



Novel Coronavirus COVID-19: A General Overview for Emergency Clinicians and Current Scenario

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

A cluster of pneumonia cases linked to the novel coronavirus (2019-nCoV) were announced by China at the end of December 2019. The current global situation, recent trends and ongoing progress in the containment and control of this epidemic, which has now spread 187 countries across the globe. A novel coronavirus virus (2019-nCov) has emerged in China, posing an International Public Health Emergency in a few weeks, and has recently become a very high-risk group by the World Health Organization (WHO). A third introduction of a highly pathogenic and large-scale corona virus disease in humans was the SARS- CoV-2 outbreak as a result of a severe acute respiratory syndrome coronavirus (SARS-CoV) in 2003 and the Middle East respiratory syndrome coronavirus (MERS-CoV) in 2012. This virus was named Coronavirus-2 Severe Acute Respiratory Syndrome (SARS-CoV-2) by the International Committee on Virus Taxonomy (ICTV) and Coronavirus Disease-19 (COVID-19) disease. Clinical symptoms of COVID-19 patients include fever, cough, fatigue, and a small number of patients with signs of gastrointestinal infection. SARS-CoV and MERS-CoV are particularly pathogenic in humans and are associated with high mortality. In this review, the epidemiology, pathophysiology, transmission, and clinical characteristics, and discussed current treatment and scientific developments and management of the recently discovered COVID-19 are reviewed, with a focus on best practices and the public health complications.

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ABBREVIATIONS

SARS-CoV : *Severe Acute Respiratory Syndrome*
MARS-CoV : *Middle East Respiratory Syndrome*
COVID-19 : *Coronavirus Disease 2019*
2019-nCoV : *Novel Corona virus 2019*
WHO : *World Health Organization*
PPE : *Personal Protection Equipment*
FFP3 : *Filtering Face Pieces (Protection in three classes against dangers)*
N95 : *Respirators and Surgical Mask*

1. INTRODUCTION

Examples include the Extreme Acute Respiratory Syndrome (SARS) and the Middle East Respiratory Syndrome (MERS) that caused earlier fatal outbreaks, and now the new 2019 Coronavirus Diseases (COVID-19), triggered by SARS2 Coronavirus (SARS-CoV-2), originally known as unknown pneumonia, posing a serious threat to the public [1-3]. A wide group of viruses is the coronavirus family of single-strand RNA viruses, which normally cause upper respiratory tract infection in humans. In 1960s, the first two members-229E and OC43-were recognized [4]. Owing to the discovery of a new virus that triggered the pandemic serious acute respiratory syndrome (SARS), this family of viruses gained attention only in 2003 [5,6]. Two additional novel coronaviruses were later identified, NL63 and HKU1, in 2004 and 2005. These two viruses cause infections in the respiratory tract and are widespread among humans [7,8]. Therefore, with no major morbidity, the four known human corona viruses, 229E, OC43, NL63, and HKU1, cause mild to moderate upper respiratory tract illness. A novel coronavirus has been found to cause sporadic cases of serious, acute respiratory infection (SARI) since September 2012. The virus strain was previously unknown and genome sequencing suggested that this particular virus belongs to the genus Beta coronavirus and is distinct from other known corona viruses and from SARS [9]. In a small number of patients with SARS, 7/28 (25%) had low titers of neutralizing antibodies for this newly discovered virus [10]. The newly identified virus was recently called Middle East Respiratory Coronavirus Syndrome (MERS-CoV) [11]. MERS-CoV was initially isolated from the respiratory tract of a patient in Bisha, Saudi

Arabia. The patient suffered serious pneumonia and acute renal failure in June 2012 [9]. The case was first released in ProMed in September 2012 [12]. Apparently, the disease is going through a difficult path in the majority of patients. A continuum of disease incidence has been observed in a family cluster of four cases. From 6 April to 17 May 2013, 21 confirmed cases of MERS-CoV infection were reported in the Al-Ahsa district of the Eastern Province of Saudi Arabia (16 males and 5 females with a median age of 56 years) with nine deaths [13,14]. At the end of December 2019, a cluster of cases of pneumonia of unknown origin in Wuhan, China, caused concern among health officials. The Wuhan Municipal Health Commission released warning on 31 December; a rapid response team was sent to Wuhan by the Chinese Center for Disease Control and Prevention (China CDC) and a report was sent to the World Health Organization (WHO) [15-18]. On 7 January 2020, the most recent coronavirus identified the causative pathogen, accompanied by the development of genomic characteristics and test methods [16,18]. Now known as COVID-19, both SARS-CoV and MERS-CoV are distinct but closely related [19]. With the recent detection of the 2019 novel coronavirus (COVID-19), there are now a total of 7 coronaviruses known to infect humans:

1. Human coronavirus 229E (HCoV-229E)
2. Human coronavirus OC43 (HCoV-OC43)
3. Human coronavirus NL63 (HCoV-NL63)
4. Human coronavirus HKU1
5. Severe acute respiratory syndrome-related coronavirus (SARS-CoV)
6. Middle East respiratory syndrome-related coronavirus (MERS-CoV)
7. Novel coronavirus (COVID-19, also known informally as Wuhan coronavirus) [20].

This analysis summarized the recent medical progress of the epidemiology, pathogenesis and clinical characteristics of COVID-19 and addressed new treatment and scientific advances in the battle against a novel coronavirus outbreak. The targets of this review was to summarize the recent medical advancement of COVID-19's epidemiology, transmission, and clinical features, and discussed current treatment and scientific method developments to fight the novel coronavirus outbreak.

2. CURRENT SCENARIO (COVID-19)

After its initial appearance in Wuhan, China, in the month of December 2019, the novel CoV was included in the category of Public Health International Emergency on 30 January 2020 [21,22]. Besides affecting mainly China, SARS-CoV-2/COVID-19 has now spread 187 countries (Fig. 1). Out of the total 3,815,561 confirmed cases, 267,469 human deaths were reported as of 8 May 2020 (CSSE). As a result of such a fast leap in relation to the total number of confirmed SARS-CoV-2 infected persons and affecting many countries in a short period of time, it was classified by the WHO as a very high risk category and studies have classified pandemic risks and threats with the bloom. In increasingly growing cases of COVID-19, it is worrying that we are making very high efforts to monitor the spread of this widely circulating virus among the world's population by taking effective prevention and control steps together with formulating global approaches and updated strategies with potential perspectives [23-30]. It is important to emphasize that there is an underreporting of these numbers due to the lack of diagnosis in many countries.

3. THE DISEASE (COVID-19)

COVID-19 is the third CoV outbreak in humans that occurred in last two decades, causing clinical manifestations of respiratory, digestive, and systematic affections, mainly expressed by pneumonia [31,32]. COVID-19 is a modern, unexplained mutation of human beings. The COVID-19 source is still unknown, although the initial cases concerned the Huanan South China Seafood Market. Although many of the early patients were working in or visiting the market, none of the exported cases came into contact with the market, indicating either human to human transmission or a more widespread source of animals. In addition to seafood, social media sources report that the Huanan South China Market has sold snakes, birds, and other small mammals, marmots and bats. The WHO confirmed that environmental samples from the marketplace were positive for the novel coronavirus but no clear association of animals was found [33]. Because of close contact, few people can remain asymptomatic carriers without any clinical symptoms of cold, fever, fatigue or pathology of the lungs. As a professional carrier, they will shed virus to other people who come in contact with them up to 21 days [34]. Initial signs

include fever, mild chills, dry cough, tiredness and shortness of breath, moderate respiratory failure, pulmonary pneumonia, which deteriorate if not treated properly and are not sufficiently medicated [35]. More recent work has shown that many bat coronaviruses can infect human cells without having to adapt intermediately [36,37]. In addition, human serology data indicate bat coronavirus protein recognition and suggest that low-level zoonotic SARS-like bat coronavirus transmission occurs outside recognized outbreaks [38]. MERS-CoV also has a zoonotic virus with possible bat origins [39]. In addition, human serology data indicate bat coronavirus protein recognition and suggest that low-level zoonotic SARS-like bat coronavirus transmission occurs outside recognized outbreaks.

4. DIAGNOSIS OF COVID-19

Serological testing at the height of the outbreak is of little use, though serum samples of recovered patients can be checked to know the IgG titer. For highly infected patients, computed tomography (CT) and X-Ray techniques may help detect pulmonary pneumonia lesions in the lungs in combination with clinical symptoms to demonstrate the COVID-19 image [35]. The detection of viral nucleic acid (VNA) is important for the diagnosis of exposed but asymptomatic carriers and it is possible to detect the viral RNA using pharyngeal swab to prevent transmission and spread risk [40]. Most popularly, RT-PCR (rRT-qPCR) is performed in real time over respiratory secretions so that viral RNA can be identified within a short time [41]. Researchers also developed a diagnostic technique for the rapid and colorimetric detection of COVID-19 coronavirus by reverse transcriptional loop-mediated isothermal amplification (RT-LAMP). This isothermic LAMP-based COVID-19 detection system is called iLACO in this technique, six primers were used to amplify a fragment of the ORF1ab gene, and phenol red is used as a pH indicator when the amplification changes color from pink to light yellow. At the same time, it remains rosy in negative cases [42]. Moreover, several reference laboratories are advancing the sequencing of the full genome from the positive rRT-PCR isolates. The full clinical outcome is not yet clear, as the symptoms reported range from mild to severe with even death in some cases [43]. Serological test is generally used to measure immunity as well as acute infection to mumps virus, measles virus, rubella virus of these viruses. Immunized patients will have persistent

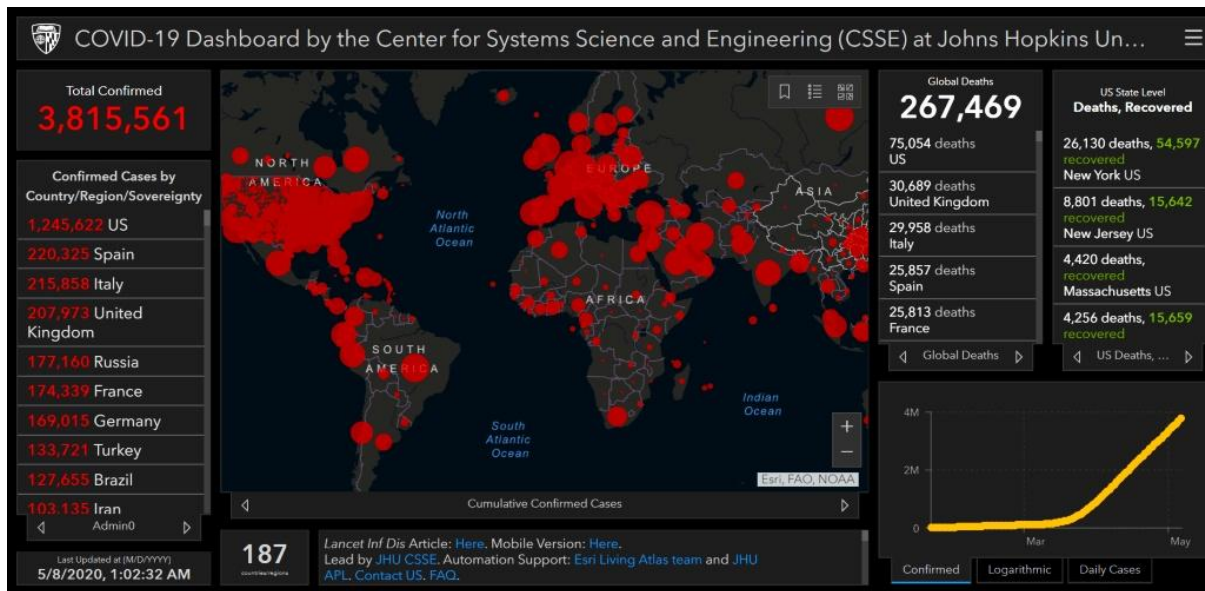


Fig. 1. Corona virus (COVID -19) update situation (According to 8 May 2020)

Globally, 8 May 2020, there have been 3,815,561 confirmed cases of COVID-19, including 267,469 deaths, in 187 countries, reported to Center for Systems and Engineering (CSSE)

immunoglobulin G (IgG) antibodies so detectable antibody levels antibody the patient is immune to infection. Serological method is used for the diagnosis of primary EBV infection and for screening and monitoring of nasopharyngeal carcinoma whereas molecular methods is used for diagnose EBV associated lymphoma of the brain and EBV involvement in other organ [44].

5. TREATMENT OF COVID-19

When infected persons are hospitalized, symptomatic and supportive care should be provided to human patients immediately according to the severity of the symptoms [45,46]. Therapy may include supplemental oxygen or

high-flow nasal cannula (HFNC) oxygen therapy through the nasal route to relieve breathing stress if methylprednisolone is required intravenously to correct hypoxemia and, in extreme cases, intravenous adrenaline (IV), any repurposed medication such as lopinavir plus ritonavir as an anti-viral drug by oral way, moxifloxacin or any antibiotic to prevent secondary bacterial infection by IM/IV route [35,44]. Nevertheless, there are many drugs under review, including other antiretrovirals, such as remdesivir, but also antivirals such as oseltamivir and other treatments, including chloroquine and also indomethacin. Researchers are making great efforts to design and grow effective COVID-19 vaccines, which could take some time [47-49].

Table 1. Potential treatment options of COVID-19

| Classes | Potential treatment option |
|-------------------|---|
| Anti-viral | > 85% of patients received antiviral agents, including oseltamivir (75 mg every 12 h orally), ganciclovir (0.25 g every 12 h intravenously) and lopinavir / ritonavir tablets (400/100 mg twice daily). Remdesivir is currently being evaluated and known to prevent MARS-COV in more than 10 medical establishments in Wuhan [50]. |
| Anti-malarial | An ancient antimalarial, chloroquine phosphate, has been effective in inhibiting the exacerbation of pneumonia due to its antiviral and inflammatory activity.[51] |
| Herbal- treatment | Traditional Chinese medicine has been widely used during the last SARS COV outbreak and is currently being used in China. The five most commonly used herbs were <i>Astragali Radix</i> (Huanggi), <i>Glycyrrhizae Radix Et Rhizoma</i> (Gancao), <i>Sapposhnikovae Radix</i> (Fangfeng), <i>Atractylodis Macrocephalae Rhizoma</i> (Baizhu) and <i>Lonicerae JaponicaeFflo</i> [52]. |

6. PREVENTION OF COVID-19

Preventing strategies focuses on patient isolation and diligent monitoring of pathogens, including appropriate screening and clinical treatment measures for infected patients to follow. For example, droplets, contact and airborne precautions should be taken during specimen processing, and incorporation of sputum should be avoided.

The general guidelines of WHO and other organizations have issued the following general recommendations:

1. Avoid close contact with people suffering from acute respiratory infections.
2. Wash your hands frequently, particularly after contact with infected people.
3. Avoid unprotected farm and wild animal contact.
4. People with acute airway symptoms should stay a little away, cover coughs or sneezes, and wash their hands with disposable tissues or shoes.
5. Strengthen the implementation of appropriate hygiene procedures for the prevention and control of diseases, in particular in emergency medicine departments.
6. Immuno suppressed people can prohibit public meetings

The most effective method for the population is to frequently wash their hands and use portable hand sanitizing to prevent contact with their face and mouth after working in a potentially polluted environment. Health workers who care for infected people should use touch and airborne measures to prevent pathogen transmission, including PPE helmets, eye protection, gowns and gloves such as N95 or FFP3 helmets. Scientific work is going on to produce a coronavirus vaccine [53]. The governments should inspire travelers to postpone their travel to avoid exposure to COVID-19 affected countries and those who are returning back from affected countries must be isolated and quarantined for health check-ups and evaluation of their health status [54]. People should wash their hands with soap-water or prefer to use sanitizers, should remain inside home, should refrain from gathering places and avoid contacts with live-dead animals like wild animals, children, and older adults must take precautions as they are more prone to the severe respiratory distress syndrome of COVID-19 [55].

7. CONCLUSION

Worldwide scientists, researchers and numerous health agencies work days and nights with a great deal of commitment to avoid further SARS-CoV-2 transmission and spread by maintaining strict caution, preventive methods, improved prevention and control measures, and by developing adequate vaccines and treatments to avoid any pandemic situation that could otherwise occur if this virus could not be stopped. While many factors, resulting from the study, still need to be established, as is the case with many elements in other age groups facing the COVID-19 pandemic, as is not evident in pediatrics year after year. Eventually, one approach to health will play an important role in the future battle against COVID-19 as well as against other diseases. It is not a silver bullet, but still, the world needs global solutions to stop a pandemic either or minimize it [30]. In the light of increasingly growing COVID-19 outbreaks, proactive steps by long-term care facilities are needed to identify and remove potentially infected staff and visitors, actively monitor potentially infected patients and implement successful prevention and control measures to avoid COVID-19 infections. Scientific researchers perform multiple medicine clinical trials and I believe these repositioning studies can help establish options for treatment with COVID-19.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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