelines and protocol

The WHO published a guideline document titled "Surviving Sepsis Campaign: Guidelines on the Management of Critically Ill Adults with Coronavirus Disease 2019 (COVID-19)" to promote recommendations for effective management of the COVID-19 patients and the safety of healthcare professionals (Alhazzani *et al.*, 2020). The guideline suggests various measures to manage the patients. The "strong" and "best practice statements" are quoted for every section.

For infection control and testing

1. HCPs performing aerosol-generating procedures on patients with COVID-19 to collect specimens in the ICU. It is recommended to use fitted respirator masks (N95 respirators, FFP2, or equivalent), instead of surgical/medical masks, along with other personal protective equipment (PPE) (i.e., gloves, gown, and eye protection, such as a face shield or safety goggles) (Alhazzani *et al.*, 2020).

2. It is advised to perform aerosol-generating procedures on COVID-19 patients in a negative pressure room.

3. If a COVID-19 patient requires an entracheal intubation, it should be performed by a well trained and experienced HCP to minimize the number of attempts and risk of transmission.

Hemodynamics

4. Hydroxyethyl starches are not recommended for acute resuscitation of COVID-19 patients under shock (Alhazzani *et al.*, 2020).

5. If norepinephrine is available, then it's not recommended to use dopamine to manage COVID-19 patients in shock.

Ventilation

6. For COVID-19 patients, it's suggested to start supplemental oxygen, if the peripheral oxygen saturation (SPO2) is < 92%.

7. SPO2 should not be maintained higher than 96% in COVID-19 patients with acute hypoxemic respiratory failure.

8. Patients receiving Non-Invasive Positive Pressure Ventilation (NIPPV) or high flow nasal cannula (HFNC), the respiratory function should be monitored.

9. In mechanically ventilated adults with COVID-19 and Acute Respiratory Distress Syndrome (ARDS), it's recommended to use low tidal volume (Vt) ventilation (Vt 4-8 mL/kg of predicted body weight) over higher tidal volumes (Vt>8 mL/kg).

10. For mechanically ventilated patients with COVID-19 and ARDS, the WHO recommends targeting plateau pressures (Pplat) of < 30 cm H2O.

11. For mechanically ventilated COVID-19 patients with moderate to severe ARDS, using a higher Positive End-Expiratory Pressure (PEEP) strategy over a lower PEEP strategy is recommended. Remarks: If using a higher PEEP strategy (i.e., PEEP > 10 cm H2O), then monitor the patients for barotrauma (Alhazzani *et al.*, 2020).

12. If recruitment maneuvers are used, it's recommended not to use the staircase (incremental PEEP)

recruitment maneuvers.

Therapy

The guideline does not advise any strong or best practice statements at this given point of time.

Infection control measures

For healthcare professionals

Since healthcare professionals are directly involved in the management of COVID-19 patients, they are in the line of fire and are more prone to transmission. The CDC has recommended various precautionary measures to protect healthcare professionals (CDC, 2020). Some main recommendations are:

1. Minimize chance for exposures: in the presence of COVID-19 patient or upon arrival of a PUI, necessary measures must be taken to prevent the exposure.

2. Adhere to standard and transmission-based precautions: the professionals must practice standard precautions such as hand hygiene before and after wearing personnel protective equipment (PPE-including gloves), a respirator or face masks (recommended N95 masks or equivalent), eye protection (i.e., goggles or a disposable face shield that covers the front and sides of the face), and gowns before visiting the patient.

3. Patient placement: if a patient is admitted based on suspicion or confirmation, the room must be a single person-Airborne Infection Isolation room (AIIRs).

4. Take precautions when performing Aerosol-Generating Procedures (AGPs): the procedure must be done by well-trained professionals, particularly procedures involving induced coughing (e.g., sputum induction, open suctioning of airways). The HCP must use PPE (N95 or higher-level respirator, eye protection, gloves, and a gown).

5. Collection of diagnostic respiratory specimens: while collecting samples from a possibly infected patient, the HCP in the room should use recommended PPEs.

6. Manage visitor access and movement within the facility: all the visitors must perform frequent hand hygiene and respiratory hygiene. The visitors must be screened for symptoms of acute respiratory illness before entering the health care facility. If at all the visitors must be limited, alternative ways of interacting with the patients such as video calls are encouraged.

For the Public

People must heed to the requests of the government authorities not to exit their living premises unless it's an emergency. As evident, preventing human transmission, quarantining, and isolation are highly recommended. The best way to avoid getting infected is not to get exposed to the virus (CDC, 2020). These recommended hygiene practices must be followed:

1. Frequent cleaning of hands: wash hands with soap and water for at least 20 seconds or use hand sanitizers that contain at least 60% alcohol; avoid touching your eyes nose and mouth with unclean hands.

2. Avoid close contact with sick people.

3. Protect yourself and others by covering your mouth and nose with masks or face covers.

4. Cover coughs and sneezes with tissues or cloths and wash your hands immediately with soap and water for 20 seconds.

5. Clean and disinfect frequently touched surfaces with bleach and recommended alcoholic solutions.

Protecting oneself is not just following the precautions; it also includes reporting to the authorities if you suspect any infected people in your community. This will not only save oneself but helps the community to stay safe.

Directions – when symptoms are noticed

Having symptoms such as cold, cough, or fever, indicate the possibility of infection. Do not panic as the symptoms usually resolve with time and proper care. When the infection is suspected, it's recommended to stay home, isolate from others, and get in touch with a doctor. Most people can recover at home without medical intervention. If the symptoms start to aggravate, it's best to seek professional care and get tested. Call the doctor before visiting and use protective equipment like face masks and gloves. Maintain hygiene by cleaning hands frequently with soap and water, cover your coughs and sneezes, and avoid contact with other people as much as possible (CDC, 2020).

When to seek medical attention

It is best to seek medical help if the symptoms get worse and develop emergency warning signs, such as trouble breathing, persistent pain or pressure in the chest, new confusion or inability to arouse, and bluish lips or face (CDC, 2020).

Directives on discontinuing home isolation

People who recovered from their symptoms can discontinue home isolation when the following are observed, i.e. no fever without the use of medicines for at least 72 hours, the disappearance of other symptoms such as cold and sneezing, and occurrence of all these after seven days since the first symptoms started.

CONCLUSIONS

COVID-19 continues to spread in a lot of countries even though we fight hard to prevent it from getting to our friends and family. To date, there is no specific vaccine or cure for treating COVID-19. The current plan to control the situation is by preventing human to human transmission. Efforts are being made every second to change the course of events for better. The flow of information between healthcare organizations and governments are helping each other to fight the infection. Various guidelines and protocols are developed and adjusted according to the status of infection. Healthcare professionals are working tirelessly round the clock to save as many people as possible. Research and studies and clinical trials are being conducted to eliminate COVID-19. Everyone is staying home, working from home, and protecting their own from harm. It seems mankind is doing enough to save itself. There are people who are without shelter and food and who can't care for themselves due to their economic burden. Every human can step up to help those. It's time we realize that saving the sick is the job of professionals but saving HUMANITY is the responsibility of every human being.

ACKNOWLEDGEMENT

The authors are acknowledged to Vinayaka Mission's Research Foundation (Deemed to be University) for providing the facilities for this research.

Conflict of interest

All the authors declare that there is no conflict of interest.

REFERENCES

Al-Omari, A., Rabaan, A. A., Salih, S., Al-Tawfiq, J. A., Memish, Z. A. 2019. MERS coronavirus outbreak: Implications for emerging viral infections. *Diagnostic Microbiology and Infectious Disease*, 93:265–285.

Alhazzani, W., Møller, M. H., Arabi, Y. M., Loeb, M., Gong, M. N., Fan, E., Du, . ., B 2020. Surviving Sepsis Campaign: guidelines on the management of critically ill adults with Coronavirus Disease 2019 (COVID-19). *Intensive care medicine*, pages 1–34.

Anderson, R. M., Fraser, C., Ghani, A. C., Donnelly, C. A., Riley, S., Ferguson, N. M., Hedley, . ., J, A. 2004. Epidemiology, transmission dynamics and control of SARS: the 2002-2003 epidemic. *Philosophical Transactions of the Royal Society of London. Series B: Biological Sciences*, 359:1091–1105.

Baden, L. R., Rubin, E. J. 2020. Covid-19 — The Search for Effective Therapy. *New England Journal of Medicine*. [Epub ahead of print].

Cai, G. 2020. Bulk and single-cell transcriptomics identify tobacco-use disparity in lung gene expression of ACE2, the receptor of 2019-nCov.

CDC 2020. Information for Healthcare Professionals about Coronavirus (COVID-19) | [WWW Document]. *Centers for Disease Control and Prevention*.

Chang, L., Yan, Y., Wang, L. 2020. Coronavirus Disease 2019: Coronaviruses and Blood Safety. *Transfusion Medicine Reviews*. [Epub ahead of print].

Corman, V. M., Landt, O., Kaiser, M., Molenkamp, R., Meijer, A., Chu, D. K., Bleicker, T., Brünink, S., Schneider, J., Schmidt, M. L., Mulders, D. G., Haagmans, B. L., Veer, B. V. D., Brink, S. V. D., Wijsman, L., Goderski, G., Romette, J. L., Ellis, J., Zambon, M., Peiris, M., Goossens, H., Reusken, C., Koopmans, M. P., Drosten, C. 2020. Detection of 2019 novel coronavirus (2019-nCoV) by real-time RT-PCR. *Euro Surveill. 25*.

de Wit, E., van Doremalen, N., Falzarano, D., Munster, V. J. 2016. SARS and MERS: recent insights into emerging coronaviruses. *Nature Reviews Microbiology*, 14(8):523–534.

Gao, J., Tian, Z., Yang, X. 2020. Breakthrough: Chloroquine phosphate has shown apparent efficacy in treatment of COVID-19 associated pneumonia in clinical studies. *Bioscience Trends*, 14:72–73.

Habibzadeh, P., Stoneman, E. K. 2020. The Novel Coronavirus: A Bird's Eye View. *The International Journal of Occupational and Environmental Medicine*, 11(2):65–71.

Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y., Cheng, . ., Z 2020. Clinical features of patients infected with 2019 novel coronavirus in Wuhan. *China. The Lancet*, 395(10223):497–506.

Kim, K. H., Tandi, T. E., Choi, J. W., Moon, J. M., Kim, M. S. 2017. Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in South Korea, 2015: epidemiology, characteristics and public health implications. *Journal of Hospital Infection*, 95(2):207–213.

Kothai, R., Arul, B. 2020. 2019 Novel Coronavirus: A mysterious threat from Wuhan, China–A current review. *International Journal of Research in Pharmaceutical Sciences*, 11(SPL1):7–15.

Peeri, N. C., Shrestha, N., Rahman, M. S., Zaki, R., Tan, Z., Bibi, S., Baghbanzadeh, M., Aghamohammadi, N., Zhang, W., Haque, U. 2020. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned? *International Journal of*

Epidemiology, pages 1–10.

Wan, S., Xiang, Y., Fang, W., Zheng, Y., Li, B., Hu, Y., Lang, C., D, H., Q, S. 2020. Clinical Features and Treatment of COVID-19 Patients in Northeast Chongqing. *Journal of Medical Virology*, pages 1–10.

Weiss, S. R., Navas-Martin, S. 2005. Coronavirus Pathogenesis and the Emerging Pathogen Severe Acute Respiratory Syndrome Coronavirus. *Microbiology and Molecular Biology Reviews*, 69(4):635–664.

Wu, Z., Mcgoogan, J. M. 2020. Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72314 Cases from the Chinese Center for Disease Control and Prevention. *JAMA-Journal of the American Medical Association*, pages 1239–1242.

Zhang, J. J., Dong, X., Cao, Y. Y., Yuan, Y. D., Yang, Y. B., Yan, Y. Q., Gao, . ., D, Y. 2020. Clinical characteristics of 140 patients infected with SARS-CoV-2 in Wuhan, China. *Allergy: European Journal of Allergy & Clinical Immunology*, 00:1–12.

Zhao, J., Yang, Y., Huang, H. P., Li, D., Gu, D. F., Lu, X. F., He, J. Y. 2020. Relationship between the ABO Blood Group and the COVID-19 Susceptibility. *medRxiv*. [Epub ahead of print].

Zu, Z. Y., Jiang, M. D., Xu, P. P., Chen, W., Ni, Q. Q., Lu, G. M., Zhang, L. J. 2020. Coronavirus Disease 2019 (COVID-19): A Perspective from China. *Radiology*. [Epub ahead of print].