COMMENTARY ARTICLE

Coronavirus (Covid-19) characteristics, evaluation, and treatment

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ABSTRACT

More than 6 million deaths worldwide, the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)-caused coronavirus disease 2019 (COVID-19) has had a devastating impact on the world's demography and is now the most significant global health disaster since the 1918 influenza pandemic. Describe the COVID-19 etiology and epidemiology. Describe the predicted radiological findings and clinical characteristics in COVID-19 patients. Write a summary of the most recent COVID-19 management options, including the many COVID-19 vaccinations that are available. Talk about inter-professional team tactics for enhancing care coordination and communication to better care for coronavirus patients and get better results.

Key Words: *Health; Global disaster; COVID-19; Pandemic; . Healthcare*

INTRODUCTION

More than 6 million people have died as a result of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which is the cause of the coronavirus disease 2019 (COVID-19), the most serious global health crisis since the 1918 influenza pandemic. This has had a devastating impact on the world's demographics. SARS-CoV-2 spread quickly throughout the world when the first instances of this primarily respiratory viral illness were initially recorded in Wuhan, Hubei Province, China, in late December 2019. As a result, the World Health Organization (WHO) was forced to declare it a worldwide pandemic on March 11, 2020. Since being deemed a global pandemic, COVID-19 has devastated numerous nations and wreaked havoc on numerous healthcare systems. Due to protracted closures brought on by the pandemic, many people have lost their jobs, which have had a negative ripple impact on the world economy. SARS-CoV-2 continues to wreak havoc around the world, with many countries experiencing a second or third wave of outbreaks of this viral illness that are primarily attributed to the emergence of mutant variants of the virus. Despite significant advancements in clinical research that have improved understanding of SARS-CoV-2 and the management of COVID-19, limiting the ongoing spread of this virus and its variants has become a matter of increasing concern.

SARS-CoV-2, like other RNA viruses, is susceptible to genetic evolution with the emergence of mutations over time, resulting in mutant forms that may have distinct properties from its ancestral strains. This is true even when SARS-CoV-2 adapts to its new human hosts. Several SARS-CoV-2 variations have been identified throughout this epidemic, however only a small number of these are regarded as Variants of Concern (VOCs) by the WHO due to their effects on public health around the world. In accordance with the WHO's epidemiological update, five SARS-CoV-2 VOCs have been discovered since the start of the pandemic:

- Alpha (B.1.1.7): The initial variation of the issue was discussed in the UK in late December 2020.
- Beta (B.1.351): first identified in December 2020 in South Africa.
- Gamma (P.1): First discovered in Brazil in early January 2021.
- Delta (B.1.617.2): first discovered in India in December 2020.
- Omicron (B.1.1.529): first discovered in November 2021 in South Africa

The emergence of these new SARS-CoV-2 variants poses a threat to undo the significant progress made so far in containing the spread of this viral illness, despite the unprecedented speed of vaccine development against the prevention of COVID-19 and robust global mass vaccination campaigns, including vaccine boosters. This review article seeks to provide a thorough explanation of the causes, epidemiology, pathophysiology, clinical characteristics, diagnostic approaches, and most recent new medications used to treat COVID-

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19. Additionally, a brief description of the several SARS-CoV-2 variants and the effectiveness of the various COVID-19 and its variants-prevention vaccines is included in this paper.

The World Health Organization (WHO) claims that the spread of viral illnesses poses a significant threat to the public's health. The severe acute respiratory syndrome coronavirus (SARS-CoV) outbreak from 2002 to 2003, the H1N1 influenza pandemic in 2009, and the Middle East respiratory syndrome coronavirus (MERS-CoV) outbreak in 2012 are just a few of the viral epidemics that have been blamed for the significant decline in global health over the past two decades. SARS-CoV-2, the virus that causes COVID-19, has spread to 223 nations since the World Health Organization (WHO) proclaimed it a worldwide pandemic. More than 593 million cases and more than 6 million fatalities have been reported globally. Following the United States in terms of COVID-19-related mortality and SARS-CoV-2 infections are India and Brazil. With almost 375,000 reported deaths, COVID-19 was really the third most common cause of death in the United States in 2020, behind cancer and heart disease. The global case fatality rate for COVID-19 is currently estimated by the WHO to be 2.2%. However, the case fatality rate greatly differs between nations and is influenced by age, underlying prior illnesses, and sickness severity.

Differences in COVID-19 Based on Age, Gender, and the Impact of Medical Comorbidities

People of all ages run the danger of getting this infection and serious illness. Patients under the age of 60 and those with concomitant conditions (such as obesity, cardiovascular illness, chronic renal disease, diabetes, chronic lung disease, smoking, cancer, solid organ or hematopoietic stem cell transplant recipients) are more at risk of developing severe COVID-19 infection. Based on an examination by Stokes et al. of confirmed cases reported to the CDC from January 22 to May 30, 2020, the proportion of COVID-19 patients needing hospitalization was six times greater in those with prior medical issues than in those without medical disorders (45.4% vs. 7.6%). According to data on gender-based COVID-19 disparities, male patients are more likely than female patients to experience severe illness and an increase in death. An evaluation of the mortality rate in 209 US acute care hospitals from March 1 to November 21, 2020, which comprised 42 604 individuals with confirmed SARS-CoV-2 infection, revealed that male patients had a higher mortality rate (12.5%) than female patients (9.6%).

Racial and Ethnic Disparities in COVID-19

Different racial and ethnic groups experience COVID-19 infections and deaths at varying rates. A recent CDC analysis of hospitalizations from a large administrative database that included about 300,000 COVID-19 patients hospitalized from March 2020 to December 2020 indicated that racial and ethnic minority groups had a higher percentage of COVID-19-related hospitalizations than White patients. A higher chance of exposure to SARS-CoV-2 and a higher risk of acquiring a severe COVID-19 disease were the main causes of the high percentage of COVID-19-related hospitalizations among racial and ethnic groups. People of Black, Hispanic, and Asian ethnic minorities are more likely to catch and die from COVID-19 infection, according to the findings of a meta-analysis of 50 studies from US and UK experts. The death rates from COVID-19 were higher among Hispanic people. Another CDC analysis of the risk of COVID-19 in sexual minority adults found that both in the general population and in particular racial/ethnic groups, sexual minority people were more likely than heterosexual people to have underlying medical comorbidities that increase the risk of developing severe COVID-19.

DISCUSSION

To understand the pathophysiology of SARS-CoV-2, a general description of viral structure and its genome is necessary. The genomic structure of CoVs, which are positive-stranded RNA viruses with an envelope and a nucleo-capsid, is arranged in a +ssRNA of about 30 kb in length, with a 5′-cap structure and a 3′-poly-A tail, making it the largest among RNA viruses. Polyprotein 1a/1ab (pp1a/pp1ab) is created when the viral RNA enters the host, starting the process of replication. Sub genomic RNA (sgRNA) sequences are produced during transcription through the Replication-Transcription Complex (RCT), which is arranged in double-membrane vesicles. There can be at least six ORFs in an abnormal CoV genome. Among these, a frameshift between ORF1a and ORF1b directs the production of both pp1a and pp1ab polypeptides, which are processed by virally encoded Chymotrypsin-Like protease (3CLpro) or Main protease (Mpro), as well as one or two papain-like proteases, for producing 16 non-structural proteins with known or predicted RNA synthesis and modification functions (NSPs 1-16). Other ORFs, in addition to ORF1a and ORF1b, encode structural proteins such as spike, membrane, envelope, and nucleocapsid proteins as well as auxiliary proteic chains. Unique structural and auxiliary proteins are translated by specialized sgRNAs in various CoVs. The NSPs' and structural proteins' roles in CoV and SARS-CoV-2 pathogenesis are connected. For instance, researchers have described how NSPs work to suppress the host's innate immune response. The envelope, one of the functions of structural proteins, is essential to the pathogenicity of viruses because it facilitates viral assembly and release. The spike glycoproteins, which have two subunits, are one of the components of CoVs (S1 and S2). The spikes on the viral surface, which direct the link to host receptors, are made up of homotrimers of S proteins.

The early stages of the disease have non-specific symptoms. A wide range of infectious and non-infectious (such as vasculitis, dermatomyositis) respiratory illnesses should be considered as part of the differential diagnosis. Adenovirus, Influenza, Human metapneumovirus (HmPV), Parainfluenza, Respiratory Syncytial Virus (RSV), Rhinovirus (common cold). Rapid antigen detection should be used in suspected cases, together with additional studies, to check for common respiratory pathogens and non-infectious disorders.

The patient's age, the illness's severity upon presentation, any coexisting diseases, the speed of implementation of treatment, and the patient's response to it are all important aspects that affect COVID-19's prognosis. The WHO's most recent estimate of the COVID-19 case fatality rate globally is 2.2%, as previously mentioned. However, the severity of the sickness, age, and underlying pre-existing disorders all has an impact on the case fatality rate. Results from a 4000 critically ill COVID-19 patients in a European multicenter prospective cohort study showed a 31% 90-day mortality rate, with higher mortality rates seen in elderly, diabetic, obese, and severe ARDS patients.

Based on its involvement in numerous significant organ systems,

COVID-19 can be considered a systemic viral disease. Severe COVID-19 and its associated problems are more likely to occur in patients who are older and have concomitant illnesses such obesity, diabetes mellitus, chronic lung disease, cardiovascular disease, chronic kidney disease, chronic liver disease, and neoplastic disorders. The most frequent side effect of a severe COVID-19 sickness is clinical deterioration that develops gradually over time or all at once and causes acute respiratory failure, ARDS, and/or multi-organ failure those results in death. Additionally, prothrombotic events such PE, DVT, MI, ischemic strokes, and arterial thrombosis are more likely to occur in COVID-19 patients. Involvement of the cardiovascular system leads to cardiogenic shock, cardiomyopathy, and malignant arrhythmias. In critically ill COVID-19 patients, GI problems include bowel ischemia, transaminases, gastrointestinal hemorrhage; pancreatitis, Ogilvie syndrome, mesenteric ischemia, and severe ileus are frequently seen. The most frequent extra pulmonary symptom of COVID-19, acute renal failure, is linked to a higher mortality risk. According to a meta-analysis of 14 studies assessing the prevalence of Disseminated Intravascular Coagulation (DIC) in hospitalized COVID-19 patients, DIC was found in 3% (95% confidence interval: 1% to 5%, P 0.001) of the patients included. DIC was also shown to be a poor prognostic sign and to be related to severe disease. More current information has become available regarding "post-acute COVID-19 syndrome," or lingering symptoms in patients who have recovered from COVID-19 infection.

CONCLUSION

The SARS-CoV-2 virus and its variations are still wreaking havoc on the global healthcare system and economies of many nations. The FDA has authorized the use of two vaccinations in the US, one vaccine under an Emergency Use Authorization (EUA), and other vaccines have received approvals from regulatory bodies across the world. With the introduction of possibly drug-resistant strains, COVID-19 will continue to be a threat to global public health until the majority of the world's population receives full vaccination (including booster injections). A multidisciplinary and inter-professional approach is necessary for the prevention and treatment of this highly contagious respiratory viral infection. This approachshould involve government officials, nurses, pharmacists, physicians from various specialties, and experts in nursing and public health. When managing patients with COVID-19, there should be closed-loop communication between the healthcare doctors, pharmacists, and nursing personnel. The most recent clinical guidelines regarding the diagnostic and therapeutic options available in the management of COVID-19 should be regularly reviewed by clinical providers caring for COVID-19 patients on the front lines, especially in light of the emergence of new SARS-CoV-2 variants that have the potential to significantly increase morbidity and mortality. Patients who have recently travelled to or are from a region with a high risk of exposure and who appear with extra pulmonary signs in the absence of pulmonary symptoms should raise the clinicians' suspicions. These individuals should receive the proper triage and SARS-CoV-2 testing. Hospitals and communities should have a strategy in place to identify moderate- and high-risk patients who may benefit from outpatient therapy such as monoclonal antibodies. Such inter-professional team initiatives could significantly alter the dynamics of the healthcare infrastructure, contribute to the eradication or elimination of this virus, and minimize its catastrophic impact on healthcare andsocioeconomic conditions around the globe.