

## THE SCRUTINY OF NOVEL CORONAVIRUS

## Recent developments in the detection process and drug discovery

DR SABBIR RAHMAN SHUVO

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), generally known as 2019 novel coronavirus (2019-nCoV), may have been evolved from bats. A recent article published in the Nature Medicine journal used genomic data of novel coronavirus and predicted that the origin of coronavirus is natural and not laboratory-made.

Coronavirus has mainly four structural proteins, spike (S), membrane (M), envelope (E), nucleocapsid (N) proteins. Recent studies have suggested that spike proteins of the coronavirus first contact with Angiotensin converting enzyme 2 (ACE2) proteins of the cells. ACE2 may play a role in the regulation of cardiovascular function and renal function. Therefore, people with high blood pressure may be more vulnerable to coronavirus infection. Additionally, researchers have found that spike protein of 2019-nCoV is 10 to 20 times more efficient in binding with ACE2 on human cells compared to the SARS-like virus from 2002; thus, the coronavirus is more contagious than the earlier SARS-like viruses.

The test for coronavirus can be done in blood-based and swab-based methods. Polymerase chain reaction (PCR) and Enzyme-linked Immunosorbent Assay (ELISA) are the two molecular methods that can be used for the detection of the viral particles. PCR is a Deoxyribonucleic



acid (DNA) amplification technique that is used regularly in the lab to increase the small amount of DNA into a large amount so that it can be analysed. The PCR technique in the combination of fluorescent dye gives real-time data about the amount of DNA present. However, for a virus like the coronavirus, single-stranded ribonucleic acid (RNA) has to be converted into DNA by using reverse transcriptase (RT) enzyme. Therefore, the

technique is called RT-PCR. However, the RT-PCR method is more time consuming compared to the ELISA methods. In ELISA methods, the presence or absence of antibodies - Immunoglobulin M (IgM) and Immunoglobulin G (IgG) to coronavirus is detected. An antibody is a protein that is found in the blood; and is produced by the immune cells in response to foreign compounds like bacteria and viruses. The positive result of ELISA

indicates that the patient has been infected with viral particles.

Viral infections can be prevented by using vaccines or by using antiviral drugs. In the current pandemic situation discovering new vaccines against coronavirus is not a suitable option, as it is a prolonged process. Favipiravir is a type of drug that blocks RNA-dependent RNA polymerase. Remdesivir is a 'nucleotide analogue' drug and has shown promise in the coronavirus treatment. Good results have been obtained for coronavirus infection from the lopinavir and ritonavir medications against HIV in Thailand and Japan. Apart from these medicines, some of the drugs help the immune system by increasing the production of interferons. Interferons cease the production of proteins and turning on the RNA-terminating enzymes in the infected cells to stop the spreading of viruses. Alpha 2B is an interferon stimulating drug that had been used in China for the treatment of coronavirus.

Bangladesh is a densely populated country, and at present, in a vulnerable situation for viral spreading. Personal hygiene and public awareness are the most effective ways of surviving viral infection until effective and approved medication against coronavirus are available.

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## EPIDEMIOLOGY

## What does endemic, pandemic and epidemic mean?

MD BILLAL HOSSEN

The coronavirus disease (COVID-19) has been spreading drastically from one country to another since December 2019. It has become one of the most rapidly spreading viruses in the world. The most uttered words nowadays are 'endemic', 'pandemic' and 'epidemic'. All three terms are epidemiological terms that are commonly used in the study of disease on human beings.

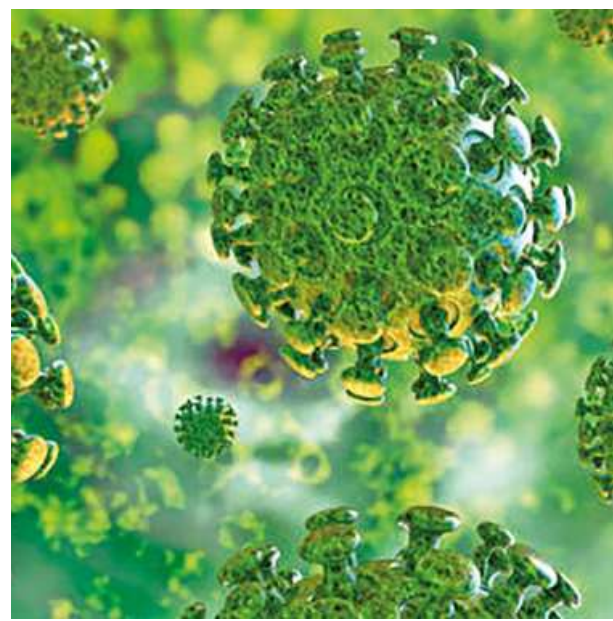
**Endemic:** The term endemic comes from the Greek word of 'Endemos' where 'En' means 'in or within' and 'demos' means 'people'. Hence endemic means 'in or within the people'. So the constant presence and/or usual prevalence of a disease or infectious agent in a population within a geographic area is called endemic. The geographical area must be small and the disease must be happening in a time frame. COVID-19 was first identified in Wuhan city of China which was then called endemic disease.

**Pandemic:** The term pandemic comes from the Greek word of 'Pandemos' where 'pan' means 'all' and 'demos' means 'in people'. Pandemic refers to an epidemic that has spread over several countries or continents, usually affecting a large number of people. Presently the COVID-19 is spreading all over the world that is why the World Health Organisation (WHO) declared it as pandemic disease.

**Epidemic:** According to the Centres for Disease Control and Prevention (CDC), epidemic refers to an increase, often sudden, in the number of cases of a disease above what is normally expected in that population in that particular area. As the COVID-19 cases increase rapidly in Bangladesh, it can be said that it is an epidemic disease.

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## HEALTH bulletin



## How long does coronavirus survive in the air and on surfaces?

SARS-CoV-2, the virus that causes novel coronavirus disease (COVID-19), can remain viable in aerosols for hours and on surfaces for days, according to a correspondence in the *New England Journal of Medicine*.

The virus's median half-life was about 1 hour as an aerosol. No viable virus was detected after 4 hours on copper, 24 hours on cardboard, and 72 hours on plastic and stainless steel.

In the U.S., reported cases have surpassed 5700, with roughly 95 deaths. Blood shortages could be seen in 2 weeks, *Reuters* reports. People are encouraged to avoid discretionary travel.

## Understanding endometriosis

DR NADIRA HAQUE

Endometriosis is one of the most serious and potentially progressive chronic diseases related to the uterine lining that women can face in their lifetime. It causes incapacitating pain, marital disharmony and infertility. Endometriosis affects an estimated 1 in 10 women and about 200 million women worldwide.

Some risk factors for endometriosis include genetic, hormonal, menstrual irregularities like retrograde menstrual flow, environmental and chemical exposure etc.

March is endometriosis awareness month which is observed worldwide each year through activities like education, medical conferences, fundraising for research and marches all across the globe with a mission to raise awareness about the disease.

**Symptoms:** Symptoms associated with endometriosis can vary widely from patient to patient. Some women experience no symptoms. Others experience severe pelvic pain that can interfere with regular activities like bowel movement, urination and severe pain during and after sexual intercourse and worsen during menstruation. The severity of the disease is not related to the degree of pain. Pain can be much worse even in a very early stage than women whose disease is much more advanced. Women with endometriosis may have gastrointestinal distress, bloating, cramps, occasionally accompanied by diarrhoea and constipation.

Endometriosis has a negative effect on fertility. About 40% women with endometriosis suffer

from infertility. The pathogenesis of infertility is dependent on the stage of the disease. In the early stage, it is hypothesised that this is secondary to an inflammatory response that impairs various aspects of conception. Whereas in later stages, disease distorted pelvic anatomy and adhesion contribute to impaired fertility.

**Diagnosis:** Laparoscopy is the gold standard method to confirm endometriosis. During



laparoscopy, surgical therapeutic interventions can be taken at the same time as ablation, fulguration of endometriotic deposits, cystectomy, adhesiolysis etc. Pelvic ultrasonography can identify endometriotic ovarian chocolate cysts. Magnetic resonance imaging (MRI) is another method to detect endometriotic lesions in a non-invasive manner. Histopathology and immunohistochemistry are useful in the diagnosis of endometriosis.

**Treatment:** While the disease cannot be eradicated, the pain and other symptoms can be managed by modifying lifestyle, following

a healthy diet avoiding highly saturated fatty food, avoidance of alcohol and caffeine, and reducing stress. As pain medication, Nonsteroidal anti-inflammatory drugs (NSAIDs), opioids and hormone therapy have been found promising. Limited evidence indicates the use of combined oral contraceptives can reduce the risk of endometriosis.

Surgical removal of endometriotic deposits is useful for pain control.

It is more effective for addressing endometriosis associated with infertility. Surgery helps to remove endometriotic deposits, preserve the ovaries and restore tubo-ovarian distortion. In vitro fertilisation (IVF) is effective in improving fertility in women with advanced-stage endometriosis.

Patients with endometriosis deserve timely diagnosis at the onset of symptoms, non-invasive diagnosis as much as possible and improved treatment access to improve their quality of life.

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## Similarities and differences: COVID-19 and influenza

As the COVID-19 outbreak continues to evolve, comparisons have been drawn to influenza. Both cause respiratory disease, yet there are important differences between the two viruses and how they spread. This has important implications for the public health measures that can be implemented to respond to each virus.

**How are COVID-19 and influenza viruses similar?** Firstly, COVID-19 and influenza viruses have a similar disease presentation - they both cause respiratory disease, presents as a wide range of illness from asymptomatic or mild through to severe disease and death.

Secondly, both viruses are transmitted by contact, droplets and fomites. As a result, the same public health measures, such as hand hygiene and good respiratory etiquette (coughing into your elbow or into a tissue and immediately disposing of the tissue), are important actions all can take to prevent infection.

**How are COVID-19 and influenza viruses different?** Influenza has a shorter median incubation period (the time from infection to appearance of symptoms) and a shorter serial interval (the time between successive cases) than COVID-19 virus. The serial interval for COVID-19 virus is estimated to be 5-6 days, while for influenza virus, the serial interval is 3 days. This means that influenza can spread faster than COVID-19.

Those most at risk for severe influenza infection are children, pregnant women, elderly, those with underlying chronic medical conditions and those who are immunosuppressed. For COVID-19, our current understanding is that older age and underlying conditions increase the risk for severe infection.

**What medical interventions are available for COVID-19 and influenza viruses?** There are currently no licensed vaccines or therapeutics for COVID-19. In contrast, antivirals and vaccines are available for influenza. While the influenza vaccine is not effective against COVID-19 virus, it is highly recommended to get vaccinated each year to prevent influenza infection.

Source: World Health Organisation

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## HOW TO HOME QUARANTINE

The home quarantined person should:



Stay in a well-ventilated single-room preferably with an attached toilet



Needs to stay away from elderly people, pregnant women, children



Restrict his/her movement within the house



Under no circumstances attend any social/religious gathering



Wash hand frequently with soap and water or with alcohol-based sanitizer



Avoid sharing household items like dishes, glasses, cups, utensils, towels, bedding



Wear a surgical mask at all the time. The mask should be changed every 6-8 hours

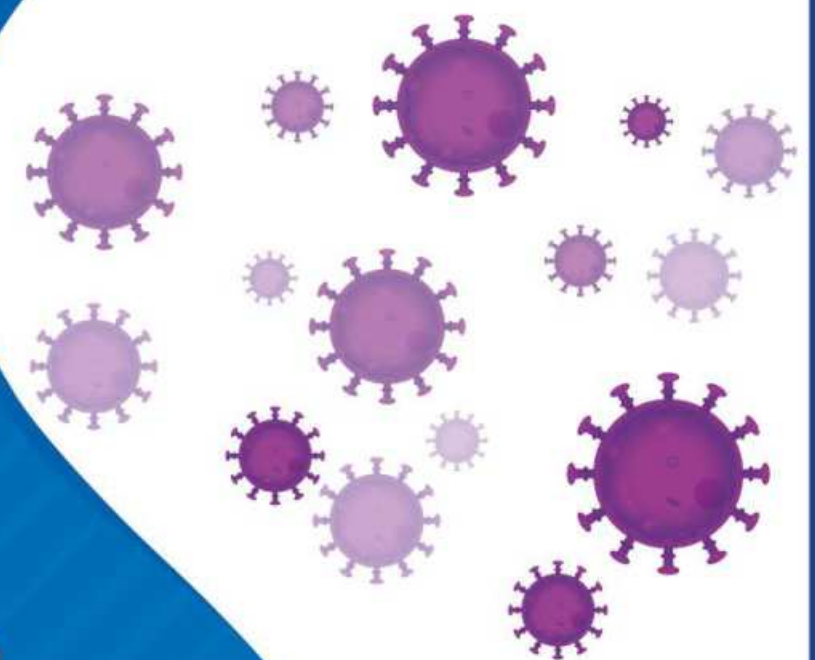


Dispose off used mask in a closed bin and bin should also be handled responsibly



If symptoms appear, he/she should immediately inform the nearest health centre

## COVID-19 OUTBREAK



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