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Novel coronavirus 2019-nCoV: Could this virus become a possible global pandemic

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Abstract: In December 2019, the emerging of a new coronavirus-induced pneumonia created a distress among people in China and the international community. This virus was identified as novel coronavirus 2019-nCoV. At the time this Review went to press, the virus has spread to across 27 countries, infecting 17,488 people and caused 362 deaths. The transmission of 2019-nCoV to individuals of different countries is predominantly through close contact with an infected person. Based on the available data, there is a rising trend of infected and death cases. At this point, there is no specific drug or vaccine to treat infected patients besides supportive care. Nevertheless, researchers and doctors around the world have reported the success of using existing antiviral drugs to treat patients.

Keywords: Novel Coronavirus, 2019-nCoV, supportive care, global pandemic, treatment

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INTRODUCTION

A new year and a new decade kicked off with a global health threat and challenge, the novel coronavirus 2019-nCoV. News emerged in early December 2019 of pneumonia outbreak by an unknown aetiology, where it is believed to be contracted at Wuhan's Huanan Seafood Wholesale Market[1]. On 31st December 2019, the World Health Organization (WHO)'s Chinese office was notified of pneumonia cluster cases, which led to the closing of the market on 1st January 2020[1]. The Chinese authorities and WHO identified it as a new type of coronavirus, better known as 2019-nCoV[2]. The 2019-nCoV virus belongs to same coronavirus family which includes the Severe Acute Respiratory Syndrome (SARS) — the virus that caused an eventual 8,096 cases and 744 deaths in 2002-2003[3]. The virus became an instant hot news and raised the fear of the international community.

The health organizations along with scientists and clinicians worked around the clock to uncover the information of 2019-nCoV. Within days of detecting the initial cluster of cases, the complete genome sequence of 2019-nCoV with a sequence length of 29,903bp was deposited on GenBank and Global Initiative on Sharing All Influenza Data (GISAID)[4,5]. The genome sequence information is beneficial in the development of primers for surveillance tests and diagnostic kits[3]. Pharmaceutical companies and researchers around the world have been working on different approaches to produce an effective drug or vaccine for 2019-nCoV[6]. These efforts accelerated after over 30 genome sequence of 2019-nCoV have been publicly deposited in GenBank (Table 1)[7].

Table 1. Genome sequence of 2019-nCoV deposited in GenBank.

GenBank Accession	Gene Region	Locality
MT008023	M	Italy, Rome
MT008022	M	Italy, Rome
MT007544	complete	Australia
MN997409	complete	USA
MN996531	complete	Wuhan
MN996530	complete	Wuhan

MN996529	complete	Wuhan
MN996528	complete	Wuhan
MN996527	complete	Wuhan
MN994468	complete	USA
MN994467	complete	USA
MN988713	complete	USA
MN988669	complete	China
MN988668	complete	China
MN985325	complete	USA
MN975268	S	China
MN975267	S	China
MN975266	S	China
MN975265	RdRP	China
MN975264	RdRP	China
MN975263	RdRP	China
MN975262	complete	China
MN970004	RdRP	Thailand
MN970003	RdRP	Thailand
MN938390	S	Shenzhen

RdRP:RNA-dependent RNApolymerase; S: Surface

EPIDEMIOLOGY

2019-nCoV reservoir

Researchers compared the genome sequence of 2019-nCoV with a viral database and suggest it belongs to betacoronavirus originated from bats. However, the specific wildlife host as virus reservoir is yet to be confirmed since various live animals was sold at the market[8,9]. A comprehensive genome sequence analysis was carried out by researchers from Beijing, China to determine the possible animal reservoir. Their evolutionary analysis suggested that snakes are the most likely wildlife animal as virus reservoir for 2019-nCoV[10]. Conversely, scientists affiliated with UK-based universities disputed the findings by Chinese researchers, and affirmed that 2019-nCoV is most closely related to bats[11]. Zhou and colleagues from China also reported this virus is potentially bat origin[12]. Pushing aside on the debate whether bats or snakes are the real culprit of 2019-nCoV, this zoonotic virus has spread to over twenty-seven countries worldwide.

The spreading

Wuhan, the epicenter has been left deserted amid the deadly coronavirus-induced pneumonia outbreak. In aim to contain the virus spread, the local authorities ordered a city-wide lockdown in Wuhan, the sprawling capital of Central China's Hubei province on 23 January 2020[1,13]. Although, early reports revealed limited human to human spread, but the recent drastic increase of infected cases proven the latter assumption was wrong. It is indeed a human-to-human transmission and the virus is spreading in a fast pace to other Chinese cities, Asian countries and other parts of the world[14,15] (Table 2). This fast-spreading virus has claimed 362 lives and infected 17,488 people in 27 countries at the time this Editorial went to press (Figure 1). China tops all the countries with over 17,000 infected patients and 361 deaths (Table 3), this figure increases daily with an estimated transmission rate/basic reproductive number (Ro) 3.0-4.0 (3–4 newly infected cases from 1 case)[16]. On 2nd February 2020, a death of a 44-year-old Chinese man from Wuhan in Philippines marked the first death that occurred outside of China. The patient showed initial signs of improvement, however his condition deteriorated within the last 24 hours and he succumbed[17]. The concern raises as transmission of 2019-nCoV to other countries besides China is mainly by people who have travelled from the epicenter of the outbreak or had close contact with an infected person. For instance, in Malaysia, eight confirmed cases are patients of China nationality, and they have been under isolation hospitalization until fully recover from the infection. Of note, based on the existing epidemiological data, the incubation period of this virus is 14 days.

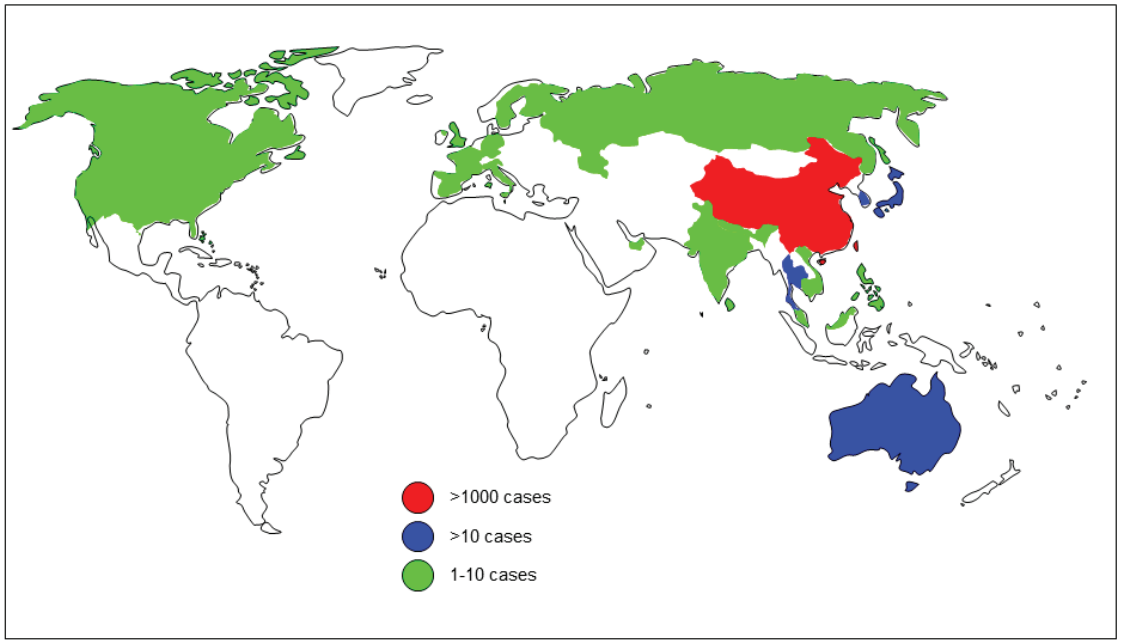

Figure 1. Illustration of novel coronavirus 2019-nCoV transmission across the global. As of 3 February 2020 , this virus has spread to over 27 countries and alarming a fear to the international community.

Table 2. The worldwide spread of coronavirus 2019-nCoV.

Countries	Confirmed Cases	Death	Cured
China	17,302	361	512
Hong Kong	15		
Taiwan	10		
Japan	20		1
Thailand	19		7
Singapore	18		
Korea	15		
Australia	12		2
Germany	10		
Malaysia	8		
US	11		
Vietnam	8		1
France	6		
United Arab Emirates	5		
Canada	4		
India	3		
Italy	2		
Philippines	2	1	
Russia	2		
UK	2		
Cambodia	1		
Finland	1		
Nepal	1		
Spain	1		
Sri Lanka	1		1
Sweden	1		
Macau	8		

Source: National Health Commission of the People's Republic of China and Worldometer on Wuhan coronavirus outbreak - https://www.worldometers.info/coronavirus/.

Table 3. The spread of coronavirus 2019-nCoV in China.

Province	Confirmed Cases	Death	Cured
Hubei	11177	350	295
Zhejiang	724		36
Guangdong	725		14
Henan	566	2	15
Hunan	521		17
Anhui	408		8
Jiangxi	391		18
Chongqing	312	2	8
Jiangsu	271		7
Szechuan	254	1	13
Shandong	259		7
Beijing	212	1	12
Shanghai	203	1	10
Fujian	179		
Shaanxi	128		
Guangxi	127		7
Yunnan	114		5
Hebei	113	1	3
Heilongjiang	118	2	2
Liaoning	74		1
Hainan	70	1	4
Shanxi	66		2
Tianjin	56		1
Ganxu	51		3
Guizhou	46		2
Ningxia	31		
Inner Mongolia	34		1
Jilin	31		1
Xinjiang	24		
Hong Kong	15		
Qinghai	13		
Taiwan	10		
Macau	8		
Tibet	1		

Source: National Health Commission of the People's Republic of China, as of 3rd February 2020

MANAGEMENT MEASURES

Lock-down and medical facilities

The occurrence of this virus has placed the Chinese government in a strong crisis management and preparedness for a pandemic. The government imposed a complete lock-down of Wuhan and about a dozen of other cities, in an attempt to prevent the virus from spreading further within China. The effectiveness of this implementation has been disputed by many experts globally. Professor Chandy John, a former president of America Society of Tropical Medicine and Hygiene mentioned that a number of potential issues may arise including basic human rights concern, inadequate healthcare facilities or medication for the sick people, and people who aren't sick — unable to leave and may fall ill after exposure to the virus. However, he still agrees that prevention of travel is one the effective way to contain the virus and reduce the transmission[18]. Likewise, a bioethicist at New York University also expressed an agreement for Wuhan quarantine and added that it is a prudent action implemented by the government[18].

Since the majority of infected cases are in Wuhan, the Chinese government has invested huge capital in building two new hospitals: Huoshenshan Hospital and Leishenshan Hospital that would be operational in early February 2020[19,20]. In addition, the Chinese government has approved the sale of two virus detection kits and a sequencing system by genomic company BGI Group, to aid and enhance the identification of this novel virus. According to BGI sources, their test kit is able to identify the novel 2019-nCoV within three hours, while the other kit can assist to differentiate and the diagnose infections. One hundred thousand test kits have been dispatched to the country's worst hit regions[21].

Global effort and protection measures

In other parts of the nation and several countries has taken precaution measures to control the spread of coronavirus. Health screening in all entry and exit points (airports, port terminals, train stations) have been beef-up in effort to contain the virus[22]. Passengers who present any clinical symptoms of fever, flu and cough, are placed in an isolation and quarantine for further evaluation and treatments. Many airlines have also drawn-up preventive measures by not providing hot meals, blankets and newspapers in the plane, in aim to contain the virus and reduce the personal contact among passengers[23]. The healthcare organization has been promoting awareness and preventive measures that should be followed by the members of the public. People should adopt good hygiene practice by washing their hands with water and soap, or use hand sanitizer, always wear a mask, avoid crowded public locations, and avoid close contact with any infected person. A person should directly report to their respective healthcare centers if they are presenting any symptoms and other risk factors of 2019-nCoV infection including had a travel history or close contact with a confirmed patient.

The novel coronavirus 2019-nCoV has created an impact to the public healthcare and to our community. In a recent interview, Dr Huang Chaolin, the vice director of Wuhan Jinyintan Hospital, revealed that there might be multiple places where the virus was first originated and transmitted to humans[24]. It is because the first few patients who was admitted at the hospital had no direct exposure to Wuhan's Huanan Seafood Wholesale Market, which was considered the primary source of the epidemic. Judging from the whole situation, there could be multi-sources, nonetheless the authorities have no clue about other sources. The Chinese Center for Disease Control and Prevention have collected environmental samples from Wuhan's Huanan Seafood Wholesale Market, and over thirty samples were found to contain the nucleic acid of the virus. If the virus is from multi-sources, experts warned the situation would become worsen in the coming days if efforts taken to contain the virus are ineffective[24].

Treatment options

Currently, there is no specific drug or vaccine available to treat this virus infection besides supportive care. A patient will present symptoms of fever, fatigue, dry cough, shortness of breath, runny nose and sore throat [25]. Patients with underlying comorbidities for example diabetes, hypertension, chronic lung disease, asthma, cardiovascular diseases, and immunocompromised are prone for severe complication of 2019-nCoV infection [25,26]. Hence, the older group and children are advice to take extra precaution measures to avoid been contract with 2019-nCoV.

In hospitals, doctors are doing their best to treat and save the lives of their patients, without the effective drug or vaccine. Doctors from Thailand successfully treated a 71-year-old patient with a combination of antivirals that used to treat flu (oseltamivir) and HIV (lopinavir and ritonavir) [27]. Where else, in The United States (US), doctors treated a 2019-nCoV positive patient with experimental Gilead Sciences drug - remdesivir. Remdesivir was given to the 35-year-old patient and his symptoms improved without any side effects [28]. Although the combinations of antiviral treatments have shown positive effect in treating 2019-CoV patients, further tests should be done to confirm the effectiveness of these antivirals. Hopefully, this novel coronavirus does not exhibit any resistance phenotype towards flu antivirals e.g. oseltamivir-resistance, which was observed previously in influenza A H7N9 virus [29].

Conclusion

The rapid rising of infected cases and deaths alarm experts, who fear the virus 2019-nCoV would likely become a pandemic across the globe. The lethally of this new virus is yet to be known, but now findings suggest that the virus may be spreading from person to person via the digestive system [30,31]. There is an increasing trend of infected cases in China and around the worldwide countries. Nevertheless, the China government, WHO and respective healthcare bodies are doing their best to understand and manage the coronavirus outbreak. On 30th January 2020, WHO declared the novel 2019-nCoV coronavirus outbreak as a Public Health Emergency of International Concern (PHEIC), and this brings an impact to China and international community

[32,33]. The PHEIC will see the mobilization of international response to work to together to contain the virus threat. Hopefully, this announcement would help with controlling the spread of the virus.

In view of the present virus outbreak, the community should adapt to the new lifestyle changes. Social distancing must be a part of their daily life. Avoid being proximity with people, mass gatherings, and functions. In certain countries, their public has the tendency to greet others by hugging or a handshake. Without realizing, they probably might be spreading or contracting the virus by their actions. Now, we may want to stop this culture for the time being. Another aspect is self-quarantine if one exhibit any symptoms of infection or had a close contact with a confirmed patient. This measure is proven to be an effective tool to contain the spread of any airborne virus.

The nation may feel stressed and unpleasant if a lock-down is imposed in their country or asked to wear mask. Looking back at history, lock-down and wearing mask was seen to be an effective step implemented by Dr Wu Lien-teh in effort to control the spread of pneumonic plague virus in 1910. Dr Wu Lien-teh, a Malaysian born doctor gained fame by ending the pneumonic plague in China and encouraging people at that time to wear gauze-and-cotton masks, controlled the people's movement, instructed to hospitalize all infected patients, carried out disinfection in open areas, mass burials of the deaths, and prohibited close contact [34]. His endless effort managed to contain the plague within seven months (March 1911).

In summary, the novel coronavirus 2019-nCoV outbreak is a reminder to the international community of an emerging virus infection that need constant surveillance, rapid diagnosis, and robust research to understand the biology features of this novel virus. There is a possibility this novel coronavirus would become a global pandemic which the severity and people's susceptibility is yet to be forecasted by the experts. If it becomes a pandemic, the developing countries may not have enough resources to cope this deadly virus. In addition, countries may experience severe setbacks as the world economic may paralyze and will take months for the recovery. Hence, the world should get prepared with adequate preventive measures to contain the spread of this deadly virus. The international community should have the preparedness for a possible pandemic outbreak and adhere to all the precaution measures. The healthcare sector should develop effective countermeasures and ensure all medical resources like masks. PPEs, and ventilators are readily available in all hospitals. Well, it is rather safer to be over prepared than being under prepared on facing this novel coronavirus 2019-nCoV.

Conflict of Interest

The authors declare that there is no conflict of interest in this work.

Author Contributions

VL and N-SAM performed the literature search, critical data analysis and writing of this review. Technical support and proofreading was contributed by B-HG and L-HL. This review writing was founded by L-HL.

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