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INVITED REVIEW

A new emerging zoonotic virus of concern: the 2019 novel Coronavirus (SARS CoV-2)

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Abstract

We review here the origin, outbreak characteristics and main epidemiological features of the novel Coronavirus (2019nCoV) responsible of a new coronavirus disease (COVID-19). Rapid global health authorities' responses are now in course and international scientific collaboration is urgently need. Previous outbreaks experiences with similar viral agents have increased the capacity to containment and control of these recurrent health menaces.

Keywords: coronavirus, epidemics, zoonotic, travelers, Colombia

Un nuevo virus zoonótico emergente de preocupación: el Coronavirus novel 2019

Resumen

Revisamos aquí el origen, características del brote y la epidemiología del nuevo Coronavirus (2019nCoV) responsable de una nueva enfermedad por coronavirus (COVID-19). Una rápida respuesta de las autoridades de salud mundiales está en marcha y se ha hecho un llamado urgente para colaboración científica internacional. Las lecciones aprendidas de brotes previos con agentes virales similares han aumentado las capacidades para contener y controlar estas amenazas recurrentes a la salud global.

Palabras clave: coronavirus, epidemias, zoonosis, viajeros, Colombia

Introduction

During the first weeks of 2020, the world has evidenced the emergence of a new human pathogen that achieved the enough zoonotic spillover to cause an outbreak, a third highly pathogenic betacoronavirus[1-3]. The 2019 novel Coronavirus (2019nCoV), is a new member of a group, that includes previously recognized zoonotic pathogens[4], as is the case of the Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV), that caused epidemics in China in 2002-2003, and the Middle East Respiratory Syndrome (MERS-CoV), affecting Saudi Arabia and neighbor countries in 2012-2013[5-8].

Epidemiology

After the epidemic localized in Wuhan, province Hubei, China, spreading to other cities and provinces of the country, occurred in the following days and weeks, but also to other countries in Asia, Europe, North America and the Pacific regions. Till February 8, 2020, there were 34,945 cases (34,609 in China, 99%), with 336 cases in other 27 countries; 266 cases in the other 15 Asian countries, 26 cases in nine European countries, 12 cases in United States, 7 in Canada, and 15 in Australia (Table 1). Daily updates of these data are found at the Situation Report site of the World Health Organization

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Table 1. Confirmed cases, deaths and patients recovered during the ongoing 2019-nCoV global outbreak (as February 8, 2020 – 6.00 a.m.), by continents and countries. Sources: WHO, CDC, ECDC, NHC and DXY, via https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6.

Continent	Number of countries affected	Country	Cases	Deaths	%	Recovered	%
Asia	16	Mainland China	34609	723	2.1	2328	6.7
		Japan Yokohama Bay*	61	0	0.0	0	0.0
		Singapore	33	0	0.0	0	0.0
		Hong Kong	26	1	3.8	0	0.0
		Thailand	25	0	0.0	5	20.0
		Japan	25	0	0.0	1	4.0
		South Korea	24	0	0.0	1	4.2
		Taiwan	17	0	0.0	1	5.9
		Malaysia	16	0	0.0	0	0.0
		Vietnam	13	0	0.0	1	7.7
		Macau	10	0	0.0	1	10.0
		United Arab Emirates	7	0	0.0	0	0.0
		India	3	0	0.0	0	0.0
		Philippines	3	1	33.3	0	0.0
		Nepal	1	0	0.0	0	0.0
		Cambodia	1	0	0.0	0	0.0
		Sri Lanka	1	0	0.0	1	100.0
		Subtotal	34875	725	2.1	2339	6.7
Europe	9	Germany	13	0	0.0	0	0.0
		France	11	0	0.0	0	0.0
		Italy	3	0	0.0	0	0.0
		United Kingdom	3	0	0.0	0	0.0
		Russia	2	0	0.0	0	0.0
		Spain	1	0	0.0	0	0.0
		Finland	1	0	0.0	0	0.0
		Sweden	1	0	0.0	0	0.0
		Belgium	1	0	0.0	0	0.0
		Subtotal	36	0	0.0	0	0.0
Americas	2	US	12	0	0.0	0	0.0
		Canada	7	0	0.0	0	0.0
		Subtotal	19	0	0.0	0	0.0
Oceania	1	Australia	15	0	0.0	2	13.3
Total	28		34945	725	2.1	2341	6.7

(WHO) (https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/)[9] and at a dedicated website of the John Hopkins University, which reports a number greater than WHO, because it reports online information from several international agencies (https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6). Other source of digested relevant information is ProMEDmail (http://www.promedmail.org), from International Society for Infectious Diseases.[10] Although at the moment, it is not possible to know the lethality, because the real number of infected people is not known, if it is understood that at least the people confirmed with the infection by the novel 2019nCoV, about 2% have died and at least 10% have severe clinical manifestations[9].

It is highlighted that the cases of China are still concentrated in the province of Hubei; the proportion of cases reported in provinces outside of Hubei (one-third) compared to cases reported in Hubei (two-thirds). So far (February 7, 2020), no cases have been confirmed in Latin America, nor in Colombia, although multiple suspected cases, of people coming from China, especially Wuhan, have been notified and ruled out. On February 4, 2020, the National Institute of Health of Colombia publicly announced that has standardized the RT-PCR to make possible the molecular diagnosis of 2019nCoV.

After the alert to the WHO about the outbreak, a rapid assessment considered the possibility to declare the ongoing situation, as occurred effectively on January 30, 2020, a Pu-

blic Health Emergency of International Concern (PHEIC)[11,12]. Even more in this setting, countries worldwide should consider the necessary preparedness and response in the front of the potential arrival of imported cases, and as has been also documented, the human-to-human transmission with autochthonous secondary cases[13,14]. However, currently there is a controversy if human-to-human transmission it is possible from an asymptomatic person, which would complicate outbreak control strategies so far.

Taxonomy

The family Coronaviridae, currently includes two classified subfamilies, Coronavirinae, and the Orthocoronavirinae. This last, has four genuses: Alphacoronavirus, Betacoronavirus, Deltacoronavirus, and Gammacoronavirus (Table 2). They compromised the currently seven virus species that affect human beings, two of them at the genus AlphaCoV (HCoV-229E and HCoV-NL63), and the other five, in at least three subgenuses of the genus BetaCoV: Embecovirus (HCoV-OC43 and HCoV-HKU1), Sarbecovirus (SARS-CoV), Merbecovirus (MERS-CoV) (Table 2). The 2019-nCoV is still considered an unclassified Betacoronavirus, but preliminary studies found it phylogenetically closely related to SARS, although different; more than 85% identity in such studies linked it with a bat SARS-like CoV[15-26].

Clinical Findings

The main clinical findings, reported in the first preliminary studies, include fever (83%-98%), cough (76%-82%), dyspnea (31%-55%), diarrhea (2%-3%), complicated with acute respiratory distress (ADRS) (17%-29%), acute cardiac injury (12%) and renal failure (3%-7%), among others.[2,27] With outcomes reported in those studies of 11% to 15% of deaths among cases (case fatality rate, CFR)%.[2,27]

Treatment and Prevention

Although there are previous studies, suggesting the use of certain antivirals, including olsetamivir, remdesivir, lopinavir/ritonavir, and even chloroquine, used for SARS-CoV and MERS-CoV, still there are no data from clinical trials. A recent study found that Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) *in vitro*[28].

In the meantime, prevention and preparedness in countries with no cases, as is the case of Colombia, is of utmost importance. Guidelines, recommendations and technical documents, from the WHO and international and regional societies[29-35], would be useful for training of healthcare workers about all the relevant aspects of the 2019nCoV but it is key that health authorities and health institutions implement them[36,37].

At the same, as this new virus, is a concern for the world (at least it has already had a global economic impact), Latin America and even Colombia, among other regions and countries, Colombia faces an ongoing epidemic of dengue with over 130,000 cases, 1% of them severe, including more than 100 associated-deaths. When considering respiratory tract infections, multiple infectious agents are actively circulating, and will be increasing in the next few months in the region, including, those under surveillance, such as Influenza A (including AH1N1), Influenza B, human metapneumovirus, respiratory syncytial virus, adenovirus, parainfluenza 1, 2, 3 and 4, rhinovirus, bocavirus and enterovirus, among others[38-40].

Recommendations

The best way to prevent infection is to avoid being exposed to this virus. However, as a reminder, CDC always recommends everyday preventive actions to help prevent the spread of respiratory viruses, including: wash the hands often with soap and water for at least 20 seconds, especially after going to the bathroom; before eating; and after blowing your nose, coughing, or sneezing. If soap and water are not readily available, use an alcohol-based hand sanitizer with at least 60% alcohol. Always wash hands with soap and water if hands are visibly dirty. Avoid touching the eyes, nose, and mouth with unwashed hands. Avoid close contact with people who are sick. Stay home when sick. Cover the cough or sneeze with a tissue, then throw the tissue in the trash. Clean and disinfect frequently touched objects and surfaces

Table 2. Current taxonomy of the human relevant coronaviruses. According the NCBI Taxonomy, National Institutes of Health, USA (https://www.ncbi.nlm.nih.gov/taxonomy).

Subfamily	Genus	Subgenus	Species	No rank
Orthocoronavirinae	Alphacoronavirus	Duvinacovirus	***Human coronavirus 229E***	
		Setracovirus	***Human coronavirus NL63***	
	Betacoronavirus	Embecovirus	Betacoronavirus 1	***Human coronavirus OC43***
			Human coronavirus HKU1	
		Sarbecovirus	***SARS-CoV***	
		Merbecovirus	***MERS-CoV***	
		unclassified Betacoronavirus	***2019-nCoV***	
	Deltacoronavirus			
	Gammacoronavirus			

using a regular household cleaning spray or wipe. There is no current specific antiviral treatment recommended for 2019-nCoV infection. People infected with 2019-nCoV should receive supportive care to help relieve symptoms. For severe cases, treatment should include care to support vital organ functions[41,42]. In addition, there have been announcements for the plans for rapid development of vaccines[43]. Although that, is worthy to say that recent T-cell immunological studies of SARS-CoV have been published, suggesting the potential cross-reactivity of the SARS-CoV-specific immunity against MERS-CoV, which may provide useful recommendations for the development of broad-spectrum vaccines against coronavirus infections[44].

Additionally, emphasis should be placed on the role and risk of healthcare workers, especially in emergency services, who in the current outbreak have already been affected (including fatal cases). For this reason, very good adherence to the infection control protocols established in the institutions and to the recommendations issued by WHO (https://apps.who.int/iris/handle/10665/174652, accessed 17 January 2020) is mandatory.

In the case of Colombia, the National Institute of Health, have developed a technical guide, "Instructions for intensified public health surveillance of probable cases of severe acute respiratory infection due to a new subtype of Coronavirus (2019nCo)". Based on the national definition for the Unusual Severe Acute Respiratory Infection (USARI or IRAGi in spanish) event (Code 348), the following definition is specified for intensified surveillance: case probable. A patient with a quantified fever greater than or equal to 38 °C and cough, with a severe acute respiratory infection –IRAG– hat develops an unusual or unexpected clinical course, especially a sudden deterioration despite adequate treatment, requiring hospitalization (IRAGi-Code 348) and meet at least one of the following conditions: Travel history to Wuhan, Hubei Province, China or other areas with confirmed viral circulation of the new coronavirus (2019-nCoV) in the 14 days prior to the onset of symptoms (see table published in the INS microsite https://www.ins.gov.co/Paginas/Inicio.aspx or see table published in the following link https://www.minsalud.gov.co/salud/publica/PET/Pages/New-Coronavirus-nCoV.aspx; health worker or other hospital staff who have had close contact, as defined below, with a probable case or confirmed by a new subtype of Coronavirus (2019-nCoV); history of close contact, as defined below, in the last 14 days with a probable or confirmed case with severe acute respiratory infection due to a new subtype of Coronavirus (2019-nCoV).

For the definition of suspected case, this will be valid, till the Ministry of Health of Colombia inform about confirmed viral circulation of the 2019nCoV in the country. Suspected case: person with a history of quantified fever greater than or equal

Figure 1. Number of cases reported in Mainland China, Asia, North America and Europe of the 2019nCoV.
Inserted, the direct-flight destinations from China's capital city Beijing (PEK) and from Bogotá, Colombia (BOG). Available at: https://gisanddata.maps.arcgis.com/apps/opsdashboard/index.html#/bda7594740fd40299423467b48e9ecf6, sources: WHO, CDC, ECDC, NHC and DXY.

to 38 ° C and cough, with a picture of acute respiratory infection (ARI), mild or moderate that does not require hospitalization (ARI for new virus–Code 346), and meets at least one of the following conditions: Travel history to Wuhan, Hubei Province, China or other areas with confirmed viral circulation of the new coronavirus (2019-nCoV) in the 14 days prior to the onset of symptoms (see table published in the INS microsite https://www.ins.gov.co/Paginas/Inicio.aspx or see table published in the following link https://www.minsalud.gov.co/salud/publica/PET/Pages/New-Coronavirus-nCoV.aspx; health worker or other hospital staff who have had close contact, as defined below, with a probable case or confirmed by a new subtype of Coronavirus (2019-nCoV); history of close contact, as defined below, in the last 14 days with a probable or confirmed case with severe acute respiratory infection due to a new subtype of Coronavirus (2019-nCoV)[45].

Close contact is defined as: any contact that has provided care to a confirmed case while the case presented symptoms: health workers who did not use the appropriate protective measures, or family members, or people who have other similar physical contact; any contact (<2 meters) that was in the same place (e.g. cohabitation, visits) that a case confirmed while the case presented symptoms; passengers located in a two-seat radius around symptomatic cases during the flight and the crew that has had contact with such cases are considered close contact on a plane[45].

Finally, a confirmed case is a person who meets the definition of probable case (of this annex) and has a positive result for new coronavirus 2019-nCoV through real-time RT-PCR[45].

The National Institute of Health as a website with dedicated information on the 2019nCoV (https://www.ins.gov.co/Noticias/Paginas/Coronavirus.aspx). For the last update of it, February 9, 6.00 am, there have been 11 "alerts" ruled out. There is also available the notification formats, algorithms for the diagnosis, protocols for the surveillance and the instructive for collection of samples[46]. Internationally, multiple other health agencies and national secretaries are developing and providing publicly similar information[9,11,12,30-35,41,42,47-55].

Conclusions

Societies and associations, such as the Colombian Association of Infectious Diseases, should be actively involved, as a scientific core of infectious diseases specialists in the country, in preparedness of the healthcare workers across the countries, with the support of their technical and thematic committees as well as their regional chapters, particularly organizing continuing medical education activities, as such have been organized recently about the 2019nCoV in Bogota and other cities. Also, keep the update of this outbreak, because the information presented today could change with the events that happen in the near future.

Ethical disclosures

Protection of human and animal subjects. This research do not used animal nor human material.

Confidentiality of data. Not applicable

Right to privacy and informed consent. No applicable

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