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Principle of infection prevention and control of pandemic COVID-19

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Abstract
COVID-19 is a new name for a new disease, coined as an abbreviated form of corona virus disease 2019. Corona viruses are a large group of viruses that may generate respiratory disorders in humans varying from common colds to further difficult conditions such as Middle-Eastern-Respiratory Syndrome (MERS) and Severe-Acute-Respiratory-Syndrome (SARS). This work presents the basic causes and effects of the disease. The work discusses about the Infection prevention and control mechanism of COVID-19.

Keywords: MERS, SARS, CORONA, IPC

1. Introduction

Corona viruses (CoV) are a large family of viruses that cause a wide range of illness from the common cold to more severe diseases. They are often zoonotic that is Middle East Respiratory Syndrome [MERS] and Severe Acute Respiratory Syndrome [SARS] and Several known corona viruses are circulating in animals that have not yet infected humans. Corona virus is one of the deadliest diseases found in human in the 21th century. On 31 December 2019, the World Health Organization (WHO) China Country Office was informed of cases of pneumonia of unknown etiology (unknown cause) detected in Wuhan City, Hubei Province of China, and WHO reported that a novel corona virus (2019-nCoV), which was named as severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) by International Committee on Taxonomy of Viruses on 11 February, 2020, was identified as the causative virus by Chinese authorities on 7 January [1]. It is reported that the virus might be bat origin [2], and the transmission of the virus might related to a seafood market (Huanan Seafood Wholesale Market) exposure [3, 4]. The genetic features and some clinical findings of the infection have been reported recently [4, 6]. Potentials for international spread via commercial air travel had been assessed [7]. Public health concerns are being paid globally on how many people are infected and suspected. The arrival of Severe-Acute-Respiratory-Syndrome CORONAVIRUS 2 (S A R S – CoV-2; Previously Tentatively named 2019 Novel Corona virus or 2019 – n CoV) disease (COVID-19) in China at the end of 2019 has produced a huge global outbreak and is a major public Health Issue. It is desirable to Limit Human–to-Human broadcast in order to reduce the secondary infections among close contacts and Healthcare-Workers and to avoid transmission amplification events and Further International spread from the country China [8]. The distribution of corona virus cases globally as on 15th April, 2020 is shown in Fig.1. The COVID-19 signs and symptoms are shown in Fig.2.

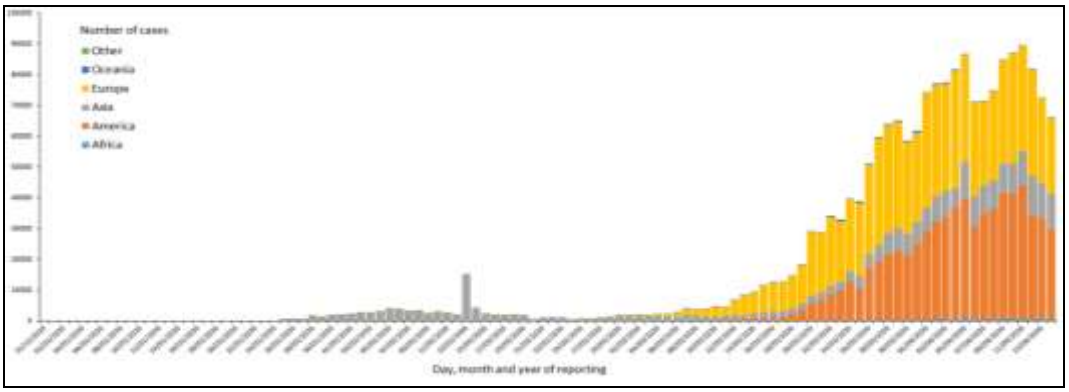

Fig 1: Globally distribution of corona virus cases [9]

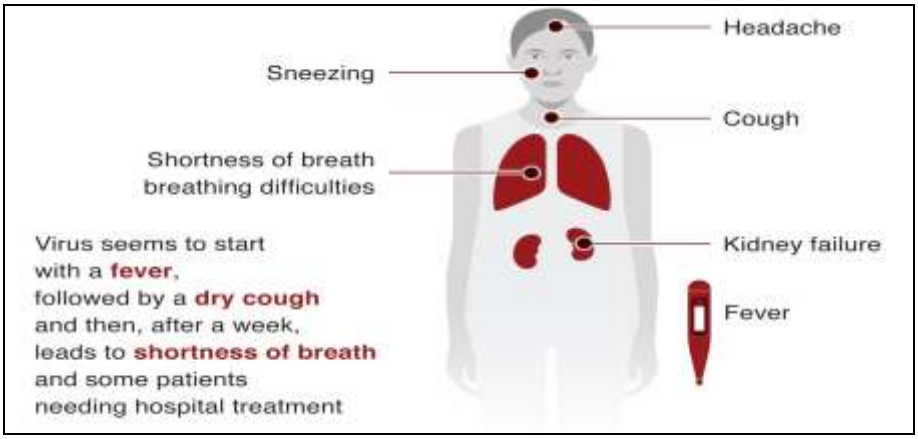

Fig 2: Symptoms of COVID-19 [10]

2. Principle of Infection Prevention and Control (IPC) [11]

1. Public health objectives and strategic priorities by scenario.

Fig.3. shows the transmission scenarios. There are basically four transmission scenarios which are observed.

a. Countries with no cases (no cases)
b. Countries with one or more cases, imported or locally acquired (sporadic cases)
c. Countries experiencing clusters of cases in time, geographic location, or common exposure (clusters of cases)
d. Countries experiencing larger outbreaks of local transmission (community transmission).

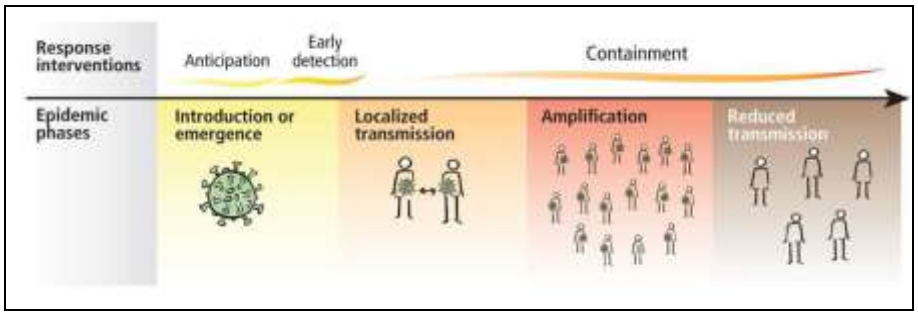

Fig 3: Transmission Scenarios [10]

3. Ventilation and exhausted air treatment as IPC measures within a COVID-19

Context

The purpose of ventilation is to provide healthy air for breathing by both diluting the pollutants originating in the building and removing the pollutants from it. Building ventilation has three basic elements:

a. Ventilation rate — the amount of outdoor air that is provided into the space, and the quality of the outdoor air;
b. Airflow direction — the overall airflow direction in a building, which should be from clean zones to dirty zones; and
c. Air distribution or airflow pattern — the external air should be delivered to each part of the space in an efficient manner and the airborne pollutants generated in each part of the space should also be removed in an efficient manner. There are three methods that may be used to ventilate a building:

1. Natural ventilation

Natural forces (e.g. winds) drive outdoor air through the building openings such as windows, doors, solar chimneys, wind towers and trickle ventilators.

2. Mechanical ventilation

Mechanical fans drive mechanical ventilation. Fans can either be installed directly in windows or walls, or installed in air ducts for supplying air into, or exhausting air from, a room.

3. Hybrid ventilation

Hybrid (mixed-mode) ventilation relies on natural driving forces to provide the desired (design) flow rate. It uses mechanical ventilation when the natural ventilation flow rate is too low.

4. Modes of Transmission

For infection to spread, all links must be connected as shown in Fig.4. IPC goal is to break a link in the chain to prevent the transfer of the pathogen.

Fig 4: Chain of Infection [10]

An infectious agent may be transmitted from its natural reservoir to a susceptible host in different ways. There are different classifications for modes of transmission. In order to be able to assess the risk and rationalize the Public Protection Equipment (PPE), it's essential to understand the mode of transmission. Table1 shows the different way a virus can be transmitted from one person to another. The Fig.5 shows who is at the risk.

Table 1: Spreading of Virus

Contact	**Direct physical transfer between one susceptible host and an infected/colonized person**	**Personal contact between a susceptible host and a contaminated intermediate object, usually inanimate**
Droplet		By inhalation of infective large particles via close contact with an infected patient sneezing or coughing

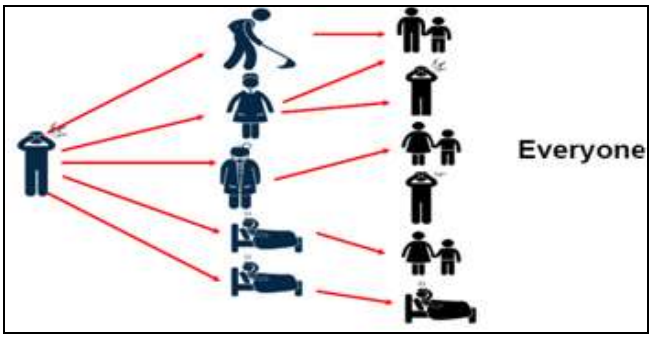

Fig 5: Everyone at risk

Conclusion

The purpose of the presented work is to study the basic causes and effects of COVID-19. In the present the information's gathered from different platforms has been clubbed to make the information handy. The work discusses about the infection prevention and control of the pandemic.

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