

Coronaviruses related to respiratory diseases in humans

Coronavirus relacionado a enfermedades respiratorias en humanos

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Abstract

Certainly, the coronavirus pandemic occurs less severely in patients without comorbidities, but more severely in immunocompromised patients, and although it is true that it began in 2019 with a high incidence in people aged 50 years or older, it is also true that nowadays it also affects children under 50 years of age, including children. The present literature review in databases such as Latindex, SciELO and Scopus, focuses mainly on the seven strains of coronavirus implicated with respiratory diseases in humans. The main results indicate that seven coronavirus strains related to respiratory diseases in humans have been reported: SARS-CoV-2, MERS-CoV, SARS-CoV, SARS-CoV, HCoV-HKU1, MERS-CoV, HCoV-OC43, HCoV-NL63, HCoV-229E, concluding that SARS-CoV and MERS-CoV viruses are the most lethal members of this family for humans, due to their virulence and the impact of their outbreaks worldwide.

Keywords

Coronaviruses, SARS, COVID-19, respiratory diseases.



Resumen

Ciertamente la pandemia del coronavirus acontece de manera menos grave en pacientes sin comorbilidades, pero más severa en pacientes inmunodeprimidos, y si bien es cierto se inició en el año 2019 con fuerte incidencia en personas de 50 años o más, también es cierto que hoy en día también afecta a menores de 50 años, incluido los niños. La presente revisión bibliográfica en bases de datos como Latindex, SciELO y Scopus, se centra sobremanera en las siete cepas de coronavirus implicadas con enfermedades respiratorias en humanos. Los principales resultados indican que se han registrado siete cepas de coronavirus relacionados con enfermedades respiratorias en humanos: SARS-CoV-2, MERS-CoV, SARS-CoV, HCoV-HKU1, MERS-CoV, HCoV-OC43, HCoV-NL63, HCoV-229E, concluyendo que los virus del SARS-CoV y del MERS-CoV son los miembros más letales de esta familia para el ser humano, por su virulencia y repercusión de sus brotes a nivel mundial.

Palabras Clave

Coronavirus, SARS, COVID-19, Enfermedades respiratorias.

Resumo

Certamente a pandemia de coronavírus ocorre menos severamente em doentes sem comorbidades, mas mais severamente em doentes imunocomprometidos, e embora seja verdade que começou em 2019 com uma incidência elevada em pessoas com 50 anos ou mais, também é verdade que hoje em dia afecta também pessoas com menos de 50 anos, incluindo crianças. A presente revisão da literatura em bases de dados como Latindex, SciELO e Scopus, centra-se principalmente nas sete estirpes de coronavírus implicadas em doenças respiratórias em humanos. Os principais resultados indicam que foram relatadas sete estirpes de vírus corona relacionadas com doenças respiratórias em humanos: SARS-CoV-2, MERS-CoV, SARS-CoV, SARS-CoV, HCoV-HKU1, MERS-CoV, HCoV-OC43, HCoV-NL63, HCoV-229E, concluindo que os vírus SARS-CoV e MERS-CoV são os membros mais letais desta família para os humanos, devido à sua virulência e impacto dos seus surtos no mundo.

Palavras-chave

Coronavírus, SARS, COVID-19, doenças respiratórias.

1. Introduction

Coronaviruses (CoVs), named for their shape similar to the crown-shaped spikes on their surface, belong to the large family Coronaviridae, are positive-strand RNA viruses (Vassilara et al., 2018), which cause various diseases, from the common cold to SARS (severe acute respiratory syndrome), whose recorded clinical signs and symptoms are mainly fever and,



in some cases, dyspnea and invasive pneumonic infiltrates in both lungs observable on chest radiographs with its range of symptoms and signs from fever to hypothermia accompanied by tachypnea, tachycardia and hypotension, which can lead to septic shock that contemplates multiorgan failure, limb ischemia, intravascular coagulation and refractory hypotension (Ruiz and Jimenez, 2020). The coronavirus family is sensitive to ultraviolet light, heat at temperatures above 20°C, lipid solvents, nonionic detergents and oxidizing agents, although it retains most of its viability at 20°C and 40% relative humidity, decreasing its viability at temperatures and humidity above these levels (Van Doremalen et al., 2013). According to Llaro et al. (2020), most of the deceased patients were older adults of male sex, with co-morbidities such as obesity, arterial hypertension, which represented high risk to an intensive care unit. The aim of the present review was to consolidate information on the coronavirus family, which causes emerging infectious diseases in humans.

2. Methodology

For this literature review, the state of the art was used both in its heuristic phase to obtain, select, compile, organize, and in its hermeneutic phase to interpret and analyze information on coronavirus, searching in different databases (SciELO, SCOPUS), using keywords such as "MERS", "SARS", "coronavirus", "Epidemiology", among others. From these databases, scientific articles were obtained from different indexed journals, highlighting some such as Rev. Med. Clin. Condes, Rev Asoc Mex Med Crit y Ter Int, Rev Med Hered, J Clin Microbiol, The New Engl J of Med, Rev Sanid. Milit. Mex, among others. On the other hand, the websites of different reference health organizations such as WHO or CDC, and of different universities such as, Central de Venezuela, Du Droit et de la Santé-Lille, de Sevilla-Spain, de Ghana, to obtain updated data on outbreaks to contrast the information obtained so far.

3. State of the art

3.1 Coronavirus

3.1.1 Definition



Human coronaviruses were first identified and described in the mid-1960s, after being detected in the nasal cavities of patients with the common cold. They are an extensive family of viruses that can cause mild illnesses such as the common cold or serious illnesses such as severe acute respiratory syndrome (SARS) or Middle East Respiratory Syndrome (MERS) as described. known in English), and more recently the new coronavirus identified in the Chinese city of Wuhan, this new virus was officially named as SARS-CoV-2, and the official name of the disease caused by this new virus is "COVID-19", according to WHO.

3.1.2 Structure

Wang and Cowled (2015) asserted that the shape of coronaviruses is generally spherical, between 120 and 160 nm in diameter.

3.1.3 Types

According to Inostroza and Pinto (2017) there are four main subgroups of coronaviruses, known as alpha, beta, gamma and delta, such that, to date, seven coronavirus strains have been reported to be associated with respiratory disease in humans: three CoVs are known to cause severe respiratory syndrome with high mortality rates: Severe acute respiratory syndrome coronavirus (SARS-CoV), MERS-CoV and Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) while 4 endemic human coronaviruses are associated with mild, self-limited respiratory illness: human coronavirus 229E (HCoV-229E), human coronavirus NL63 (HCoV-NL63), HCoV-OC43 and HCoV-HKU1.

3.1.3.1 HCoV-229E (alpha coronavirus): The first human coronavirus (HCoV) appeared in the mid-1960s and was isolated from people with the common cold. Initially, two species were detected: HCoV-229E and later HCoV-OC43, both being among the viruses responsible for the common cold (Vassilara et al., 2018). The predominant symptoms were acute rhinorrhea, nasal congestion and / or sore throat, acute exacerbations of chronic obstructive pulmonary disease (COPD), and pneumonia in infants, children, and the elderly with underlying diseases, with nasal discharge being the hallmark of all symptoms after of the inoculation of HCoV-229E to healthy volunteers.



3.1.3.2 HCoV-NL63 (alpha coronavirus): It was first identified in 2004 in a seven-month-old Dutch baby with bronchiolitis, by an amplified cDNA fragment length polymorphism method; in 2005, HCoV-NL63 was detected in children under 5 years of age (Kofi, 2014). HCoV-NL63, which causes up to 10% of all respiratory diseases, generally infects children and the immunocompromised, with mild upper respiratory symptoms (cough, runny nose, fever) plus lower respiratory tract involvement, such as bronchiolitis and croup.

3.1.3.3 HCoV-OC43 (beta coronavirus): This virus, previously called B814, was isolated for the first time in a patient who presented symptoms of the common cold, in addition to its established role in minor infections of the upper respiratory tract, there is evidence of its association with diseases of the lower respiratory tract, including croup, bronchiolitis and pneumonia, especially in those coinfecting with other respiratory viruses (Kofi, 2014).

3.1.3.4 HCoV-HKU1 (beta coronavirus): It was first identified in 2005 in a 71-year-old man with chronic lung disease in Hong Kong (Woo et al. 2005). A high sero-prevalence (59.2%) of HKU1 was obtained in adults (Kofi, 2014), which suggests a high level of previous exposure. This human coronavirus also occurs in children, who have upper or lower respiratory tract infection or both (Kofi, 2014).

3.1.3.5 SARS-CoV (beta coronavirus)

Definition: The SARS-CoV virus is a betacoronavirus that, like the rest of the members of its subfamily, has a polyadenylated, positive-stranded, single-stranded RNA-type genome with an approximate length of 29,727 nucleotides (Perlman, 2005 cited by Castillo, 2016); Cause of SARS, an acute, febrile, infectious-contagious disease, which is accompanied (in severe cases) by severe lung failure, high fever, dry cough, dyspnea and frequently by pulmonary infiltrates and hypoxemia (Cruz et al., 2003).

Appearance: SARS-CoV was the first virus to appear, generating an outbreak in November 2002 in southern China and infecting more than 8,400 people in 26 countries in America, Asia and Europe in which there were more than 800 deaths, with a lethality rate



of 9.6%. This pandemic was contained in little more than 6 months, being considered controlled in the summer of 2003 and since 2004 no new cases of the disease have been reported. (March & Erkoreka, 2020).

Etiological agent: Initially it was conjectured that SARS was caused by a picornavirus, later by a pneumovirus, but shortly afterwards it was determined that the true agent corresponded to the genus Coronavirus. A coronavirus very similar to that associated with SARS has been found in wild animals that are consumed in the markets of Guandong, China, it was found that cockroaches and rats act as passive hosts, ingesting and eliminating the virus, but without presenting any serological or histopathological evidence of infection ((Ksiazek and Erdman, 2003).

Epidemiology: The SARS epidemic began in Foshan province of Guandong, where on November 16, 2002, the first case of a rare pneumonia occurred, which later manifested in another 30 people, the most affected being ambulance personnel and hospital personnel. In addition to this, WHO experts have speculated that the SARS virus originated in cattle, "jumping" from animals to humans in a similar way to what has happened with HIV-AIDS, hemorrhagic fever due to Ebola and bovine spongiform encephalitis, years later, vulnerable groups are currently considered to be those who are extremely exposed to the risk of contracting COVID-19 infection, including the homeless, the elderly, people with health problems or with economic difficulties (Smith et al. 2020), although vulnerability is changeable, so that anyone can become vulnerable according to changes in their health status or occupational or social conditions (Vicente et al., 2020)

Pathophysiology: The SARS-CoV virus binds to the host cell through ACE2 receptors present in the cells of the bronchial epithelium, specifically infecting type I pneumocytes, causing atypical pneumonia of particular severity. At the tissue level, the permeability of the alveolar capillaries increases, causing pulmonary edema and hypoxia, in addition to hyperplasia and neutrophil infiltration, which also contributes to an increase in the amount of inflammatory cytokines (Graham et al., 2013 citados por Castillo, 2016).



Incubation period: The incubation period is from 2 to 16 days (Picard, 2003; Lee, 2003 cited by Cruz et al., 2003). The WHO (2003) reported that the disease consists of two phases:

- a) Prodomal.- It resembles a common cold (fever, followed by muscle pain, headache, and odynophagia), but usually begins with a high fever (over 38 ° C) and is often accompanied by chills, headache, malaise, and myalgia. When the disease begins, some patients have mild respiratory distress, absence of rash, and neurological and gastrointestinal manifestations, but in some cases, diarrhea has been observed during the prodromal period of fever. In percentage terms, the following manifestations have been found: Fever, 100%; General malaise, 100%; Chills, 97%; Headache, 87%; Myalgia, 81%; Vertigo, 61%; Cough, 39%; Odynophagia, 23%; Nasal discharge, 23%. In certain cases, the picture begins with severe headache, vertigo and myalgia. The temperature remains high throughout the evolution of the disease.
- b) Respiratory. - After 3-7 days, the respiratory phase (or SARS itself) of the disease begins with a dry cough and / or dyspnea that may be accompanied or progress to hypoxemia. In 10% to 20% of cases, some patients have a rapid decline in lung function and are complicated by acute respiratory distress syndrome (ARDS) requiring intensive care, intubation, and mechanical support. ventilatory. After the seventh day, the respiratory phase begins with the attack of a dry, non-productive cough or dyspnea that may be accompanied and progress to hypoxia; its case fatality rate is 9.6% (Giwa, 2020). In many patients, the respiratory phase is characterized by early focal infiltrates that are later confluent or patchy, and interstitial infiltrates are also seen. Some radiographs of patients in advanced stages of the disease show areas of lung condensation. In the early stage of the disease, the white blood cell count is normal or decreased, but accompanied by lymphopenia. When lung disease reaches its peak, more than half of patients have leukopenia and thrombocytopenia. Renal function remains normal in most patients.

Diagnosis: The diagnosis of SARS virus infection is based mainly on the different clinical and epidemiological characteristics presented by the patient, accompanied by



different tests, such as chest radiography, pulsed oximetry, blood gas, and analysis of various blood parameters; regarding the laboratory diagnosis of SARS infection, it can be done by different methods, always bearing in mind that it is necessary to work with a biosafety level III, and that a negative result in any of the tests does not exclude the presence of the virus; In addition, a wide variety of samples can be used, such as urine, feces, expectorated sputum (preferred, whenever available), blood and plasma (Castillo, 2016).

Treatment: The hydroxychloroquine It is an antimalarial that can block viral infection by increasing the pH of the early infection by increasing the pH of the early endosome, required for membrane fusion between the virus and the host cell and the host cell. Recently, it has been shown that hydroxychloroquine hydroxychloroquine has recently been shown to specifically inhibit SARS-CoV replication, replication of SARS-CoV by interfering with the glycosylation of its cellular receptor (Sosa et al., 2020). Antiviral therapy has been used such as ribavirin used in the treatment of Influenza (due to its broad spectrum and activity against RNA viruses, however, its efficacy has not been fully demonstrated and in vitro studies have not yielded favorable results) or the inhibitor of oseltamivir neuraminidase (Valero et al., 2005) Lopinavir / ritonavir has also been used many times in association with rivabirin or steroid pulses.

Control: The control of this disease can be carried out by early detection of the case, its isolation and the management of contacts, the latter being the most effective. The SARS epidemic has been brought under control, but health authorities must not lower their guard because everything seems to indicate that the end of SARS has not been marked. The appearance of new cases can mean the beginning of a new wave after a silence of several months, not to mention the appearance of other diseases such as avian influenza, whose implications in the epidemiological picture of a region could be very severe. It could be that it is a seasonal disease, it is possible that the original source of the outbreak is still in the environment or it could be that the virus is still circulating in an animal reservoir and waiting for the right conditions to infect humans again (Valero et al., 2005).



3.1.3.6 MERS-CoV (beta coronavirus)

Classification: MERS-CoV corresponds to the first member of the C lineage of the Betacoronavirus genus isolated from humans within the Coronavirinae subfamily, along with several viruses detected in bats in Europe, Africa and China, other than SARS and the known endemic human betacoronaviruses HCoV-OC43 and HCoV-HKU1, HCoV-NL63 and HCoV-229E (Drexler, 2014). The MERS-CoV genomes are classified phylogenetically into clades A and B. The viral genomes detected in the first cases in humans (clade A cluster; EMC / 2012 and Jordan-N3 / 2012) are genetically different from the others, that is, clade B (Cotten, 2014). Several virus sequences are available in GenBank, including complete genomic sequences from both humans and camels, so there are multiple different MERS-CoV genotypes, possibly each from a separate zoonotic event (Cotten, 2013); however, all human and camel sample sequences related to this epidemic in the Middle East are closely related and many are identical.

Epidemiology: This strain of coronavirus was isolated from a sputum sample from a 60-year-old man who died of severe pneumonia associated with kidney failure in Saudi Arabia in 2012. The first cases occurred in several countries in the Middle East and later spread. to the United Kingdom, France, Italy, Germany; Egypt and the United States subsequently reported this first laboratory-confirmed case; later the zoonotic transmission was raised, conjecturing that the virus is transmitted from bats to camels, then by direct contact or consumption of unpasteurized milk it is transmitted to man. Contagion occurs through close or in-hospital contact, especially in patients with comorbidities, although the possibility of a pandemic is low because transmission is inefficient and there is insufficient evidence of community transmission (Berry et al., 2015 cited by Inostroza and Pinto, 2017). The cases of infection by MERS-CoV are usually classified according to the type of contagion by which the infection has been acquired, the most common form of contagion being the primary one; that is, by contact with animals that are known to be hosts, or they can be like dromedaries. It seems that a type of fruit bat of the genus *Taphoratus* is the original reservoir of the virus, but direct transmission between bats and humans has not been



proven, but rather it is believed that the virus suffered a series of mutations that allowed it to infect dromedaries, and from them to humans (Su et al., 2016).

Clinical characteristics and sequelae: The disease usually begins with fever and cough followed by chills, sore throat, myalgia, and arthralgia, continuing with dyspnea until rapidly progressing to pneumonia, often requiring ventilatory and other organ support (Assiri, 2013), symptoms similar to SARS, that is, with the presence of cough, fever, gastrointestinal disorders, before progressing to pneumonia and serious complications such as acute respiratory distress syndrome and kidney failure (De Sousa et al., 2014 cited by Inostroza and Pinto, 2017). The mortality rate is 30%, but it is significantly higher in patients with comorbidities and immunosuppression. The most frequent complications that have been reported in fatal cases are hyperkalemia, ventricular tachycardia, disseminated intravascular coagulation, pericarditis, and multiorgan failure (Singh, 2016 citado por Inostroza y Pinto, 2017).

Diagnosis: They have been protocolized and standardized worldwide since 2013, in charge of the WHO, being adopted by the rest of the countries, so they are currently universal (WHO, 2015). People who have acute febrile respiratory disease, with clinical, radiological or histopathological evidence of parenchymal lung disease, who have a history of travel to infected countries in the 14 days prior to the onset of symptoms, and whose disease does not have any other known cause. In addition, a person who has an acute febrile respiratory illness and has had close contact with a confirmed case of MERS-CoV virus infection should also be suspected. A case will be confirmed as long as it meets all these characteristics and the diagnosis is corroborated by a positive result of a laboratory test, either by PCR or by demonstration of specific antibodies (Castillo, 2016).

Treatment: Once the case of MERS-CoV is confirmed, a double task is carried out by the hospital services, treating the patient and preventing the virus from being transmitted to the rest of the patients in the unit. Due to the lack of specific drugs to eradicate the virus, the treatment of patients will be mainly symptomatic, using techniques such as oxygen therapy, in case of dyspnea or hypoxemia; replacement of fluids, in case of presenting IRAS



(Severe Acute Respiratory Infection); monitoring of the constants, always depending on the severity and particular idiosyncrasy of the patient (Castillo, 2016).

The combination of type 1 interferon plus lopinavir / ritonavir is considered the first line of treatment for MERS and 10 to 14 days of antiviral treatment is recommended. Plasma therapy has shown some efficacy among antiviral drug-refractory patients if administered within 2 weeks of disease onset (Singh, 2016 citado por Inostroza y Pinto, 2017).

3.1.3.7 SARS-CoV-2 (beta Coronavirus)

A new coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is causing a new disease known as COVID-19 that has been identified as the source of a pneumonia outbreak in Wuhan, in the Hubei region, China, late 2019 (Holshue et al., 2019; Harcourt et al., 2020); and is that the first SARS-CoV-2 found in the Wuhan patient HU-1, at the beginning of December 2019, was born practically perfect, since in the following months, despite the fact that the virus reproduced billions of times during the pandemic suffered a relatively small number of significant mutations (Zhan et al, 2020).

The virus was discovered to be a member of the β coronavirus family, in the same species as SARS-CoV and SARS-related bat CoVs (Lu et al., 2020; Chang et al., 2019 cited by Harcourt et al. al., 2020). Spread patterns indicate that SARS-CoV-2 can be transmitted from person to person and may be more transmissible than SARS-CoV (Li et al., 2020; Chang et al., 2020 cited by Harcourt et al., 2020 The peculiarity of SARS-CoV-2 that apparently it was already born in an evolved version contrasts with the origin and evolution of SARS-CoV, the agent of the epidemic that affected China between 2002 and 2004, in two successive waves, but it did not significantly spread to the rest of the world (Zhan et al, 2020). As is known, the two viruses have a genomic homology of 79% and share the receptor, ACE2, with which they bind to human cells. of SARS-CoV-2, SARS-CoV was not born perfect, but its ability to infect improved through a significant series of mutations that occurred in the first months of the outbreak, through person-to-person transition (Zhan et al, 2020) At this first period of intense mutagenicity and selection of the varieties The most contagious diseases were



followed by a period of low mutagenicity, a sign that the virus had reached a sufficient adaptation to ensure its conservation through its passage to humans.

Transmission: The first cases of COVID-19 were reported in Wuhan (China), inside a live animal market, presumably through zoonosis, initially the virus was transmitted from animals to humans; while person-to-person transmission develops through contact with large respiratory droplets, infected secretions or through contact with a surface contaminated by respiratory droplets (Sosa et al., 2020). Super propagators played an extraordinary role in the transmission of the 2003 SARS outbreak and may also play an important role in the current COVID-19 outbreak. A super spreader is an individual who transmits an infection to significantly more other people than the average infected person (Tesini, 2020).

Incubation period: Lauers et al. (2020) mention that researchers from the Johns Hopkins Bloomberg School of Public Health, the School of Public Health and Health Sciences of the University of Massachusetts (United States), and the Ludwig-Maximilians University of Munich, Germany, conducted a pooled analysis of cases confirmed COVID-19 infections from people outside of Hubei Province, China reported between January 4 and February 24, 2020 to determine the incubation period of COVID-19, which was estimated to average 5.1 days with 95% confidence interval (CI), 4.5 to 5.8 days), and 97.5% of those who develop symptoms will do so within 11.5 days (CI, 8.2 to 15.6 days) of infection. These estimates imply that, under conservative assumptions, 101 out of 10,000 cases (99th percentile, 482) will develop symptoms after 14 days of quarantine (Quesada et al., 2020). According to the authors, “This work provides additional evidence for a mean incubation period for COVID-19 of approximately 5 days, similar to SARS. These results support current proposals for the duration of quarantine or active monitoring of people potentially exposed to SARS-CoV-2, although longer monitoring periods may be justified in extreme cases”. The current active monitoring period recommended by the US Centers for Disease Control and Prevention (14 days) is well supported by the evidence (Lauers et al., 2020).



Prevention and treatment: Currently, there is no vaccine available to prevent COVID 19 (Centers for Disease Control and Prevention, CDC, 2020). There is evidence to suggest that human coronaviruses can remain infectious on inanimate surfaces for up to 9 days (Nicks and Wong, 2020).

4. Discussion

About HCoV-229E, children and the elderly were considered the most vulnerable to lower respiratory tract infections, other symptoms observed were malaise, headache, chills, and cough (Vassilara et al., 2018). HCoV-NL63, It is customary to diagnose coronavirus infections using reverse transcription polymerase chain reaction (RT-PCR) and other nucleic acid tests of nasopharyngeal samples (Kofi, 2014). Esper et al., (2006) reported that HCoV-HKU1 circulated in the United States, stating that the strain identified in the clinical virology laboratory at Yale-New Haven Hospital was similar to the original strain described in Hong Kong. The efficacy of these SARS-CoV therapeutic regimens, continues to be debated, as does the use of nebulizations with bronchodilators (Albuterol) and antibiotic therapy with beta-lactams and macrolides or fluoroquinolones (Valero et al., 2005). In an increasingly globalized world, it is essential to implement measures that prevent the displacement of diseases, which is why this pandemic was one of the first that caused health controls to be imposed at airports, cruise ships, stations (Castillo, 2016). Symptomatic disease is frequently associated with the transmissibility of a pathogen; However, given the recent evidence of SARS-CoV-2 transmission by mildly symptomatic and asymptomatic people (Chan et al., 2020; Rothe et al., 2020 cited by Lauers et al., 2020) they observe that the latent period can be shorter than the incubation period estimated here, with important implications for transmission dynamics.

5. Conclusions

With the advance of diagnostic techniques, we know "new respiratory viruses" that produce similar clinical pictures, ranging from mild respiratory symptoms to severe forms of



pneumonia, so we must be informed about this virus, and be very attentive to recognize the early manifestation of lethal diseases such as COVID-19. These viruses can be detected by PCR, although with a non-quantitative PCR it is difficult to demonstrate that the virus found is the causative agent of the disease, in addition to the fact that frequently more than one virus is found in a sample, which makes etiological diagnosis even more difficult.

Coronavirus infections are an example of emerging infectious diseases that have arisen sporadically since the beginning of human history, which continue and will continue to claim more lives worldwide, despite the efforts of researchers, since there is only preventive and short-term vaccine to deal with this coronavirus, which, by the way, has a surprising capacity to spread and is highly contagious, being able to resist for several hours on contaminated surfaces. SARS-CoV and MERS-CoV, due to their virulence and the repercussions of their outbreaks, are considered the most representative and lethal members of this family.

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