

Review Article

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COVID-19: A Perpetuating Challenge to Health Care Personnel

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ABSTRACT

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An ongoing outbreak of a new virus of a novel Coronavirus (nCoV) is a spill over event, with its epicentre in Wuhan, People of Republic of China has emerged as global health emergency. The outbreak began in December 2019 and now has been reported from about 180 countries. The emergence of SARS-CoV-2 has once again exposed the weaknesses of the global health systems preparedness, and ability to respond to an infectious threat. The present review highlights the updates of novel SARS- CoV-2 and also identifies the need to strengthen the health system and global health security.

Introduction

Coronavirus pandemic is a major threat to humanity. The world is facing another zoonotic infection caused by a novel strain of coronavirus (1). This new virus was provisionally named '2019-n CoV' by the world health organization (WHO), but now called (from 11th Feb 2020) as 'severe acute respiratory syndrome coronavirus (SARS-CoV-2) (2). This virus is a cause of coronavirus disease 2019 (Covid-19) and is contagious among humans (3). The virus is thought to have originated in animals (4,5). This virus came to lime light following a

spate of cases of pneumonia with no obvious reasons in December, 2019 from Wuhan City of China's Hubei province (6). The virus has now outspread globally and has become a problem of global concern. Human to human transmission of the virus has been confirmed (3).

Since the reports of the onset of infection leading to chaos and confusion from Wuhan city of China, the virus has rapidly spread to other parts of the world and has become perpetuating challenge to global medicine. On 11th March, 2020, WHO officially declared it as a Pandemic. This infection has been

reported from 180 countries and the number of morbidity and mortality is rising daily (1).

According to Reuters news dated 9th June 2020, more than 7.14 million people have been infected with Novel Corona virus globally and 406,929 have died. In India, according to ministry of health and family welfare on 10th June 2020, total number of confirmed cases are 133632 whereas 135205 have been recovered and 7745 deaths have been reported. (7)

This infection has affected almost all continents except Antarctica and number of morbidity and mortality rising daily. But in China, now the reported cases are less as compared to the other parts of the world. Most unfortunate part of this is that there is no definite treatment and management for this problem and is still a distant dream.

According to the health officials, all the deaths may not have occurred only due to Corona virus infection, but may be due to co-morbid conditions like asthma, diabetes, cardiac disease, cancer or immunocompromised patients etc. morbidity and mortality of health personals has also been reported throughout the world.

India faced a huge public crisis during this recent pandemic with tremendous pressure and resources constrain on the health care system.(8)

SARS-CoV-2 is a positive strand RNA virus (Fig I) belonging to the family of single stranded RNA viruses known as corona viridae and order – Nidovirus. It was believed to be a common type of virus which infects mammals, birds and reptiles but no previous report of human infection. However, Middle east Respiratory-syndrome first reported in Saudi Arabia in September 2012 and severe acute respiratory syndrome (SARS) identified

in southern China in 2003 with case fatality rate as 35% and 10% respectively (9).

Unfortunately, the current situation looks grave, because Coronavirus is outspreading very swiftly among humans. Species emerging into an acute disease (10). Human Corona virus includes alpha-coronaviruses (229E and NL 63) beta-Coronaviruses (OC43 and HKU1) and middle east respiratory syndrome related coronavirus (MERS-CoV) etc (1).

Transmission

The cause of viral infection to human is not clear yet. There are reports of its origin in a seafood market with vats and other live animals in Wuhan and spread from these animals to human. Also, claims of the cross-species dissemination between snake and humans are available in literature. However, no definite rate of animals in the channelling of this virus to humans is established (11,12). Human to human transmission of the virus has been confirmed. Corona viruses are primarily spread through close contact in particular through respiratory droplets from cough and sneezes within range of about 6 feet (13,14). Viral RNA has also been found in stool samples from infected patients (13,14,15). WHO stated on 1 February 2020 that “transmission from Asymptomatic cases is likely not a major driver of transmission at this time but now it has been confirmed that transmission through asymptomatic carrier can occur”?

The ICMR (Indian Council of Medical Research) – National institute of virology (ICMR-NIV) has carried out extensive data collection from bats, which may provide critical insight for the on-going spill over event. However, it remains difficult to say whether this virus will become entrenched with endemic seasonal or annual epidemics

(like pandemic H1N1, influenza) (17, 18) or it would extinguish like SARS. The knowledge based around developing robust signals which can predict the emergency of viruses of this group or their mutants is still developing. The gap in the current evidence have no alternative except to prepare for combatting epidemic spill overs in the years ahead.

Case definition

According the WHO's interim guidance documents (19) the case definitions being used currently are

SARI – An acute respiratory infection with a history of fever or measure temperature >38 and cough onset within 10 days and requiring hospitalization.

Surveillance case definitions for SARS-CoV-2 –

A person with SARI with no other aetiologies with one of the following:

1. History of travel in last 14 days; and
2. Patient is an HCW who has been caring for patients with SARI of unknown aetiology.

Patient with acute respiratory illness and at least one of the following:

1. Close contact with a confirmed or probable case of SARS-CoV-2 in the 14 days before illness onset; (20)
2. Worked or attended health care facility in the 14 days before onset of symptom where patients with hospital-associated SARS-CoV infections were reported.

A sensitive and specific definition for community-based surveillance remains elusive. The indicators for referral and their outcome impact are yet to be ascertain symptomatically.

Clinical manifestations

Individual of all age groups are vulnerable to SARS-CoV-2. The aged and those with underlying chronic disease are highly susceptible to become acute cases (16).

The clinical features mainly involve the respiratory tract, the common presenting symptoms include fever (99%), dry cough (60%), fatigue (70%), myalgia (44%) and dyspnoea (21, 22). Less common symptoms are headache, dizziness, diarrhoea, nausea and vomiting (23). Symptoms such as pharyngeal pain, dyspnoea, dizziness, abdominal pain and anorexia are more likely to be present in patients with severe illness. In addition, patients who are elderly, have co-morbidities including hypertension, diabetes, cardiovascular disease and cerebrovascular disease are more likely to have adverse outcome. In severe cases the Corona virus can cause pneumonia, kidney failure, acute respiratory distress syndrome, septic shock, coagulation dysfunction and death (24).

Laboratory diagnosis

Diagnosis is suspected in patients with signs and symptoms of pneumonia or patients who satisfy clinical case definition and are epidemiologically linked to a history of travel from affected location or who have had contact with confirmed case of SARS-CoV-2 (25). Sample collection from both upper and lower respiratory tract are accepted nasal swab, oropharyngeal swab, sputum, bronchoalveolar lavage, endotracheal aspirate or wash and tissue biopsy are preferred samples and stool sample in case of diarrhoea. All the procedures from sample collection to packaging should be done taking stringent contact precautions, using PPE with eye protection, three layered surgical masks (N95 mask should be restricted to sample collection and in-patient care), disposable gown, gloves

and shoe covers. This should be preferably be performed in a negative pressure isolation room. The collected sample should be referred to the designated laboratories assigned by the ICMR to test for novel Corona virus using Real time PCR.

A diagnostic test Real-time PCR has been developed and countries are quarantining and testing the suspected case by using test. The WHO recommends that RT-PCR must be done in BSL-2 laboratories (26). Routine confirmation of case of Covid-19 is based on detection of unique sequences of virus RNA by NAAT such as reverse RT-PCR with confirmation by nucleic acid sequencing when necessary.

The viral genes targeted so far, include, the N, E, S and RdRP genes. Heat treatment of RNA extraction is not recommended (27). Whole handling specimens of SARS-CoV-2, one must ensure neither the sample nor the HCW is contaminated. Charile Berlin, from Germany, was the first to develop the assay and standardize the protocol for real time PCR (28).

Prevention

As there is no specific treatment for Covid-19, complete isolation of confirmed cases is advised by the experts (1). SARS-CoV-2 spreads via respiratory droplets and physical contact. It is essential to practice precautionary measures to prevent transmission. Standard precautions consist of hand hygiene.

Use of personal protective equipment (PPE). Hand hygiene should be done with alcohol-based hand rubs containing 60-80% ethanol. PPE consists of N-95 mask, face shield, goggles, gowns, gloves and shoe covers (29). Particulate i.e. NIOSH-certified N-95, EV

standard FFP2 or equivalent should be used by HCWs involved in aerosol generating procedures in healthcare settings the COVID positive patients should be placed in a negative pressure isolation room.

Quarantine

On the present scenario when there is unavailability of drug and vaccine. The aim of WHO is to help the international community prevention and respond to acute public health care risk. The WHO has created a range of info-graphs to demonstrate how infected cases can protect themselves and others from catching the infection (27).

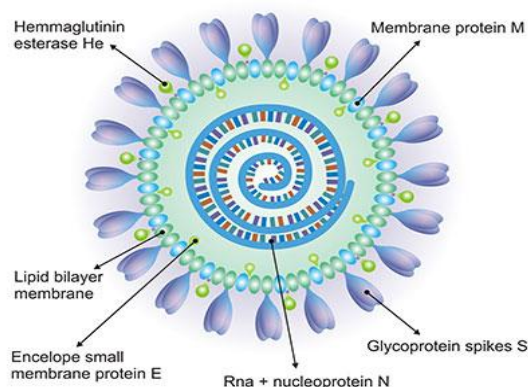
Importance of travel history is an imperative step to determine a patient rise of SARS-CoV-2 (30). Quarantining the patient with a history of travel to infected locations or contact with an infected individual will help in preventing the spread of infection. By avoiding mass gathering, regular use of hand washing or hand sanitizers, also maintaining a distance of at least one meter from people who are coughing or sneezing will also help to reduce the infection (27). Anyone with flu should contact the health department for timely diagnosis and management.

Treatment

There is no specific drug for Covid-19. Treatment is mostly supportive based on the organ system affected. Published evidence for preliminary therapeutic experiences indicated that patients requiring hospitalization were managed with broad spectrum antibacterial, antibiotics and antiviral drugs.

The treatment course may require management of respiratory failure with non-invasive ventilation.

Fig.1



Vaccine

The WHO R&D blueprint and its working group conveyed an informal consultation on prioritization of vaccine candidates against SARS-CoV-2 in Geneva on January 30, 2020 (31) and identified at least five leading candidate vaccines for SARS-CoV-2 (39). Many countries are engaged in the process of vaccine, but all the studies from various countries are currently in the pre-clinical phase. Only the biggest news related to the development of vaccine has come from Moderna Inc. with its candidate – mRNA – 1273 showing signs that it can create an immune response to fend off the Novel Coronavirus. However, data is based on 8 people trial only needs more clinical trials.

Another candidate British Pharmaceutical giant AstraZeneca with University of Oxford produced a vaccine prototype which have also reached clinical trial stage and hoping vaccine candidate for masses.

To conclude the management of rapidly rising cases of Covid-19 has raised alarms in the healthcare facilities all around the globe. In the absence of specific knowledge regarding its mode of transmission animal reservoir source the only alternative is to follow the guidelines of WHO, ICMR and the national government. Further-more, research and

development of specific vaccine and drugs against the unbridled infection are the need of the hour.

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