

The Outbreak of COVID-19: An Overview

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ABSTRACT

Corona viruses are a group of RNA viruses. In late December 2019, Patients with pneumonia with unknown etiology was get admitted in health care facilities in Wuhan, China, and resulted in a pandemic disease which affected more than 200 countries and responsible for 182,989 deaths world-wide. The disease is officially named as Coronavirus Disease-2019 (COVID-19, by WHO on February 11, 2020). COVID-19 is a potential zoonotic disease with low to moderate (estimated 2%–5%) mortality rate. Currently, there is no definite treatment for COVID-19 although some trials are under investigation. Hence, appropriate use of PPE, regular hand hygiene, Respiratory and cough etiquettes, social distancing are some key elements to prevent the spread of disease.

KEYWORDS: *Coronavirus, COVID-19, Outbreak*

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INTRODUCTION

Corona viruses are a group of related RNA enveloped viruses that are responsible for causing diseases in mammals and birds. This virus was first discovered in 1960s. Corona viruses are named after the crown-like spikes on their surface.¹

infections and responsible for epidemics in 2003 and 2012 respectively.²

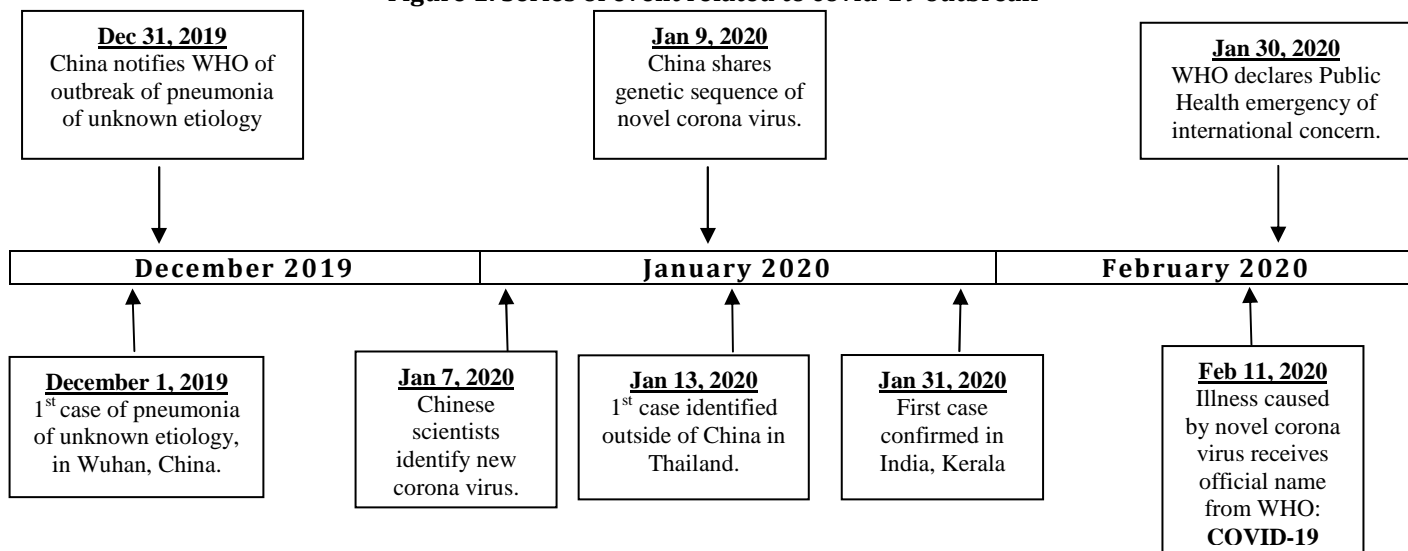
In December 2019, in Wuhan, China many patients was admitted with pneumonia of unknown etiology which was characterized by fever, dry cough, fatigue, diarrhea and loss of appetite.³ On December 31, 2019, the Chinese Center for Disease Control and Prevention (China CDC) dispatched a rapid response team to affected city to investigate the etiology that was linked to an open seafood and animal market of Wuhan city, China.⁴ Afterwards the market was closed on January 1, 2020, for sanitary procedure and disinfection. However, the other cities including Beijing and Shanghai get infected with this COVID-19.⁵ As on 09th May 2020, there are 4,032,719 confirmed cases from more than 200 countries, 276,677 deaths from novel virus, 1,399,714 total recoveries. China has over 82,887 positive cases while Italy's tally stands over the 217,185, Spain over 262,783 and USA with 1,322,164 positive cases. In India 59,662 cases positive with novel virus with 1981 mortalities and 17,847 recoveries.⁶

Table 1: Over view of coronavirus

Family	Coronaviridae
Sub-family	Orthocoronaviridae
Genera	Four: Alpha, Beta, Delta, Gamma
Species	Seven : HCoV-229E, HCoV-NL63 (Alpha genus) HCoV-OC43, HCoV-HKU1, MERS-CoV, SARS-CoV, COVID-19 (Beta genus)

In humans, they are responsible for causing very mild illnesses including the common colds. However, severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV)—are known to be causing severe lower respiratory tract

Figure 1: Series of event related to covid-19 outbreak



Before Covid-19 two major outbreaks occur in 2003 and 2012 due to coronavirus. In 2003, in southeast China, numerous of patients affected and died due to mysterious pneumonia of Unknown etiology which was latter named as SARS coronavirus.⁷ The second outbreak in 2012 of novel coronavirus in Middle East with the similar features with SARS(2003) named as Middle-East Respiratory syndrome coronavirus with mortality rate of 37%.^{7,8}

VIROLOGY

The exact origin of the 2019- nCoV remains unclear. It is believed that it is zoonotic in nature and bats may be the main culprit due to similar sequence identity to the bat-CoV.^{8,10} Whereas reports from previous studies related to SARS- and MERS-CoV, suggest bat as their natural reservoir. Raccoon dog thought to be the intermediate host for SARS-CoV and the dromedary camel for MERS-CoV.^{8,10} Evidences of person-to-person transmission was seen in previous outbreaks of coronavirus in 2003 and 2012 whereas initially, in covid-19 outbreak limited person-to-person transmission was reported.^{3,5} New evidences of person –to– person transmission among families was also reported from various areas.¹¹ Furthermore, the survival time of novel coronavirus in the environment is not clear.

Table 2: Characteristics of SARS, MERS, COVID-19

Characteristics	SARS	MERS	COVID-19
First patients reported	Guangdong, China, November 2002	Zarga, Jordan, April 2012, and Jeddah, Saudi Arabia, June 2012	Wuhan, China, December 2019
Virus	SARS-CoV	MERS-CoV	SARS-CoV-2
Type of coronavirus	Betacoronavirus	Betacoronavirus	Betacoronavirus
Animal hosts	Bats (natural reservoir), masked palm civet and raccoon dogs may be intermediate hosts	Bats (natural reservoir), dromedary camel (intermediate host)	Bats, animals sold at the seafood market in Wuhan might represent an intermediate host.

EPIDEMIOLOGY

The outbreak of novel coronavirus was first reported in Wuhan, China when many patients were admitted to the health care facility with pneumonia like symptoms of unknown etiology. At least 41 people who were related to a local market, the Huanan Seafood Market was affected at first and “epidemiologic alert” was issued by Chinese health authority on December 31st, 2019.³ A total of 59 patients with complaint of Fever and dry cough were referred to Jin Yin-tan hospital, out of which 41 patients were found positive for the covid-19 infection. Two-third (66%, 27/41) patients had history of exposure to Huanan Seafood Market.³ However, the first confirmed case of COVID-19 had no history of Seafood Market exposure. After that the disease was started spreading from Wuhan to other parts of China. The first case of COVID-19 outside China was reported in Thailand on 13th January, 2020. At present covid-19 cases are present in more than 200 countries world-wide. After the outbreak mandatory quarantine of 14 days for travelers and rapid surveillance for fever cases were done at National and state levels. The portal of entry of covid-19 is through respiratory tract or mucosal surfaces (such as conjunctiva). No evidences of oral-fecal transmission were seen yet. Lungs are the major organ involved in covid-19.

CLINICAL MANIFESTATIONS

The infection is acute in nature with mean incubation period of 5.2 days.¹³ Symptoms usually begin with fever, dry cough, and fatigue. But afterwards multiple systems may be involved.

Patients may be present with symptoms related to respiratory system with includes cough, shortness of breath, sore throat, and chest pain, gastrointestinal system (diarrhea, nausea, and vomiting), musculoskeletal system (muscle ache), and nervous system (headache or confusion). Majority of patients were present with fever, cough and shortness of breath.^{3,14} As per the evidence the median time to first hospital admission is 7.0 days (4.0–8.0). Patients with fatal disease may develops ARDS later on and condition may get severe in a short period of time with death due to multiple organ failure.^{3,14}

Table 3: Case definitions of surveillance:¹⁵

Suspected case	<ul style="list-style-type: none"> ➤ All symptomatic individuals who have undertaken international travel in the last 14 days or ➤ All symptomatic contacts of laboratory confirmed cases ➤ or ➤ All symptomatic healthcare personnel (HCP) ➤ or ➤ All hospitalized patients with severe acute respiratory illness (SARI) (fever AND cough and/or shortness of breath) ➤ or ➤ Asymptomatic direct and high risk contacts of a confirmed case (should be tested once between day 5 and day 14 after contact)
Confirmed case	A person with laboratory confirmation of virus causing COVID-19 infection, irrespective of clinical signs and symptoms
Close contact	<p>A person living in the same household as a COVID-19 case;</p> <p>A person having had direct physical contact with a COVID-19 case (e.g. shaking hands);</p> <p>A person having unprotected direct contact with infectious secretions of a COVID-19 case (e.g. being coughed on, touching used paper tissues with a bare hand);</p> <p>A person having had face-to-face contact with a COVID-19 case within 2 metres and > 15 minutes;</p> <p>A person who was in a closed environment (e.g. classroom, meeting room, hospital waiting room, etc.) with a COVID-19 case for 15 minutes or more and at a distance of less than 2 metres;</p> <p>A healthcare worker (HCW) or other person providing direct care for a COVID-19 case, or laboratory workers handling specimens from a COVID-19 case without recommended personal protective equipment (PPE) or with a possible breach of PPE;</p> <p>A contact in an aircraft sitting within two seats (in any direction) of the COVID-19 case, travel companions or persons providing care, and crew members serving in the section of the aircraft where the index case was seated (if severity of symptoms or movement of the case indicate more extensive exposure, passengers seated in the entire section or all passengers on the aircraft may be considered close contacts).</p>

DIAGNOSIS

The COVID-19 is an acute viral respiratory tract infection and many differential diagnoses related to common viral pneumonia should be considered, such as influenza, parainfluenza, adenovirus infection, respiratory syncytial virus infection, *Mycoplasma pneumoniae* etc.^{1,11} Therefore, it is important to know the travel and exposure history of a suspected patient (Case Definition of suspect, confirmed and close contact given in Table 3). Laboratory diagnosis for COVID-19 should be performed in a well-equipped laboratory with up to bio-safety level.

The definitions of reported COVID-19 include (as of February 7, 2020 (CDC Taiwan)):

1. Clinical conditions, met any following one	1.1 Febrile illness (≥38°C) or acute respiratory infection
	1.2 clinical, radiological, or pathological evidence of pneumonia
2. Laboratory conditions, with any of the following:	2.2 Clinical specimen (nasopharyngeal swab, sputum, or lower respiratory tract aspirates, etc.) that were isolated and identified as 2019-nCoV
	2.3 Clinical specimen that show positive by RT-PCR.
3. Epidemiologic conditions, with any of the following 14 days before onset of symptoms	3.1 History of travel history from or evidence of contacting patients with fever or respiratory symptoms
	3.2 History of travel from or living in other part of mainland China (including Hong Kong and Macaw)
	3.3 History of contact with probable or confirmed COVID-19 cases, including health provider, under the same roof, direct contact of the mucus or body fluid.

If the patient is present with any of the above Clinical, Epidemiological and Laboratory condition the person should be immediately quarantine in health care facility in Negative pressure room or single room. If the first laboratory report is negative but patients’ symptoms persist without explainable etiology, keep the patient quarantine and repeat a second sample after 24 hours later in case of first negative to rule out initial false-negative result.

Sample collection:¹⁶

Preferred sample:

Throat and nasal swab in viral transport media (VTM) and transported on ice.

Alternate: Nasopharyngeal swab, BAL (Bronchoalveolar Lavage) or endotracheal aspirate which has to be mixed with the viral transport medium and transported on ice.

General guideline while collecting sample:

- Trained health care professionals to wear appropriate PPE with latex free purple nitrile gloves while collecting the sample from the patient. Maintain proper infection control when collecting specimens
- Restricted entry to visitors or attendants during sample collection
- Complete the requisition form for each specimen submitted.
- Proper disposal of all waste generated

Respiratory specimen collection methods:

Lower respiratory tract

- Bronchoalveolar lavage, tracheal aspirate, sputum
- Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container.

Upper respiratory tract

- Nasopharyngeal swab AND oropharyngeal swab

Real-time RT-PCR assay was used to detect viral RNA. Chest x-ray and computer tomography (CT) can be done to rule out pneumonia.^{3,14} Routine laboratory test can also be done in early stage that shows lymphopenia, prolonged prothrombin time, elevated D-dimer, elevated liver enzymes, total bilirubin, and lactate dehydrogenase.³

TREATMENT

Currently, there is no validated treatment for COVID-19. The main strategies are symptomatic and supportive care, such as keeping vital signs stable, maintaining oxygen saturation and blood pressure, and treating complications, such as secondary infections or organs failure.

1. Specific therapy:

NO SPECIFIC ANTIVIRALS have been proven to be effective as per currently available data. However, based on the available information (uncontrolled clinical trials), the following drugs may be considered in patients with severe disease and requiring ICU management:¹⁶

- Hydroxychloroquine (Dose 400mg BD – for 1 day followed by 200mg BD for 4 days)
- In combination with • Azithromycin (500 mg OD for 5 days)
- Other Eligible individuals for Hydroxychloroquine:
- Asymptomatic healthcare workers involved in the care of suspected or confirmed cases of COVID-19 400 mg twice a day on Day 1, followed by 400 mg once weekly for next 7 weeks; to be taken with meals
- Asymptomatic household contacts of laboratory confirmed cases 400 mg twice a day on Day 1, followed by 400 mg once weekly for next 3 weeks; to be taken with meals
- The drug is not recommended for prophylaxis in children under 15 years of age.¹⁷

2. Convalescent therapies (plasma from recovered COVID-19 patients):

This strategy had been used to support passive immunization. Based on the studies from MERS, the therapeutic agents with potential benefits include convalescent plasma, interferon-beta/ribavirin combination therapy, and lopinavir.¹⁸

3. **Vaccine:** There is currently no vaccine available for preventing 2019-nCoV infection.

PREVENTION

Since there are no standard treatments for COVID-19, it is important to avoid infection or further spreading. For those who had history of travel in recent 14 days, body temperature monitor and self-quarantine for 14 days should be performed. For health-care workers, personal protective equipment should be put on and taken off properly while caring probable or confirmed patients. Stringent protection procedures should be conducted for high-risk procedures (such as endoscopy, Ambu bagging, and endotracheal tube intubation) in a negative pressure rooms or single rooms. The confirmed case should be isolated (prefer a negative pressure isolation room or, alternatively, a single room with good ventilation). Under the circumstances of resolved symptoms for 24 hours and consecutive two negative results, isolation could be released. Corpses should be burned or buried deep.

Prevention at Community Level:

- Stay home when you are sick.
- Avoid contact with people who are sick.
- Get adequate sleep and eat well-balanced meals.
- Wash hands often with soap and water for 20 seconds or longer and dry hands with a clean towel or air dry.
- Wear a cloth face cover when going out in public.
- Avoid touching your eyes, nose, or mouth with unwashed hands or after touching surfaces.
- Cover your mouth with a tissue or sleeve when coughing or sneezing.
- Clean and disinfect “high touch” surfaces often.
- Keep at least six feet between you and others.
- Avoid crowded places. Events with 1,000 or more people have been canceled. Community events with 250 or more recommended be canceled or postponed. Major sports events are canceled.
- Avoid public transit if possible and don’t travel to areas with active outbreaks.

Conclusion:

COVID-19 is a novel virus. Common signs of infection include respiratory symptoms, fever, cough, shortness of breath and breathing difficulties. Currently, there is no specific treatment for the disease and symptomatic treatment was the only strategy. Hence, prevention of infection is the key element to control this health problem: appropriate use of PPE, regular hand hygiene, appropriate waste management, Respiratory and cough etiquettes, regular environment cleaning and awareness in the community.

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