
Review Article

A Review of Covid-19

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Abstract:

According to the WHO, total confirmed cases of Coronavirus up to May 17, 2023: 766,440,796, Deaths: 6,932,591 from COVID-19, triggered by the novel SARS-CoV-2. Total number of vaccine doses administered was 13,350,530,518 around the world. SARS-CoV-2 is a 29.9 kb RNA beta-coronavirus that is enveloped, positive-sense, and single-stranded. Close contact with infected patients and exposure to aerosol viruses from medical devices and procedures, such as endoscopy, may put healthcare workers at risk of infection. Current data suggests that children under the age of 18 have a low rate of infection (2.4 percent). The current gold standard and confirming test for COVID19 is the detection of viral nucleic acid using reverse transcriptase polymerase chain reaction (RT-PCR). The World Health Organization (WHO) has indicated that controlling infectious diseases like COVID19 requires education, isolation, prevention, transmission control, and treatment of sick people. By following the steps one can help to keep the illness from spreading. Protection consists of staying at home (home quarantine) and avoiding direct contact with healthy (potentially asymptomatic) or diseased patient.

Introduction

The term novel coronavirus 2019 was coined by the World Health Organization (WHO) which belongs to a family of viruses called 'Nidovirus' that might cause different complications like fever, breathing problems, pneumonia and inflammation of the lungs. These infections are common in creatures overall, yet not very many cases have been known to influence people. In pneumonia patients It refers to a coronavirus that affected the lower respiratory, in Wuhan, China, on 29 December 2019 [1]. The novel coronavirus 2019 is recognized internationally as coronavirus disease 2019 declared by WHO. The virus is severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) In December 2019. A group of patients with pneumonia of unknown cause was apparently related to a local Huanan South China Seafood Market in Wuhan, Hubei Province, China [2]. Several important clinical features of COVID-19 were reported. First, an attack rate of 83% is shockingly high even within family context, proposing the strong transmissibility of SARSCoV-2. Second, in elderly patients with much more common signs and more dangerous radiological abnormalities seen, the clinical appearances, virus of COVID-19 in this family vary from mild to moderate. In general, it appears that SARS 19 is more serious than COVID- 19. Third, it was observed that an SARS-CoV-2 RNA in the sputum sample and asymptomatic kid has ground-glass opacification in his lung [3].

Many instructions can be gained from Asian ICUs' combined knowledge with COVID-19 outbreaks, MERS and SARS. The COVID-19 pandemic feasts around the globe, all health worker, the intensive care unit (ICU) staff, policymakers, states, medical administrators, and researchers need to chock for a rise in patients severely ill [4].

So, COVID-19 virus spread may occur through direct contact with infected people or by indirect contact with surfaces in the instant environment or with items used on the infested person (e.g., stethoscope or thermometer. The droplet transmission is corresponds to the existence of microbes within droplet nuclei as compare to Airborne transmission. The particles size less than 5 µm in diameter that can remain in the atmosphere for more long periods and can be spread to others over distances greater than 1 m. There is specific sign of infection with COVID-19 can lead to bowel infection and can be found in feces[5].

According to the WHO, 25 March 2020, 414,189 cases and 18,399 deaths from COVID-19, triggered by the novel SARS-CoV-2, were reported worldwide. On 26 February 2020, however, the rate of case rise in the rest of the world became higher than that in China. Significant outbreaks occur in Italy (69,176 cases), Iran (24,811 cases), and the USA (51,914 cases), and the outbreak keeps expanding geographically [6], As per the WHO report May 17, 2023, the total confirmed cases 766,440,796 and 6,932,591 deaths due to COVID-19 across the globe. (WHO),

Sars-Cov-2 Characteristics

SARS-CoV-2 is a 29.9 kb RNA beta-coronavirus that is enveloped, positive-sense, and single-stranded [7,8]. SARS-CoV-2 genome analysis revealed that it shares 88 percent of its sequence with bat-SL-CoVZXC21 and bat-SL-CoVZC45, and 96.2 percent with another bat CoV RaTG13 [9]. However, current research suggests that pangolins transported from Malaysia to China, as well as other putative intermediary hosts such as turtles or snakes, could be the virus's direct source rather than a bat [10].

Furthermore, SARS-protein-coding CoV-2's capabilities are 79.5 percent and 51 percent similar to SARS-CoV and MERS-CoV, respectively. Like SARS-CoV, SARS-CoV-2 uses the Angiotensin-Converting Enzyme 2 (ACE2) receptor to pass through cells [11,12]. As a result, previous treatments that were effective in controlling the SARS-CoV and MERS-CoV pandemics may also be effective in SARS-CoV-2.

Demographics

The majority of those infected are between the ages of 30 and 69, although the typical age of an infected individual is 51, and men account for 51% of recorded cases. Close contact with infected patients and exposure to aerosol viruses from medical devices and procedures, such as endoscopy, may put healthcare workers at risk of infection. Current data suggests that children under the age of 18 have a low rate of infection (2.4 percent), with a large proportion of adult contact tracing rather than identified symptoms. In China, healthcare workers accounted for 3.5% of COVID19 patients, and Italy reported that 20% of its healthcare workers are infected. [13,14,15,16]. Men had a greater risk of infection, disease severity, ICU admission, and death than women at each level of the illness severity. COVID19 is more common in men than it is in women, according to statistics. Males also had more serious illnesses at the time of diagnosis than women, which means men are 18% more likely than women to acquire severe COVID19. Furthermore, men were more likely than women to be admitted to the ICU for COVID19 patients. Finally, we discovered that men are more likely than women to die from COVID19. These higher risks for men were statistically significant at all levels of severity, with minimal variation (17).

Diagnosis

The current gold standard and confirming test for COVID19 is the detection of viral nucleic acid using reverse transcriptase polymerase chain reaction (RTPCR). The specific RTPCR assay, the type of sample obtained, the sample quality, and the length of sickness at the time of testing all influence the sensitivity of RTPCR. When viral load is low, such as in the early or late stages of the disease, RTPCR can be false negative [19]. Smears of the nasopharyngeal and oropharyngeal mucosa are indicated for early infection identification and diagnosis. Positive rates for bronchoalveolar lavage were 93 percent, 72 percent for sputum, 63 percent for nasal swabs, 46 percent for bronchoscopic brush biopsies, 32 percent for throat swabs, 29 percent for faces, 1 percent for blood, and 0 percent for urine samples in a multi-specimen RTPCR sensitivity study. Because viral loads are larger in lower respiratory tract specimens, positive rates are anticipated to be higher [20, 19, 21]. The American Academy of Pediatrics (AAP) recommends performing molecular analysis tests on nasopharyngeal and throat (oropharyngeal) swabs [single swab for sampling throat first, then nasopharyngeal] at 24 hours of age, then repeating the test at 48 hours. In newborns who are mechanically ventilated, tracheal aspirate should be examined. If a newborn's PCR sample was originally positive, follow-up tests with a 48-72 hour gap should be undertaken for up to two consecutive negative tests. To decrease colonization, the Canadian Pediatric Society suggests testing within two hours of cleaning your face. It is recommended that if the tests are positive, you repeat them in 24 to 48 hours. To reduce the danger of virus exposure by aerosol transmission, the best measures should be adopted during specimen collecting and processing.

Mode of Transmission

Respiratory diseases can be transferred by drops of various sizes. Respiratory droplets are droplet particles with a diameter of 5 to 10 m, whereas droplet nuclei are droplet nuclei with a diameter of less than 5 m. (WHO, 2014). The COVID19 virus is largely transmitted between people by droplets and contact pathways, according to current data (Burke, 2020; Chan et al., 2020; Huang et al., 2020; Liu et al., 2020; Mission, 2020; Thompson, 2020). A study of 75,465 COVID19 cases in China found no evidence of airborne transmission (Ong et al. 2020). When a person is in close contact (within 1 m) with someone who is experiencing respiratory symptoms (such as coughing or sneezing), they are at risk of being exposed to possibly infectious respiratory droplets through their lining (mouth and nose) or conjunctiva (eyes). Transmission can also happen by fomites in the infected person's zone [22, 23,24]. SARSCoV2 can be transmitted both directly and indirectly (through droplets and person-to-person transmission) (contaminated objects and air pollution). In the meantime, Personal Protective Equipment (PPE) may be a source of airborne diseases [25]. SARSCoV2 is thought to be spread mostly through respiratory droplets when a patient coughs, sneezes, or even speaks or sings, as previously stated. Droplets can only fly a few feet (almost two meters) and can only stay in the air for a short duration. In droplets (less than five microns in diameter), however, SARSCoV2 stays intact and contagious for up to three hours [26]. As a result, air isolation, room ventilation, and proper disinfectant use (particularly in restrooms) may be able to inhibit the virus's propagation in aerosols [27]. When a person's hands come into close contact with mucous membranes such as the eyes, nose, or mouth after touching a surface infected with SARSCoV2, COVID19 can develop [28].

RTPCR remained positive between 5 and 13 days after discharge in a study of four infected hospital staff [29], despite each patient having at least two negative tests. Additionally, virus shedding in faces can last up to five weeks (the maximum shedding time was 37 days [30] and in patients who died to death) with a mean of 11.2 days after the pulmonary test was negative [31]. It is recommended that the present discharge criteria be changed because SARSCoV2 can be transferred from recovered patients.

The following are the current download criteria:

- (1) Two negative RTPCR results in a row separated by at least 24 hours.

- (2) On computed tomography (CT) evaluation of the chest, the patient's acute exudative lung lesions were completely resolved.
- (3) Temperature normalization for 72 hours.
- (4) The patient's airway symptoms are resolved. [29,32].

Because pregnant women are at a higher risk of getting COVID19, it's crucial to look into the possibility of COVID19 transmission vertically. Although a baby from an infected mother tested negative in seven duplicate newborn blood, stool, and oropharynx samples [33], recent studies have shown that immunoglobulin M (IgM) antibodies against SARSCoV2 were present in the blood of newborns, implying that SARSCoV2 transmission from mother to fetus could not be ruled out [34,35]. Although it is unknown if SARSCoV2 was transmitted to humans from sick animals in the Hunan seafood market (civet, snake, or other species), animal-to-human transmission is a distinct possibility [36]. SARSCoV2 can infect ferrets, cats, dogs, and other domestic animals [37]. Cats have been found to become infected with SARSCoV2 and disseminate the virus to other cats. Although it is unknown whether cats can transfer the virus to their owners, this is not yet a problem for cat owners. Ducks, pigs, chickens, and dogs, on the other hand, are unlikely to be infected. However, two days after the owner was quarantined for COVID19, a German Shepherd dog died (cause of death could not be established because the owner refused to perform an autopsy). As a result, it is necessary to consider the possibility of virus transfer from animal to human.

Preventive Approaches

The World Health Organization (WHO) has indicated that controlling infectious diseases like COVID19 requires education, isolation, prevention, transmission control, and treatment of sick people. By following the steps outlined below, you can help to keep the illness from spreading. Protection consists of staying at home (home quarantine) and avoiding direct contact with healthy (potentially asymptomatic) or diseased people. Avoid making unneeded excursions. Follow social distance guidelines such as avoiding crowded public locations and keeping everyone at least two metres apart when coughing or sneezing; when welcoming someone, don't shake hands. Hand washing for at least 20 seconds with soap and water or a hand sanitizer containing at least 60% alcohol, especially after contacting general surfaces, going to the bathroom, or shaking hands; avoiding touching eyes, nose, and mouth with unwashed hands; disinfecting surfaces with householdays. Because of the long incubation period and the presence of asymptomatic patients, it may be necessary to employ a medical mask (particularly N95) or a ventilator (especially FFP3). It's also a good idea to disinfect old respirators, only use them for a limited time, and properly dispose of discarded masks. Respiratory masks (protection classes FFP1, FFP2, and FFP3 [39]) are designed to be single-use devices, however they can be re-used for a short time unless there is a risk of contamination from infectious particles deposited on the surface [40]. It should be discarded if the respirator becomes soiled or soaked with human fluids, if it no longer fits well, or if breathing through the respirator becomes difficult. Masks must also be discarded after being used in an aerosol generation procedure (AGP). Manufacturers had no motivation to sterilise masks or create masks for repeated use until recently. However, the ability to disinfect and reuse masks is critical. SARSCoV2 can survive in the environment for a long period, even on the surface of diverse materials such as cardboard, iron, or linen. Because of the significant contamination from respirators and surgical masks during the COVID19 epidemic, steam and hydrogen peroxide could be used to sanitise worn masks.

There are several vaccine techniques being studied in animals against SARSCoV and MERSCoV, including live attenuated viruses, viral vectors, inactivated viruses, subunit vaccines, recombinant DNA, and protein vaccines. Several clinical trials have been started to examine the efficiency of several vaccinations against SARSCoV2, despite the fact that there is presently no authorised vaccine against SARSCoV2. [41].

Treatment

The treatment options available for COVID-19 and their mechanisms of action are briefly outlined in

Table 1. Different drugs available for COVID-19

DRUGS	Mechanism of action	Adult dose/ administration drug	Contraindications	Toxicities	References
1- Azithromycin	It inhibits the synthesis of bacterial proteins and also has an antiviral effect.	500 mg × 1, then 250 mg × 4 days by Oral (5 days total)	Hypomagnesemia -Myasthenia Gravis Torsade de pointes Hypokalemia	- prolongation of QT interval	(42–44)
2	Recovered			- Thrombosis	(45–53)
Immunoglobulin	COVID19 Patient Antibodies May Neutralize Virus When Injected into			- Arrhythmia - Fever Flushing Malaise	-

	New Patients			Renal impairment Headache	
3-Choloroquine (CQ)/Hydroxy-Choloroquine (HCQ)	Impaired entry and exit of viruses through the cell and disruption of viral protein synthesis.	HCQ 400mg BID × 2doses, then 400mg q day by Oral × 4 days (five doses)	- Presence of retinal or visual field flaws Known hypersensitivity to CQ/HCQ and 4-aminoquinoline	Bone marrow suppression - Can cause QT interval prolongation, torsade de pointes, arrhythmia 4-Retinopathu - CQ/HCQ has a narrow therapeutic index Seizure Myopathy	(54–58)
4. Tocilizumab	Recombinant human IL6 monoclonal antibody; binds to IL6 receptors	400mg (flat dose) × 1 by IV	- Caution in patients with neutropenia (<500 cells / micro L) or thrombocytopenia (<50,000 cells / micro L) - Patients with known hypersensitivity to Tocilizumab	Hypertension Hypersensitivity reactions- Increase in upper respiratory Tract infections like tuberculosis Hematologic effects Nasopharyngitis Headache Hepatotoxicity -GIT perforation	(59–69)
5- Corticosteroids	Due to their different effects on various cytokines (IL1, IL6, IL8, IL12, TNFα), corticosteroids play an anti-inflammatory role and reduce pathological damage.		Diabetes Hypertension - Patients with underlying infections	Short-term use does not cause any significant side effects, but long-term use can result in: - Weight gain - diabetes Osteoprosis hypertension	(70–74)
6- Remdesivir	An adenosine analog; It causes premature termination of nascent viral RNA strands by incorporation into the viral genome.	200mg × 1, then 100mg daily × 9 days (10 doses) by IV		- Kidney injury - Elevated level of transaminases	(75–82)
7- Nirmatrelvir with Ritonavir	Inhibitor of a cysteine residue in the 3C-like protease (3CLPRO) of SARS-CoV-2. This cysteine is responsible to the activity of the 3CLPRO of SARS-CoV-2 and potentially other members of the coronavirus family	300mg Nirmatrelvir + 100mg Ritonavir, twice a day for 5 days	Patients with Hepatic diseases	Hypertension, Myalgia, Diarrhea	(83-84)

Covid-19 Management

With the emerging issues posed by this public health emergency, there is a growing need for the timely detection and development of drugs that can be used to treat COVID19 infections. A wide range of previously approved drugs for additional indications and some investigational drugs are being tested in clinical trials with gains in COVID19 (Prevention 2020). As the COVID19 pandemic evolves, more and more research has come to light supporting different prevention and treatment strategies. However, before introducing various active pharmaceutical ingredients into clinical practice, it is of the utmost importance that the attending

physician exercise caution and critically evaluate the existing data.

A standardized testing protocol, prevention of mother-to-child transmission, and optimal management of symptomatic newborns are key areas of perinatal management of suspected COVID19 / positive newborns. It is advisable to form a cohort of pregnant women who are positive for SARSCoV2 or screened (PUI) with ILI [85,86,87]. Ideally, this should be done by phone or video consultation prior to admission to the hospital or upon admission to the hospital. Prenatal steroids and magnesium sulfate for neuroprotection should be administered according to current guidelines. The pregnant woman should wear a mask to avoid spreading the drops. The neonatal team should discuss delayed cord clamping, separation of the newborn from the mother versus co-accommodation with the parents prior to delivery, and feeding options using a shared decision-making approach. Newborn co-housing, PPE, and separation practices vary widely by country / setting and the guidelines of scientific societies or institutions. Therefore, decisions must be tailored to local needs and the situation. It is more important that the family is fully and openly informed and that a common choice is made after the consultation. In real life there is no –zero risk and the decision must be made after evaluating the risk-benefit ratio, the availability of resources, the feasibility, and the parental preference.

Precautions and Ppe

In the context of the pandemic, the classification of pregnant women as suspected, positive or negative cases will optimize the use of resources. In routine encounters with newborns confirmed or suspected of COVID19 infection, contact and droplet infection precautions are recommended. This includes gowns, gloves, standard procedure mask, and eye protection (face shield or safety glasses). For procedures such as bag-mask ventilation, intubation, suctioning, and newborns with any form of respiratory support, contact, air, and droplet infection precautions are recommended. PPE includes a gown, gloves, N95 respirator with eye protection, or an air-purifying respirator (powered air-purifying respirator (PAPR)[85].

Respiratory Management

Although infant COVID can cause a number of symptoms affecting the cardiovascular, GI, and CNS systems, the most common symptom is shortness of breath. However, other illnesses such as premature labour, sepsis, respiratory distress syndrome, and transient tachypnea of the infant are more likely to require ventilation than COVID-19 pneumonia. From an epidemiological standpoint, infant ARDS should be diagnosed primarily using the Montreux definition, which is also used to define disease severity [88]. To better support the baby while also protecting healthcare workers from the virus, airway management procedures should be evidence-based. The accumulation of aerosol-containing particles, which can spread the disease, is the greatest worry with respiratory assistance in neonates with suspected or proven COVID19 infection. The majority of neonates tested negative or were asymptomatic, hence data on respiratory care in COVID19 infection is scarce. As we wait for more proof, it makes sensible to take a practical, physiology-based approach to these neonates.

Covid-19 Vaccines

A COVID-19 vaccine is a vaccine designed to provide acquired immunity to the virus that causes coronavirus disease, severe acute respiratory syndrome coronavirus 2 (SARS CoV 2). (COVID-19). Prior to the COVID-19 pandemic, there was an in-depth collection of 4,444 information on structure and function [89] SARSCoV2 gene sequence data was collected on 10 COVID19 on March 19, 2020. [90] Vaccines against COVID19 were largely blamed for the spread of to reduce the severity and death of the virus. (91) The SARS CoV2 genetic sequence data was shared through GISAIID on January 10, 2020, and the global pharmaceutical industry made a strong commitment to combat COVID19 on March 19, 2020. [92] COVID19 vaccines have been largely attributed to reduced spread, severity, and death caused by the virus. [93]

1. Moderna

Moderna COVID-19 (mRNA-1273) is a vaccine against Covid-19. The vaccine is safe and effective for all individual aged 6 months and above. WHO also recommends the use of mRNA-1273 in pregnant individual.

2. Pfizer

BioNTech The Pfizer - BioNTech COVID19 vaccine, also known as Comirnaty, is a mRNA vaccine developed by BioNTech in Germany and Pfizer in the US Fosun Pharma distributes Comirnaty in Hong Kong, Macao and Taiwan.

3. V Sputnik

The Russian Research Institute of Epidemiology and Microbiology of Gamaleya has developed the Sputnik V COVID19 vaccine, a viral vector vaccine.

4. Covaxin

Bharat Biotech and the Indian Council for Medical Research worked together to develop Covaxin, an inactivated viral vaccine.

5. EpiVacCorona

The Russian State Research Center for Virology and Biotechnology has developed EpiVacCorona, a peptide vaccine.

6. J&J Covid-19 Vaccine

Janssen Ad26.COVS.S Covid-19 vaccine is safe and effective for all individual age 18 and above.

7. ZyCoVd

Cadila Healthcare, an Indian pharmaceutical company, has developed ZyCoVd, a DNA plasmid-based COVID19 vaccine with

the support of the Research Assistance Council of the Biotechnology Industry.

8. Minhai

Minhai COVID19 vaccine developed by Minhai Biotechnology Co. and Shenzhen Kangtai Biological Products Co. Ltd. In China there is an inactivated virus vaccine. [94].

Waste Management

According to the Medical Waste Processing and Management Regulation 2008, medical waste cannot be mixed with other waste generated in clinics, collected by clinics, transported and stored separately according to classification at any time. The current COVID19 pandemic has already turned safe places around the world into a living hell with high death toll due to its rapidly spreading culture, and is contributing to constant lockdowns in almost every part of the country. Amid all the problems it has caused thus far, a major problem that can wreak havoc in an already destructive and infectious environment in a densely populated city is the mishandling of medical waste. Wuhan in China is home to 11 million people and is the first city to be brutally brutalized by the pandemic. According to the Emergency Office of China's Ministry of Ecology and Environment, its hospitals produced more than 240 tons of medical waste a day during the peak of the outbreak, compared to 40 tons before the epidemic occurred. The central government deployed 46 mobile medical devices to handle this huge amount of medical waste treatment borne by the city of Wuhan, and a new facility with a 30-ton capacity was installed in 15 days in March. Biomedical waste is toxic because it contains possible virus particles that may be hidden under human skin: items contaminated with blood bags, needles, syringes or other sharp objects and body fluids, as well as bandages, casts, cotton swabs and with blood or body fluids contaminated with bedding. Experts say that drug waste is not like other types of waste, such as household or commercial waste. You can infect it directly through the skin or by ingesting and inhaling objects such as inhalers. Antibiotic-immune microbes and viruses (including COVID19 at this time) could spread rapidly through medical waste. Biomedical waste is harmful because it contains possible virus particles that may be hidden under the human body: objects contaminated with blood, needles, syringes or other sharp objects and body fluids, as well as bandages, casts, cotton swabs and blood or body fluids - contaminated bedding [95,96].

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