

Review Article

Novel Coronavirus Disease 2019 (COVID-19) Outbreak in Algeria: A New Challenge for Prevention

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In December 2019, the novel Coronavirus Disease 2019 (COVID-19) outbreak started in Wuhan, the capital of Hubei province in China. Since then it has spread to many other continents and regions, including low-income countries. With the current trajectory of the 2019-nCoV outbreak unknown, medical measures and public health will both be needed to contain spreading of the 2019-nCoV and to improve patient outcomes.

It is imperative to increase attentiveness of tourists and travelers about the dangers and suitable protective recommendations and for health professionals to be attentive and vigilant if a patient with pneumonia or severe respiratory symptoms reports a recent history of travel to the country affected with SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2). Preventive measures should be taken by National and local health authorities of the affected countries, including Algeria, in order to increase hospital hygiene and disinfection. Finally, it is fundamental to explore the explanations for people's poor compliance with recommendations and rules and to take exact measures in order to improve them. The present manuscript reviews current strategies on prevention of 2019-nCoV infection.

Keywords: Novel coronavirus disease; COVID-19; Severe acute respiratory syndrome coronavirus 2; Viral infection and transmission; Preventive measures; Algeria

Abbreviations

2019-nCoV: Novel Coronavirus; CDC: US Centers for Disease Control and Prevention; COPD: Chronic Obstructive Pulmonary Disease; CoV: Coronavirus; COVID-19: Coronavirus Disease 2019; HCoV: Human Coronavirus; HIV: Human Immunodeficiency Virus; ICTV: International Committee on Taxonomy of Viruses; MERS-CoV: Middle East Respiratory Syndrome- Coronavirus; SARS-CoV-2: Severe Acute Respiratory Syndrome Coronavirus 2; TB: Tuberculosis; TCID50: Tissue Culture Infectious Dose; WHO: World Health Organization

Introduction

The Coronavirus Disease 2019 (COVID-19) is an infectious and viral disease caused by a new coronavirus discovered after an outbreak in Wuhan, China, in December 2019. Coronavirus (CoV) belongs to the Coronaviridae family, Nidovirales order. CoVs are divided into four genera: α -, β -, γ -, and δ -coronavirus. α - and β -coronaviruses only contaminate mammals, whereas γ - and δ -coronaviruses mainly infect birds, with a few infecting mammals. Six human CoV (HCoV) have been detected, comprising four endemic (HCoV-OC43, -229E, -NL63, and -HKU1) and two epidemic (SARS-CoV and MERS-CoV) viruses (Figure 1 and Figure 2) [1,2].

In December 2019, an outbreak of pneumonia of unknown etiology happened in Wuhan city, Hubei Province, China. Most of the patients had a history of visiting the Huanan Seafood Wholesale Market [5]. The Chinese scientists and researchers isolated and identified a coronavirus from a patient, and phylogenetic examination

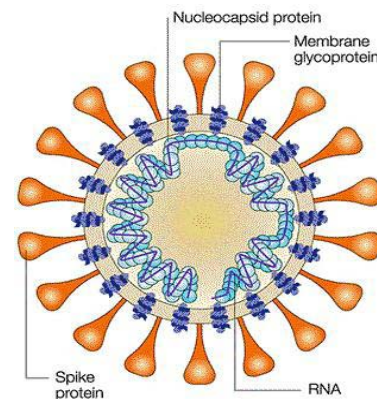
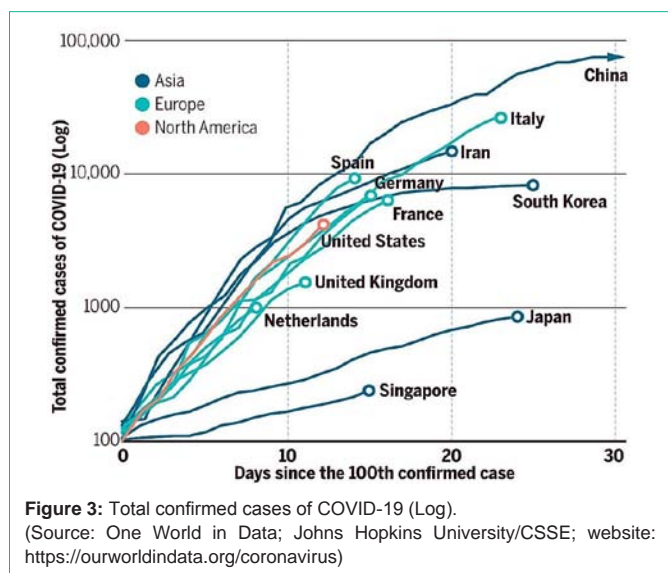
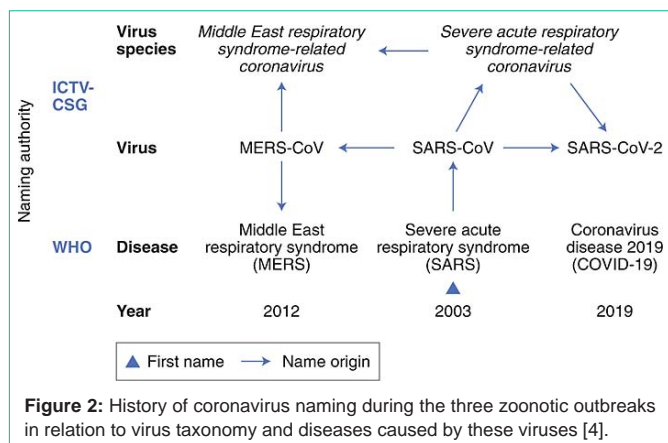


Figure 1: Representation of the severe acute respiratory syndrome coronavirus (SARS-CoV) particle [3].

of the sequence revealed it belongs to a new HCoV, which is designated as 2019 Novel Coronavirus (2019-nCoV) [6]. Previous investigations have reported that 2019-nCoV may originate from wild animals, but the precise origin remains uncertain [7,8].

COVID-19 in African Countries

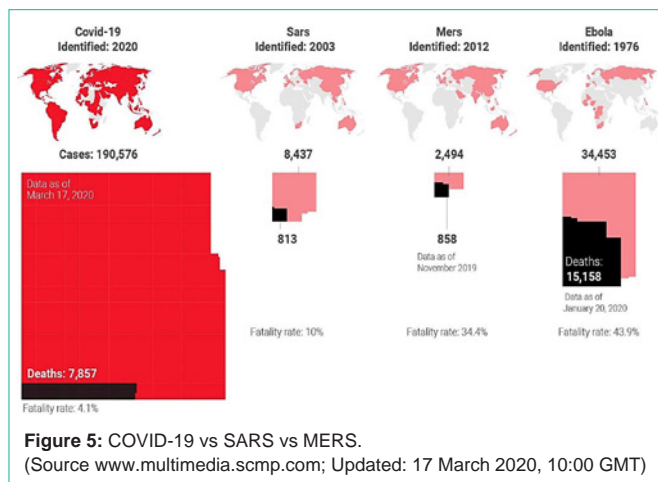
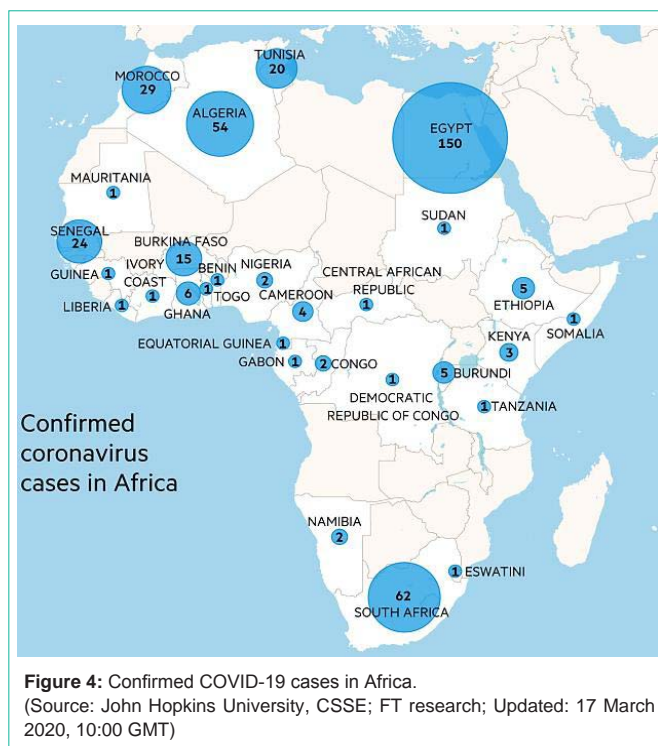
The coronavirus was called SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2) and has spread to more than 120 countries (including many low-income countries), with a total of 92,818 confirmed human cases worldwide as of 03 March 2020. On 30 January 2020, the World Health Organization (WHO) stated the



outbreak a “public health emergency of international concern” [9,10]. China’s outbreak has come to a halt and South Korea has flattened its curve, but COVID-19 case numbers are still rising rapidly in many Western countries (Figure 3).

The first ten cases have now been described in Africa (Egypt, Algeria, Nigeria, Morocco and Senegal) (Figure 4). Recently, Sudan, Kenya, Ethiopia and Guinea pronounced their first confirmed human cases of COVID-19 as the viral infection has now spread to at least 18 countries in Africa. Other African countries that reported cases of the COVID-19 are Burkina Faso, Togo, Cameroon, the Democratic Republic of the Congo (DRC), Nigeria, Ivory Coast, South Africa, Gabon and Ghana [11,12].

The spread onto the African continent is of important alarm for several explanations. Densely and large and populated areas and townships with extensive poverty and high migration are the most susceptible peoples for airborne infections and pandemics. Furthermore, existing epidemics of Tuberculosis (TB), Human Immunodeficiency Virus (HIV) and malaria are likely to collide with COVID-19 and may lead to an augmented morbidity and mortality-not stated yet from affected countries. Besides, the extensive of non-communicable diseases in Africa, such as heart disease, Chronic



Obstructive Pulmonary Disease (COPD), diabetes and hypertension are documented risk elements for severe causes of COVID-19 [11,13].

China’s strong response to containing the COVID-19 epidemic was best practice and exemplary to the world. Back in 2003, there were 305 cases (including 5 deaths) caused by the outbreak of Severe Acute Respiratory Syndrome (SARS-CoV) before the Chinese government reported it to the WHO on 10 February 2003 (Figure 5). However, there were only 27 cases (and no deaths) due to COVID-19 before it was reported to the WHO in January 2020. Since then, the global clinical and scientific community has established guidelines for prevention, diagnosis and management and is working continuously on therapeutic compounds and vaccines [14].

Cases Rise in Algeria

On 25 February 2020, Algeria confirmed its first case of SARS-

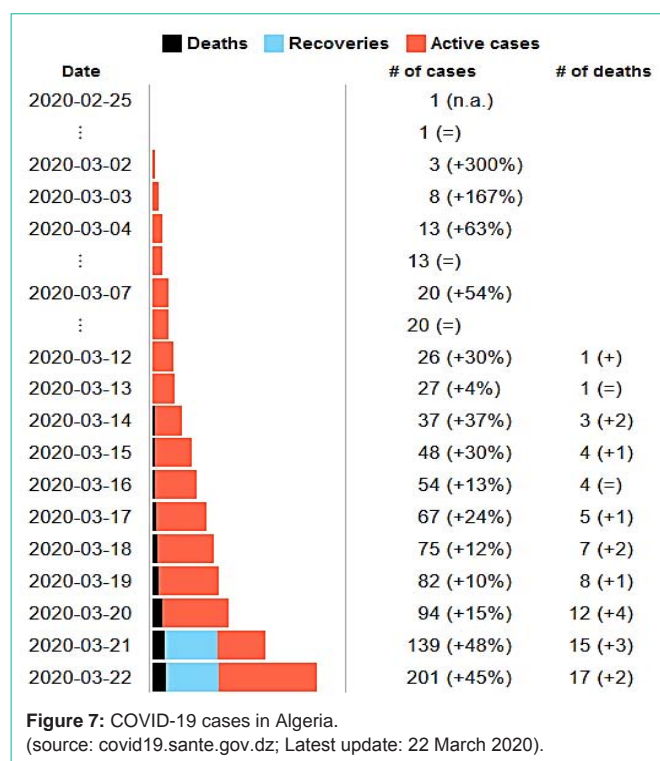
Table 1: Antimicrobial agent effective against different coronaviruses: Human coronavirus 229E (HCoV-229E), mouse hepatitis virus (MHV-2 and MHV-N), canine coronavirus (CCV), transmissible gastroenteritis virus (TGEV), and severe acute respiratory syndrome coronavirus (SARS-CoV).

Antimicrobial agent	Concentration	Coronaviruses tested	References
Ethanol	70.00%	HCoV-229E, MHV-2, MHV-N, CCV, TGEV	[36-38]
Sodium hypochlorite	0.1-0.5%; 0.05-0.1%	HCoV-229E SARS-CoV	[37,39]
Povidone-iodine	10% (1% iodine)	HCoV-229E	[37]
Glutaraldehyde	2.00%	HCoV-229E	[37]
Isopropanol	50.00%	MHV-2, MHV-N, CCV	[38]
Benzalkonium chloride	0.05%	MHV-2, MHV-N, CCV	[38]
Sodium chlorite	0.23%	MHV-2, MHV-N, CCV	[38]
Formaldehyde	0.70%	MHV-2, MHV-N, CCV	[38]

Country, Other	Total Cases	New Cases	Total Deaths	New Deaths	Total Recovered	Active Cases	Serious, Critical	Tot Cases/1M pop
Lebanon	248	+18	4		8	236	4	36
Iraq	233	+19	20	+3	57	156		6
Colombia	231	+35	2	+2	3	226		5
Serbia	222	+51	2	+1	2	218	4	25
Dominican Republic	202	+90	3			199		19
Algeria	201	+62	17	+2	65	119		5
Armenia	194	+34			2	192	6	65
Kuwait	188	+12			30	158	5	44
Bulgaria	187	+24	3		3	181	3	27
Slovakia	185	+7			7	178	2	34
San Marino	175	+15	20		4	151	13	5,158
Taiwan	169	+16	2		28	139		7
Uruguay	158	+48				158	2	45

Figure 6: Confirmed cases and deaths by country, territory, or conveyance. The COVID-19 is affecting 176 countries and territories around the world and 1 international conveyance (the "Diamond Princess" cruise ship harbored in Yokohama, Japan). (Source: www.worldometers.info; Updated: 22 March 2020, 11:00 GMT)

CoV-2, an Italian man who arrived on 17 February; on 28 February, Algeria deported him back to Italy, via a special flight from the Hassi Messaoud airport where he was subject to quarantine. On 2 March, Algeria confirmed two novel human cases of SARS-CoV-2. On 3 March, Algeria stated another two new cases of SARS-CoV-2, which brought the total number of confirmed cases to five. The declaration revealed that the two new cases of COVID-19 are from the same family, and were living in France, adding that there's an exploration to determine the identities of the persons who were in contact with them. The Algerian Ministry of Health declared on the evening of 3 March that three new cases of SARS-CoV-2 had been recorded, bringing the total number of cases to eight. On 4 March, 4 new cases of SARS-CoV-2 had been confirmed, from the same family, bringing the total number of cases to 12. On 12 March, five new cases of COVID-19, including one death, aged 78 and placed in isolation at Blida hospital (Figure 6 and Figure 7). Two cases having stayed in France, one in the Souk-Ahras province, the other in the Tizi-Ouzou province and three in that of Blida province. The total number of confirmed cases is 26 adding a woman in the state of



Skikda having stayed in France was announced, and a second death aged 55 is recorded without indication of the place of residence. On 17 March, a fifth death was recorded in the Blida Province, a 51-year-old man with chronic conditions. On 19 March, 10 new confirmed cases of the COVID-19, including two new deaths, to reach a total of 82 confirmed cases including eight deaths. (source: Ministry of Health, Population and Hospital Reform; website: <http://covid19.sante.gov.dz/>).

On the other hand, according to the President of the Republic of Algeria, the COVID-19 pandemic is an issue of "health safety" and "national security", and the State is completely aware of the sensitive crisis and is concerned with the respect of rights and freedoms as much as it assumes its responsibility in protecting people and property. However, the State cannot, alone, ward off the spread of the COVID-19 pandemic, if people do not satisfy their responsibility to protect themselves and do not conscientiously fulfill with preventive measures and hygiene rules. The State's efforts will remain imperfect, without the discipline, cohesion and understanding of the population, in particular through declaring suspicious human cases to decrease infection and contamination risks (Algeria Press Service, 2020).

Infection and Transmission

SARS-CoV-2 is supposed to have a zoonotic origin and was first detected and isolated from patients with pneumonia in Wuhan city, China. The spread from human-to-human is mostly an aerosol transmission through contaminated respiratory droplets (sneezing or coughing). Furthermore, respiratory droplets containing the SARS-CoV-2 may contaminate surfaces (e.g. screens of smart phones) up to 96 hours. Respiratory droplets and contact are the principal transmission ways [1-15].

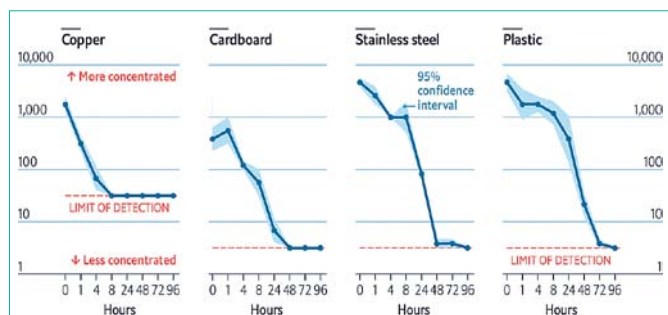


Figure 8: Concentration of viable SARS-CoV-2 virus in a sample, CID50* /L of air, log scale [16].

A new investigation revealed that the SARS-CoV-2 can remain viable in the air for up to 3 hours, on copper for up to 4 hours, on cardboard up to 24 hours and on plastic and stainless steel up to 72 hours. This research was published recently in The New England Journal of Medicine [16].

SARS-CoV-2 was more stable on plastic and stainless steel than on copper and cardboard, and viable SARS-CoV-2 was detected up to 72 hours after application to these surfaces (Figure 8), although the virus titer was significantly reduced (from 103.7 to 100.6 TCID50/mL of medium after 72 hours on plastic and from 103.7 to 100.6 TCID50/mL after 48 hours on stainless steel).

The half-lives of SARS-CoV-2 and SARS-CoV-1 were similar in aerosols, with median estimates of approximately 1.1 to 1.2 hours. Aerosol and fomite transmission of SARS-CoV-2 is probable, since the coronavirus can remain viable and infectious in aerosols for hours and on surfaces up to days (depending on the inoculum shed).

Another study published in February in The Journal of Hospital Infection analyzed several dozen previously publications on human coronaviruses (other than the new SARS-CoV-2) to get a better idea of how long they can survive outside of the human body [17]. They concluded that if this new SARS-CoV-2 resembles other human coronaviruses, such as its “cousins” that cause MERS and SARS, it can stay on surfaces - such as glass, metal or plastic - for as long as 9 days. In comparison, flu viruses can last on surfaces for only about 2 days. But some of them don’t remain active for as long at temperatures higher than 30°C. The authors also revealed that these coronaviruses can be efficiently wiped away by household disinfectants.

2019-nCoV infected patients are the main infection sources (Figure 9). Nevertheless, we also should attribute importance to asymptomatic human cases which may have a dangerous role in the spread progression of SARS-CoV-2. Near contact with asymptomatic cases with silent infection are the central transmission routes of 2019-nCoV infection [1-18]. Furthermore, people of all ages are vulnerable to 2019-nCoV. The elderly and those with underlying chronic illnesses are expected to become severe cases. Up until now, all pediatric cases with laboratory-confirmed 2019-nCoV disease were slight cases, and no deaths had been described [1-19].

Management of COVID-19

Since the initial COVID-19 outbreak, this virus, named SARS-CoV-2, has spread to more than 120 countries around the globe, and has infected many thousands of people. According to the US

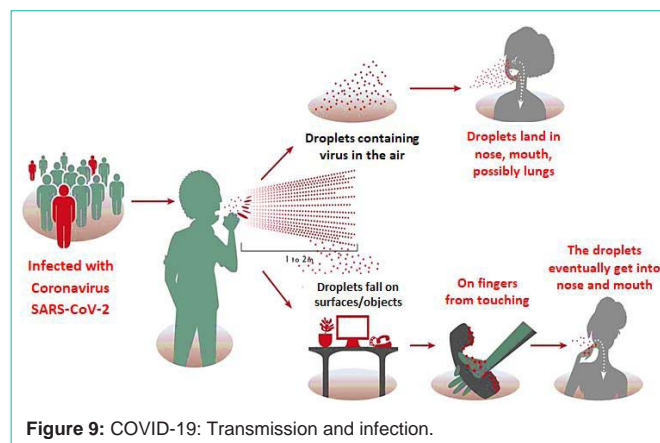


Figure 9: COVID-19: Transmission and infection.

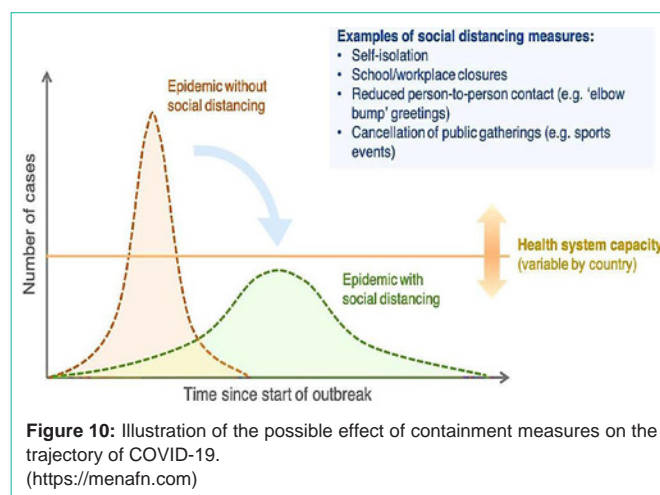
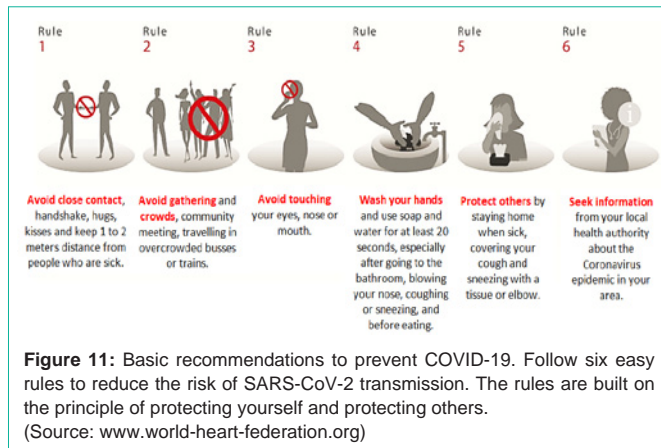


Figure 10: Illustration of the possible effect of containment measures on the trajectory of COVID-19. (https://menafn.com)

Centers for Disease Control and Prevention (CDC), there is no precise suggested antiviral therapy for COVID-19. Individuals with COVID-19 need palliative care to help relieve clinical symptoms, and people with severe infection may need care to support vital organ roles [20,21]. Nowadays, there’s no vaccine or treatment to protect you from the SARS-CoV-2. There also are no distinctive medications or drugs approved and appropriate to treat the symptoms of COVID-19. Antibiotics are also ineffective because COVID-19 is a viral infection and not bacterial. Scientists and researchers are currently working on discovering and developing a vaccine exactly for this SARS-CoV-2, as well as possible cures for COVID-19. Treatment options and vaccines for COVID-19 are currently being studied around the world. There is emerging indication that some medications may have the potential to treat the symptoms of COVID-19. More large-scale testing is required to conclude if these drugs are safe. Clinical trials for these treatments could take several months or years [22,23].

Recommendations on Prevention for Special Populations

People with chronic underlying syndromes may be at bigger risk of severe COVID-19 infection and death. In the largest Chinese cohort, 16% of patients developed severe disease with a mortality rate of 8.1%. Of those patients, 38.7% had co-morbidities. Consequently, patients with co-morbidities need additional laborious prevention measures. For patients with chronic respiratory disease (e.g. chronic



obstructive airways disease), infectious diseases (e.g. TB and HIV), chronic cardiovascular disease, autoimmune diseases or cancer, basic recommendations (Figure 11) to prevent COVID-19 [11-33] are:

- Avoid large gatherings—stay at home (Figure 10);
- Keep at least 2 meters distance from a patient with respiratory symptoms and do not stay in the same room with this person. Regularly disinfecting toys by heating, 75% alcohol or chlorine-containing disinfectants;
- Wash hands for children frequently, or teach children seven-step washing technique. Children's health monitoring: children with a history of close contacts of infected patients need to be monitored for body temperature and clinical features routinely;
- Newborns delivered by infected mothers must complete a pathogen test and be isolated in a single ward or at home according to their medical conditions;
- Reduce exposure to infection: avoid public transport at epidemic regions, and wear masks when going to crowded or poorly ventilated public places;
- Vulnerable people should consider moving to relatives in rural areas and spend their time in voluntary room isolation, such as a small hut, receiving food supplies without direct contact;
- Travel should be reduced to a minimum;
- Use a mask if travelling in a bus, train or plane. If masks are not available or affordable, cover your nose and mouth with a cloth or similar.

In case SARS-CoV-2/COVID-19 begins to spread in low-income countries at high risk of airborne contaminations, containment may not be realistic and response efforts will possibly need to transition to several moderation approaches, which could comprise isolating ill people at home, closing universities, schools, places of religious worship and public events [11].

How to Avoid Infection from the Coronavirus?

The novel COVID-19 is principally transmitted from human to human. At this point, the best method to avoid getting contaminated is to avoid being around people who have been exposed to the SARS-

CoV-2. Moreover, according to the CDC, you can take the following safety measures and precautions to lower your possibility of viral infection [31-35]:

- Wash your hands thoroughly with soap and water for at least 30 seconds.
- Use hand sanitizer with at least 60-70% alcohol if soap isn't available (Table 1).
- Avoid touching your face unless you've recently washed your hands with soap and water.
- Stay clear of people who are sneezing and coughing.
- Avoid crowded regions as much as possible.
- Avoid eating or touching wild animals, and going to markets selling with live animals.
- Older people are at the highest risk of infection and may want to take extra precautions to avoid coming into contact with the virus.

WHO Recommendations

COVID-19 is a worldwide public health danger. Understanding the properties and characteristics of the SARS-CoV-2, its way of infection and transmission, the brutality of infection and current medical or other treatments are imperative for the control and management of this viral infection.

The WHO has established typical recommendations for the decrease of exposure and transmission of a variety of viral infections [22-45]. These recommendations include:

- Preventing transmission by respiratory droplets and contact. Cover mouth and nose with a napkin or towel when coughing or sneezing;
- Avoiding close contact with infected persons;
- Regular cleaning of hands with soap and water for at least 30 seconds;
- Try not to touch nose, mouth or eyes before cleaning hands thoroughly after returning from public places, after covering the mouth when coughing, before eating or after using toilet;
- Covering the nose and mouth with a tissue while sneezing and coughing, then directly throwing the tissue away and washing hands with soap and water for at least 30 seconds;
- Looking for medical care in case of cough and fever;
- Sharing past travel history with healthcare providers;
- Avoiding direct unprotected contact with live animals and surfaces in areas with current reported cases of COVID-19 infections;
- Avoiding the consumption of undercooked or raw animal products;
- Handling raw meat, milk or animal organs with care to prevent cross-contamination.

According to currently available data about COVID-19, the WHO recommends that important precautions, protections and measures

should be implemented or applied to minimize and reduce the risk of importation or exportation of the viral infection. Active surveillance for new cases of COVID-19 and close monitoring of their contacts are required to control the spread of infection [33-45].

Education campaigns should be launched to promote protections for travelers, including frequent hand-washing, cough etiquette, and use of personal protection equipment (e.g. masks) when visiting public places. Moreover, the general public should be encouraged to report fever, cough and other risk symptoms for COVID-19 infection, including travel history to contaminated region and close contacts with confirmed or suspected infected persons [33,44].

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