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COVID 19

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Covid Pandemic 2019--??

Introduction

What is SARS-COV-2, Covid-19?

The first case of COVID-19 was reported Dec. 1, 2019, and the cause was a then-new coronavirus later named SARS-CoV-2. SARS-CoV-2 is believed to have originated in an animal and changed (mutated) causing illness in humans. In the past, other infectious disease outbreaks have been traced to viruses originating in birds, pigs, bats and other animals that mutated to become dangerous to humans.

The emergence and spread of infectious diseases with pandemic potential have occurred regularly throughout history. Major pandemics and epidemics such as plague, cholera, flu, severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) have already afflicted the world's population. Many infectious diseases leading to pandemics are caused by zoonotic pathogens that were transmitted to humans due to increased contacts with animals through breeding, hunting and global trade activities. In the past, implementation of public health measures such as isolation, quarantine and border control helped to contain the spread of infectious diseases and maintain the structure of the society

According to the American Journal of Tropical Medicine and Hygiene (ASTMH), "In 2007, scientists studying coronaviruses warned: "The presence of a large reservoir of SARS-CoV–like viruses in horseshoe bats… is a time bomb. The possibility of the re-emergence of SARS and other novel viruses… should not be ignored." Few paid attention following the disappearance of SARS after the initial outbreak in 2002. Now, COVID-19 has emerged as the deadliest respiratory disease pandemic since 1918, when the "Spanish" influenza pandemic killed an estimated 50 million people. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7470595/ - b2 We need to understand what happened so that we can prevent it from happening again and be better prepared to contain similar pandemics at their outsets."

When a virus enters a human cell for the first time, it has very recently been transmitted from cells of some other host, that is, from another animal or an insect vector. This process of transfer from a vertebrate or an insect has been referred to as host-switching, sometimes described as a spillover event. Most of the human viral and nonviral infectious diseases that have existed for centuries—measles, influenza, cholera, smallpox (eradicated in 1980), falciparum malaria, dengue, HIV, and many others—originated by animal-to-human host-switching.

In order to understand Covid and all viruses, it's important to know that they are nonliving self-contained genetic programs capable of redirecting a cell's machinery to produce more of themselves.

Futhermore, the ASTMH (American Society of Tropical Medicine and Hygiene) asserts that "It should be clarified that theories about a hypothetical man-made origin of SARS-CoV-2 have been thoroughly discredited by multiple coronavirus experts. SARS-CoV-2 contains neither the genetic fingerprints of any of the reverse genetics systems that have been used to engineer coronaviruses nor does it contain genetic sequences that would have been "forward engineered" from preexisting viruses, including the genetically closest sarbecoviruses. That is, SARS-CoV-2 is unlike any previously identified coronavirus from which it could have been engineered.

Engineering such a virus would have required 1) published or otherwise available scientific knowledge that did not exist until after COVID-19 recognition; 2) a failure to follow obvious engineering pathways, resulting in an imperfectly constructed virus; and 3) an ability to genetically engineer a new virus without leaving fingerprints of the engineering.

History of pandemics

The COVID-19 pandemic is not the first, and certainly not the last to savagely hit the world. Pandemics evoke nationwide focused response and during the period, other services, including provision of healthcare are neglected. The pandemics test the structure and competence of the health system. Yet, post-pandemic period sees preferred efforts for the restoration of economic activities. Health system remains weak, at times getting weaker because of the impact of the pandemic.

The previous century saw three major pandemics: the first (Spanish flu) caused by influenza A (H1N1) killed around 20-50 million people and caused a loss in the global gross domestic product (GDP) of around 16 per cent. The other two in 1957 and 1968 were relatively milder but still killed nearly one million. A novel influenza virus made a dramatic appearance in Mexico in March 2009 in the form of a H1N1 subtype. The pandemic swept the whole world, and killed 18,449 people in 214 countries.

The last two decades of this millennium have made us confront the major events of huge public health importance including severe acute respiratory syndrome (SARS), Middle East respiratory syndrome (MERS), avian flu (Influenza H5N1), influenza (H1N1) and the ongoing COVID-19 due to SARS-CoV-2. The lessons learned from pandemics should not be forgotten once pandemics cease to exist. These must be translated into actions that are sustained on all-time basis. Learning from COVID-19 pandemic as well as accumulating experiences from previous pandemics (and even outbreaks such as Nipah in Kerala and epidemics of Ebola in Africa), the pandemic preparedness and response plan should be developed in such a way that the remaining health services are not disrupted.

Global response to the COVID-19 pandemic has exposed inherent weaknesses in our preparedness and response. The health systems have been grossly overwhelmed by the pandemic.

Pandemics are nothing new. They have been a reality throughout history. While Covid is the first pandemic most of us have experienced, the world's population has been dealing with it for centuries. The shift from hunter-gatherers to agrarian societies has favored the spread of infectious diseases in the human population. Expanded trades between communities have increased interactions between humans and animals and facilitated the transmission of zoonotic pathogens. And of course, the increase in human mobility and travels has dramatically increased the spread of disease.

Climate changes also influence the transmission of pathogens by expanding the habitats of various common zoonotic disease-carrying vectors such as mosquitos and ticks. Land use due to increasing human population also affects the distribution of disease-carrying vectors.

Plague is caused by the flea-borne bacteria *Yersinia pestis* that is responsible for at least three human plague pandemics: the plague of Justinian in Egypt, the Black Death and the Third Plague which began in China. Millions of people died as a result of the plague. Luckily, the cause has been identified and is easily treated with antibiotics.

Cholera is an acute, and often fatal disease of the gastrointestinal tract. The bacteria colonize the small intestine and produce the cholera toxin which is responsible for a rapid and massive loss of body fluids leading to dehydration, hypovolemic shock and death. Humans are infected through contaminated water used for drinking or preparing foods. There have been seven cholera pandemics which took place In Asia, Europe, South America and Africa.

The influenza virus causes 3 to 5 million cases of severe illness and approximately 500,000 deaths worldwide but is typically a seasonal epidemic. Most influenza infections are asymptomatic or cause only mild or classical influenza illness characterized by 4 or 5 days of fever, cough, chills, headache, muscle pain, weakness and sometimes upper respiratory tract symptoms. Severe complications can occur especially in infants, elderly and individuals with chronic conditions such as diabetes mellitus and cardiac/pulmonary diseases. Among the most severe complications is pneumonia which can be associated with secondary bacterial infection. Influenza viruses can be distinguished in types A, B, C, and D. Influenza A and B are responsible for outbreaks in tropical regions and seasonal epidemics in temperate regions. However, the influenza A viruses are the only ones with a pandemic potential.

The Russian flu that occurred between 1889 and 1893 was the first well-described pandemic. The virus spread rapidly as it took only 4 months to travel around the planet. The pandemic virus reappeared every year for 3 years and caused an estimated 1 million deaths worldwide.

Twenty-five years later, the Spanish flu was caused by an A/H1N1 virus that apparently arose by genetic adaptation of an existing avian influenza virus to a new human host. The 1918–1919 pandemic spread in at least 3 distinct waves within a 9 month interval. The first wave occurred during spring-summer 1918 and caused high morbidity and low mortality. Both the second and third waves in summer-fall 1918 and winter 1918–1919 caused high mortality. The 1918–1919 influenza pandemic resulted in approximately 500 million infections and 50 million deaths worldwide.

The new subtype of a previous flu virus caused the 1957–1959 pandemic called the Asian flu. Sustained transmission of the 1957–1959 pandemic virus started on December 1957 with recurrent waves occurring over several years. The global mortality of this influenza pandemic was estimated at 1–2 million due mainly to death from respiratory diseases.

The Hong Kong flu was seen from 1968-1970. The mortality rate of this global pandemic was estimated to be 0.5–2 millions.

In 2009 we saw the Swine flu, which was transmitted from pigs. Non-pharmaceutical interventions that were implemented included hand washing, use of face masks and cough etiquette. The 2009 pandemic was the first one to combine vaccines and antiviral use. Symptomatic individuals and their contacts were isolated and received antiviral treatment as prophylaxis. Although the vaccine was approved only during the second wave, the immunization program in Canada covered 33 to 50% of its population compared to 13 to 39% in United States.

A series of avian influenza A viruses have caused sporadic cases and outbreaks of severe diseases and deaths in humans. The constant adaptation and exchange of genes between influenza viruses in different species, including at the animal-human interface, is still a critical challenge for the emergence of pandemic viruses nowadays. The first human outbreak due to a HPAI was caused by an A/H5N1 virus in 1997 in Hong Kong where 18 positive cases associated with 6 deaths were reported. This A/H5N1 HPAI virus continues to spread in poultry and in a large number of wild bird species on several continents. This virus caused severe and fatal spillover infections in humans and rarely resulted in human-to-human transmission. This virus was then shown to evolve to highly pathogenic strains in late 2016. Infection with A/H7N9 has been reported in 1,567 human cases with a fatality rate of 39% as of September 5, 2018.

SARS-CoV originated in Guangdong province (China) in 2003. Bats are likely the possible natural reservoir of SARS-CoV and palm civets could be intermediary hosts before dissemination to humans. Infection with SARS-CoV typically caused an influenza-like syndrome with rigors, fatigue and high fever. Less common symptoms include nausea, vomiting and diarrhea. In 20–30% of infected patients, the disease progressed to an atypical pneumonia, with shortness of breath and poor oxygen exchange in the alveoli with the patients requiring management in ICU or mechanical ventilation.

In early December 2019, atypical pneumonia was reported in a cluster of patients in Wuhan (China) and were shown to be caused by a new coronavirus, called SARS-CoV-2, the disease is referred to as COVID-19. The animal reservoirs are likely bats.

Plague and cholera pandemics first spread along trade and military routes. Then, the geographical spread of pathogens followed the movement of human population through rail, ship and air travels. Nowadays, the globalization of travels and trade of animals and animal-based foods further increase the spread of infectious diseases and the speed with which they are disseminated around the world. Land use and urbanization to accommodate agriculture and living areas modify the habitats of pathogens, hosts and disease vectors and affect the transmission dynamics of infections to humans. The geographic distribution of disease vectors and hosts as well as the living habitats of microorganisms is also affected by climate changes and could potentially increase the spread of pathogens. Increased contacts between humans and animals through breeding, hunting, wet markets and trade of exotic pets.

The spread of infectious diseases is thus expected to increase due to human activities and their effects on the environment. Epidemics and pandemics will also occur more frequently and will represent new challenges for public health. The implementation of global surveillance programs for the rapid detection of pathogen spillover from animal to the human population is of prime importance.

The time of onset and the pathogen that will cause the next pandemic are unpredictable. Therefore, pandemic preparedness plans emphasize that non-pharmaceutical interventions should be implemented first to control human-to-human transmission of the pathogen. Ideally, these interventions should adequately control the spread of an infection while minimizing societal and economic disruption. Risks of resurgence can follow once these non-pharmaceutical interventions are lifted. Once available, rapid testing, contact tracing, and the isolation of infected individuals should be put in place for a more effective response. Furthermore, pharmaceutical interventions including rapid point-of-care diagnostic tests, broad spectrum antimicrobials/antivirals. As well as new platforms for accelerated vaccine development and production should be developed to improve the global response to the pandemic.

What is Covid-19?

According to the World Health Organization (WHO), October 2021:

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus will experience mild to moderate respiratory illness and recover without requiring special treatment. However, some will become seriously ill and require medical attention. Older people and those with underlying medical conditions like cardiovascular disease, diabetes, chronic respiratory disease, or cancer are more likely to develop serious illness. Anyone can get sick with COVID-19 and become seriously ill or die at any age.

The best way to prevent and slow down transmission is to be well informed about the disease and how the virus spreads. Protect yourself and others from infection by staying at least one yard apart from others, wearing a properly fitted mask, and washing your hands or using an alcohol-based rub frequently. Get vaccinated and follow the most up to date protocols.

The virus can spread from an infected person’s mouth or nose in small liquid particles when they cough, sneeze, speak, sing or breathe. These particles range from larger respiratory droplets to smaller aerosols. It is important to practice respiratory etiquette, for example by coughing into a flexed elbow, and to stay home and self-isolate until you recover if you feel unwell.

How does the coronavirus spread?

Researchers know that the coronavirus is spread through droplets and virus particles released into the air when an infected person breathes, talks, laughs, sings, coughs or sneezes. Larger droplets may fall to the ground in a few seconds, but tiny infectious particles can linger in the air and accumulate in indoor places, especially where many people are gathered and there is poor ventilation. This is why mask-wearing, hand hygiene and physical distancing are essential to preventing COVID-19.

Variants

Viruses constantly change through mutation and sometimes these mutations result in a new variant of the virus. Some variants emerge and disappear while others persist. New variants will continue to emerge. CDC and other public health organizations monitor all variants of the virus that causes COVID-19 in the United States and globally.

If you think about a virus like a tree growing and branching out; each branch on the tree is slightly different than the others. By comparing the branches, scientists can label them according to the differences. These small differences, or variants, have been studied and identified since the beginning of the pandemic.

Some variations allow the virus to spread more easily or make it resistant to treatments or vaccines. Those variants must be monitored more carefully. Variants of concern include the Delta variants, which was first seen in India. It spreads very easily and causes more severe cases than other variants. Even those up to date on their vaccines can spread the delta virus to others, but vaccinated people give good protection against severe illness, hospitalization, and death.

The Delta variant, which evolved from previous strains of COVID-19, was once the most dominant type of coronavirus in the U.S. Research shows it spreads faster and has a shorter incubation period than the SARS-CoV-2 variants that came before it. Delta's incubation is around 4 days, compared to the 5.6 days for earlier strains. This means that once a person is infected with the Delta strain, their symptoms may show up more quickly, and the body will shed the virus earlier. The mutation allows the virus to produce a higher load of viral particles in the body. This makes the Delta variant more than 2 times as contagious as earlier variants. In fact, one study from China showed that in infections caused by Delta, the viral load was 1,000 times more than that of previous coronavirus strains.

The Omicron variant was first identified in South Africa, and spreads more easily than other variants to date. Omicron first appeared in the U.S. in December of 2021, and it's incubation period is only three days, according to the CDC. This increased transmissibility also comes along with milder symptoms. It is less severe in general. Monoclonal antibody treatments are effective against the Delta variants, and against some infections caused by Omicron. According to a December 2021 South African study, the risk of reinfection from the Omicron coronavirus variant is 3 times higher than it is for previous strains of the virus. There is no evidence of increased reinfection risk associated with the Delta variants compared to the original strain.

Incubation

An incubation period is the length of time between when a person becomes infected and when they experience symptoms. Symptoms show up in people within two to 14 days of exposure to the virus. A person infected with the coronavirus is contagious to others for up to two days before symptoms appear, and they remain contagious to others for 10 to 20 days, depending upon their immune system and the severity of their illness.

This is important, because testing for Covid-19 too soon after exposure may produce a false negative result. Professionals and government officials use this number to decide how long people need to stay away from others. Once a person is exposed, they are at risk, and they need to self-quarantine.

According to the CDC, mild to moderate COVID-19 may be contagious for 10 days from the first day symptoms are noticed. For the severely affected or critically ill from COVID-19, that time period jumps to 20 days from the start of symptoms. Researchers estimate that people who get infected with the coronavirus can spread it to others 2 to 3 days before symptoms start and are most contagious 1 to 2 days before they feel sick. The incubation period for COVID-19 is thought to have a median time of 4-5 days from exposure to symptoms onset.

Interestingly, a virus' incubation period does not impact how long symptoms and contagiousness last. What does affect these two factors is vaccination status, age, and pre-existing health conditions. And yet, two similar vaccinated people often have totally different experiences. Some people may have the coronavirus and never show symptoms. Others may not know that they have it because their symptoms are very mild. Current studies might not include the mildest cases, and the incubation period could be different for these.

How is COVID-19 diagnosed?

Covid is diagnosed through a laboratory test. Diagnosis by examination alone is difficult since many COVID-19 signs and symptoms can be caused by other illnesses. Some people with the coronavirus do not have symptoms at all. However, a person can start with a self-assessment.

The following is the CDC self-assessment:

Most common symptoms include:

- Fever
- Dry cough
- Tiredness

Less common symptoms:

- Aches and pains
- Sore throat
- Diarrhea
- Conjunctivitis
- Headache
- Loss of taste or smell
- Rash on skin, or discoloration of fingers or toes

Serious symptoms:

- Difficulty breathing or shortness of breath
- Chest pain or pressure
- Loss of speech of movement

Seek immediate medical attention if you have serious symptoms. Always call before visiting your doctor or health facility.
On average it takes 5–6 days from when someone is infected with the virus for symptoms to show, however it can take up to 14 days.

Testing for COVID-19 too soon after exposure may produce false-negative results. There are two basic types of tests for COVID-19.

Viral or diagnostic test: A viral test can tell you if you are currently infected with the coronavirus that causes COVID-19. Since you can decide for yourself if you need a test, it's important to know how important timing is to assure an accurate result. To test for the COVID-19 virus, a health care provider takes a sample from the nose (nasopharyngeal swab), throat (throat swab) or saliva. The samples are then sent to a lab for testing. If you're coughing up sputum, that may be sent for testing. The FDA has authorized at-home tests for the COVID-19 virus. These were once only available only with a doctor's prescription, but now can be purchased at pharmacies, and have been given away through government programs.

Antibody test: An antibody test can show if you were previously exposed to or infected with the virus that causes COVID-19, and if your body has created antibodies in an attempt to defend itself. It takes at least 12 days after exposure for your body to make enough antibodies to show up on a test. This is a blood test that must be ordered by a physician.

This test helps scientists gather data about how the immune system fights off COVID-19 in recovered patients. We do not yet know if a person with a positive antibody test is protected from getting re-infected with the virus or, if so, how long that protection might last.

Select asymptomatic individuals — Testing certain asymptomatic individuals may also be important for public health or infection control purposes. Some indications for testing asymptomatic individuals include:

- Following close contact with an individual with COVID-19 (this includes neonates born to mothers with COVID-19). The time to detect RNA following exposure is unknown, so the optimal time to test for COVID-19 following exposure is uncertain. The Centers for Disease Control and Prevention (CDC) recommends testing once five days have passed since the last exposure; we typically test five to seven days post-exposure.

- Early identification of infection in congregate living facilities that house individuals at risk for severe disease (eg, long-term care facilities, correctional and detention facilities, homeless shelters). This includes testing in response to identified COVID-19 cases within the facility as well as intermittent screening of employees and residents

- Screening hospitalized patients at locations where prevalence is high.

- Prior to surgical procedures or aerosol-generating procedures.

- Prior to receiving immunosuppressive therapy (including prior to transplantation).

If resources allow, the CDC suggests serial testing of select groups of asymptomatic individuals (eg, residents and staff in other congregate settings, workers with public interactions or large numbers of close contacts) to help prevent transmission by quickly identifying cases so that infected individuals can be isolated and contacts.

- **When** to avoid testing in asymptomatic individuals – In the United States, the CDC suggests against retesting asymptomatic individuals who were previously diagnosed with SARS-CoV-2 within the prior three months because of the low likelihood that a repeat positive test during this interval represents an active reinfection

Precautions

COVID-19 most commonly spreads between people who are in close contact through respiratory droplets or small particles produced when an infected person coughs, talks, or breathes. Growing evidence shows that droplets can remain suspended in the air and travel distances beyond six feet, according to the CDC. Indoor environments with poor ventilation increase the risk of transmission.

To prevent infection and to slow transmission of COVID-19, do the following:

Hand washing

All medical professionals know the importance of proper and frequent handwashing. Washing with warm water and soap for at least 20 seconds, covering all surfaces of the hands and using friction to scrub the germs off the hands. Rinse well and dry. As an alternative, an alcohol based hand gel/spray can be used instead.

It's especially important to wash your hands:

- Before eating or preparing food
- Before touching your face
- After using the restroom
- After leaving a public place
- After blowing your nose, coughing, or sneezing
- After handling your mask
- After changing a diaper
- After caring for someone sick
- After touching animals or pets

If soap and water are not readily available, **use a hand sanitizer that contains at least 60% alcohol**. Cover all surfaces of your hands and rub them together until they feel dry.

Masks

Masks must fit well and be relatively comfortable in order to be effective. They are recommended for children ages three and up. In general, masks do not need to be worn outside. Of course, if there are a large number of people crowed together, or a person has a weakened immune system which puts them at risk, or if they live with someone at risk or not vaccinated masks are advised.

While any mask is better than no mask, there are real differences in the types and quality of masks available. Masks are made to contain droplets that are breathed, coughed, or sneezed out. If they fit closely to the face, they can also provide some protection from particles spread by others. Respirators are made to protect by filtering the air and fitting closely on the face to filter out particles.

A cloth mask or bandana offers the least protection, with layered finely woven products doing a better job. Well-fitting surgical masks and KN95's offer more protection, and a National Institute for Occupational Safety & Health (NOISH)-approved respirator (including N-95s) will give the highest level of protection.

When choosing a mask, consider the activity. If caring for someone with Covid, taking public transportation, or if a person is not vaccinated, it's important to wear a high-quality mask. It needs to fit snugly over the mouth, nose, and chin. Check for gaps by cupping your hands around the outside edges of the mask. Make sure no air is flowing near the eyes or sides of the mask. With a good fit, you can feel warm air come through the front of the mask. Do not wear masks with exhalation valves, vents, or other openings, or when they are wet or dirty. For extra protection, a cloth mask can be worn on the bottom with a disposable one on top. A nose wire helps insure a good fit.

Distance

Maintain a distance of at least 3 feet from other people whenever possible. Researchers at the University of Bristol assessed the airborne survival of bacteria in aerosol droplets from coughs and sneezes. They found the average sneeze or cough can send around 100,000 contagious germs into the air at speeds up to 100 miles per hour. These germs can carry viruses, such as influenza, respiratory syncytial virus (RSV) and adenoviruses, and Covid-19. They can also carry bacteria, such as *Streptococcus pneumoniae* or *Haemophilus influenzae*. Coughing can also propel droplets across longer spaces than simple speaking.

The most critical time for spread of those germs, according to the researchers, is in the first few minutes after a sneeze or cough occurs. While aerosols that carry the germs eventually drop to the ground, that takes time.

Given the small size of bioaerosol droplets (diameter less than the width of a human hair), they can remain suspended in the air for prolonged periods of time. It is imperative that we cover our mouths with our forearms or elbows.

A paper from the University of Bristol found that singing does not produce very substantially more respiratory particles than speaking, when both are at a similar volume. The Swedish researchers measured particles emitted by 12 healthy singers and two people with confirmed Covid-19; 7 of the 14 were professional opera singers. In a chamber with particle-free air, they sang a short Swedish song, Bibbis pippi Petter, repeated it 12 times in two minutes at constant pitch, then repeated it again with the consonants removed, leaving only the vowels. "In our work we investigated a number of different aspects of singing: singing compared to talking, singing loud compared to normal singing, singing with face mask and singing consonants compared to vowels. Consonants release very large droplets — and B and P stand out as the biggest aerosol spreaders. At the same time, larger droplets fall to the ground earlier, and so have a shorter lifespan than smaller droplets. It was felt that there was still scientific uncertainty. They concluded that it is primarily the volume at which a person speaks or sings that determines how far particles will be spread.

Avoid touching your face

We receive germs through our mucus membranes, such as the nose, eyes. and mouth. It is important to avoid touching the face and especially the mouth with our hands. Viruses can live for days on surfaces from desktops to door handles, and once on our hands can be transferred into our bodies through these entry points. This can be a hard habit for some people to break. This is where masks are doubly important because they prevent unintentional touching.

Stay home when not feeling well

Covid-19 can take so many forms, it's best to stay away from other people when you don't feel well yourself.

Healthy habits

Refrain from smoking if your lungs are comprised in anyway. A healthy diet, fresh air, plenty of sleep, and moderated exercise will go a long way toward boosting the immune system and protecting the body from any types of infections.

Avoid crowds

Use caution when there are a lot people present. Avoid going to stores at peak hours or traveling on busy public transport. Stay 6 feet away from others, and visit only well ventilated places. Open windows whenever possible.

Teaching guide for those who have Covid

Most people who become ill with COVID-19 will be able to recover at home. Some of the same things you do to feel better if you have the flu — getting enough rest, staying well hydrated, and taking medications to relieve fever and aches and pains — also help with COVID-19.
Beyond that, the FDA has also authorized treatments that may be used for people who have been hospitalized with COVID-19 and other medications to curb the progression of COVID-19 in people who are not hospitalized but who are at risk for developing severe illness. Scientists continue working hard to develop other effective treatments.

Mild Symptoms

Let your doctor know that you have COVID-19. Some people who are at increased risk for severe COVID-19 illness may be candidates for oral antiviral treatment or intravenous monoclonal antibody therapy, both of which can reduce the risk of hospitalization and death. If you've been told to recover at home, these measures can help reduce symptoms:

- While you don't need to stay in bed, you should get plenty of rest.
- Stay well hydrated.
- To reduce fever and ease aches and pains, take acetaminophen or ibuprofen. Be sure to follow directions. If you are taking any combination cold or flu medicine, keep track of all the ingredients and the doses. For acetaminophen, the total daily dose from all products should not exceed 3,000 milligrams.

Early in the pandemic, there were some concerns that NSAIDs such as ibuprofen (Advil, Motrin, others) and naproxen (Aleve) might not be safe for people with COVID-19. However, the CDC now recommends taking medications, such as ibuprofen or acetaminophen, to relieve fever if you have COVID-19.

Quarantine

Quarantine is a strategy used to prevent transmission of COVID-19 by keeping people who have been in close contact with someone with COVID-19 apart from others. Those who have had close contact with someone with COVID-19 and you are in one of the following groups do not need to quarantine.

- Those up to date with their COVID-19 vaccines.
- Anyone who has had confirmed COVID-19 within the last 90 days (meaning a positive result using a viral test).

They should wear a well-fitting mask around others for 10 days from the date of the last close contact with someone with COVID-19 (the date of last close contact is considered day 0). The patient must get tested at least 5 days after they last had close contact with someone with COVID-19.

If the test is positive or is COVID-19 symptoms develop, they must isolate from other people and follow recommendations in the Isolation section below. If someone tested positive for COVID-19 with a viral test within the previous 90 days and subsequently recovered and remain without COVID-19 symptoms, they do not need to quarantine or get tested after close contact. They should wear a well-fitting mask around others for 10 days from the date of the last close contact with someone with COVID-19 (the date of last close contact is considered day 0).

Who should quarantine?

DEFINITIONS

Exposure

Contact with someone infected with SARS-CoV-2, the virus that causes COVID-19, in a way that increases the likelihood of getting infected with the virus.

Close Contact

A close contact is someone who was less than 6 feet away from an infected person (laboratory-confirmed or a clinical diagnosis) for a cumulative total of 15 minutes or more over a 24-hour period. For example, three individual 5-minute exposures for a total of 15 minutes. People who are exposed to someone with COVID-19 after they completed at least 5 days of isolation are not considered close contacts.

If a person comes into close contact with someone with COVID-19, they should quarantine if they are not up to date on COVID-19 vaccines.

Isolation (also called quarantine) is used to separate people with confirmed or suspected COVID-19 from those without COVID-19. People who are in isolation should stay home until it's safe for them to be around others. At home, anyone sick or infected should separate from others, or wear a well-fitting mask when they need to be around others. People in isolation should stay in a specific "sick room" or area and use a separate bathroom if available. Everyone who has presumed or confirmed COVID-19 should stay home and isolate from other people for at least 5 full days (day 0 is the first day of symptoms or the date of the day of the positive viral test for asymptomatic persons). They should wear a mask when around others at home and in public for an additional 5 days. People who are confirmed to have COVID-19 or are showing symptoms of COVID-19 need to isolate regardless of their vaccination status. This includes:

- People who have a positive viral test for COVID-19, regardless of whether or not they have symptoms.
- People with symptoms of COVID-19, including people who are awaiting test results or have not been tested. People with symptoms should isolate even if they do not know if they have been in close contact with someone with COVID-19.

Teaching guide for those who have Covid

- Stay home and away from other people for at least 5 days (day 0 through day 5) after your last contact with a person who has COVID-19. The date of your exposure is considered day 0. Wear a well-fitting mask when around others at home, if possible.
- For 10 days after your last close contact with someone with COVID-19, watch for fever (100.4◦F or greater), cough, shortness of breath, or other COVID-19 symptoms.
- If you develop symptoms, get tested immediately and isolate until you receive your test results. If you test positive, follow isolation recommendations.
- If you do not develop symptoms, get tested at least 5 days after you last had close contact with someone with COVID-19.
    - If you test negative, you can leave your home, but continue to wear a well-fitting mask when around others at home and in public until 10 days after your last close contact with someone with COVID-19.
    - If you test positive, you should isolate for at least 5 days from the date of your positive test (if you do not have symptoms). If you do develop COVID-19 symptoms, isolate for at least 5 days from the date your symptoms began (the date the symptoms started is day 0). Follow recommendations in the isolation section below.
    - If you are unable to get a test 5 days after last close contact with someone with COVID-19, you can leave your home after day 5 if you have been without COVID-19 symptoms throughout the 5-day period. Wear a well-fitting mask for 10 days after your date of last close contact when around others at home and in public.
    - Avoid people who are immunocompromised or at high risk for severe disease, and nursing homes and other high-risk settings, until after at least 10 days.
- If possible, stay away from people you live with, especially people who are at higher risk for getting very sick from COVID-19, as well as others outside your home throughout the full 10 days after your last close contact with someone with COVID-19.
- Monitor your symptoms. If you have an emergency warning sign (including trouble breathing), seek emergency medical care immediately.
- Stay in a separate room from other household members, if possible.
- Use a separate bathroom, if possible.
- Take steps to improve ventilation at home, if possible.
- Avoid contact with other members of the household and pets.
- Don’t share personal household items, like cups, towels, and utensils.
- Wear a well-fitting mask when you need to be around other people.
- If you are unable to quarantine, you should wear a well-fitting mask for 10 days when around others at home and in public.
- If you are unable to wear a mask when around others, you should continue to quarantine for 10 days. Avoid people who are immunocompromised or at high risk for severe disease, and nursing homes and other high-risk settings, until after at least 10 days.
- Do not go to places where you are unable to wear a mask, such as restaurants and some gyms, and avoid eating around others at home and at work until after 10 days after your last close contact with someone with COVID-19.

If you had COVID-19 and had symptoms, isolate for at least 5 days. To calculate your 5-day isolation period, day 0 is your first day of symptoms. Day 1 is the first full day after your symptoms developed. You can leave isolation after 5 full days.

- You can end isolation after 5 full days if you are fever-free for 24 hours without the use of fever-reducing medication and your other symptoms have improved (Loss of taste and smell may persist for weeks or months after recovery and need not delay the end of isolation).
- You should continue to wear a well-fitting mask around others at home and in public for 5 additional days (day 6 through day 10) after the end of your 5-day isolation period. If you are unable to wear a mask when around others, you should continue to isolate for a full 10 days. Avoid people who are immunocompromised or at high risk for severe disease, and nursing homes and other high-risk settings, until after at least 10 days.
- If you continue to have fever or your other symptoms have not improved after 5 days of isolation, you should wait to end your isolation until you are fever-free for 24 hours without the use of fever-reducing medication and your other symptoms have improved. Continue to wear a well-fitting mask. Contact your healthcare provider if you have questions.
- Do not go to places where you are unable to wear a mask, such as restaurants and some gyms, and avoid eating around others at home and at work until a full 10 days after your first day of symptoms.

If an individual has access to a test and wants to test, the best approach is to use an antigen test towards the end of the 5-day isolation period. Collect the test sample only if you are fever-free for 24 hours without the use of fever-reducing medication and your other symptoms have improved (loss of taste and smell may persist for weeks or months after recovery and need not delay the end of isolation). If your test result is positive, you should continue to isolate until day If your test result is negative, you can end isolation, but continue to wear a well-fitting mask around others at home and in public until day 10. Follow additional recommendations for masking and avoiding travel as described above.

Ending isolation for people who tested positive for COVID-19 but had no symptoms.
If you test positive for COVID-19 and never develop symptoms, isolate for at least 5 days. Day 0 is the day of your positive viral test (based on the date you were tested) and day 1 is the first full day after the specimen was collected for your positive test. You can leave isolation after 5 full days.

- If you continue to have no symptoms, you can end isolation after at least 5 days.
- You should continue to wear a well-fitting mask around others at home and in public until day 10 (day 6 through day 10). If you are unable to wear a mask when around others, you should continue to isolate for 10 days. Avoid people who are immunocompromised or at high risk for severe disease, and nursing homes and other high-risk settings, until after at least 10 days.

- If you develop symptoms after testing positive, your 5-day isolation period should start over. Day 0 is your first day of symptoms. Follow the recommendations above for ending isolation for people who had COVID-19 and had symptoms.
- Do not go to places where you are unable to wear a mask, such as restaurants and some gyms, and avoid eating around others at home and at work until 10 days after the day of your positive test.

Ending isolation for people who were severely ill with COVID-19 or have a weakened immune system (immunocompromised)

People who are severely ill with COVID-19 (including those who were hospitalized or required intensive care or ventilation support) and people with compromised immune systems might need to isolate at home longer. They may also require testing with a viral test to determine when they can be around others. CDC recommends an isolation period of at least 10 and up to 20 days for people who were severely ill with COVID-19 and for people with weakened immune systems. Consult with your healthcare provider about when you can resume being around other people.

People who are immunocompromised should talk to their healthcare provider about the potential for reduced immune responses to COVID-19 vaccines and the need to continue to follow current prevention measures (including wearing a well-fitting mask, staying 6 feet apart from others they don't live with, and avoiding crowds and poorly ventilated indoor spaces) to protect themselves against COVID-19 until advised otherwise by their healthcare provider. Close contacts of immunocompromised people—including household members—should also be encouraged to receive all recommended COVID-19 vaccine doses to help protect these people.

Isolation in high-risk congregate settings

In certain high-risk congregate settings that have high risk of secondary transmission and where it is not feasible to cohort people (such as correctional and detention facilities, homeless shelters, and cruise ships), CDC recommends a 10-day isolation period for residents. During periods of critical staffing shortages, facilities may consider shortening the isolation period for staff to ensure continuity of operations. Decisions to shorten isolation in these settings should be made in consultation with state, local, tribal, or territorial health departments and should take into consideration the context and characteristics of the facility. CDC's setting-specific guidance provides additional recommendations for these settings.

Quarantine in high-risk congregate settings

In certain congregate settings that have high risk of secondary transmission (such as correctional and detention facilities, homeless shelters, or cruise ships), CDC recommends a 10-day quarantine for residents, regardless of vaccination and booster status. During periods of critical staffing shortages, facilities may consider shortening the quarantine period for staff to ensure continuity of operations. Decisions to shorten quarantine in these settings should be made in consultation with state, local, tribal, or territorial health departments and should take into consideration the context and characteristics of the facility. CDC's setting-specific guidance provides additional recommendations for these settings.

The Immune System—the Body's Defense Against Infection

To understand how COVID-19 vaccines work, it helps to first look at how our bodies fight illness. When germs, such as the virus that causes COVID-19, invade our bodies, they attack and multiply. This invasion, called an infection, is what causes illness. Our immune system uses several tools to fight infection. Blood contains red cells, which carry oxygen to tissues and organs, and white or immune cells, which fight infection. Different types of white blood cells fight infection in different ways:

- **Macrophages** are white blood cells that swallow up and digest germs and dead or dying cells. The macrophages leave behind parts of the invading germs, called "antigens". The body identifies antigens as dangerous and stimulates antibodies to attack them.
- **B-lymphocytes** are defensive white blood cells. They produce antibodies that attack the pieces of the virus left behind by the macrophages.
- **T-lymphocytes** are another type of defensive white blood cell. They attack cells in the body that have already been infected.

The first time a person is infected with the virus that causes COVID-19, it can take several days or weeks for their body to make and use all the germ-fighting tools needed to get over the infection. After the infection, the person's immune system remembers what it learned about how to protect the body against that disease.

The body keeps a few T-lymphocytes, called "memory cells," that go into action quickly if the body encounters the same virus again. When the familiar antigens are detected, B-lymphocytes produce antibodies to attack them. Experts are still learning how long these memory cells protect a person against the virus that causes COVID-19.

Dr. Daniela Weiskopf, an instructor at the division of vaccine discovery at La Jolla Institute for Allery and Immunology has studied the body's immune response to a Covid infection. "Several months ago, our studies showed that natural infection induced a strong response, and our most recent study now shows that the responses last," says Dr. Daniela Weiskopf at the La Jolla Institute for Immunology. "We are hopeful that a similar pattern of responses lasting over time will also emerge for the vaccine-induced responses."

After your body's disease defense system (the immune system) fights off a virus, it keeps a memory of it. A study suggests that people's immune systems remember COVID-19 for months after recovery. The immune system makes different types of cells and molecules to fight disease. These include antibodies, T cells, and B cells.

Researchers looked at immune responses from about 200 people who'd recovered from COVID-19. Some had been infected up to eight months before the analysis. Other cases were more recent. Of the people who recovered, 95% had immune system "memories" of the virus that causes COVID-19, SARS-CoV-2. Almost everyone had antibodies that block the virus' spike protein. The virus uses this protein to enter cells.

The number and type of antibodies varied between people. But the levels usually remained stable over time. They slightly decreased six to eight months after infection.

Immune cell levels also remained high. Memory B cells, which make antibodies, increased for a few months after infection and then remained stable. Most people had one important type of T cell. About half had another type of T cell that kills infected cells.

New research shows that the antibodies that develop from COVID-19 remain in the body for at least 8 months. For people who recover from COVID-19, immunity to the coronavirus can last about 3 months to 5 years, research shows. Immunity can occur naturally after developing COVID-19 or from getting the COVID-19 vaccination. Because the length of immunity after developing COVID-19 or getting the vaccine is unknown, practicing physical distancing and wearing a mask need to continue to stop the spread.

Immune cells and proteins that circulate in the body can recognize and kill the pathogen if it's encountered again, protecting against disease and reducing illness severity.

The components of immunity protection include:

- Antibodies are proteins that circulate in the blood and recognize foreign substances like viruses and neutralize them.
- Helper T cells help to recognize pathogens.
- Killer T cells kill pathogens.
- B cells make new antibodies when the body needs them.

People who recover from COVID-19 have been found to have all four of these components. However, specifics about what this means for the immune response and how long immunity lasts are not clear.

How natural immunity works after COVID-19 develops

After a person acquires a virus, the immune system retains a memory of it. Immune cells and proteins that circulate in the body can recognize and kill the pathogen if it's encountered again, protecting against disease and reducing illness severity.

The components of immunity protection include:

- Antibodies are proteins that circulate in the blood and recognize foreign substances like viruses and neutralize them.
- Helper T cells help to recognize pathogens.
- Killer T cells kill pathogens.

- B cells make new antibodies when the body needs them.

People who recover from COVID-19 have been found to have all four of these components. However, specifics about what this means for the immune response and how long immunity lasts are not clear.

After people recover from infection with a virus, the immune system retains a memory of it. Immune cells and proteins that circulate in the body can recognize and kill the pathogen if it's encountered again, protecting against disease and reducing illness severity. This long-term immune protection involves several components. Antibodies—proteins that circulate in the blood—recognize foreign substances like viruses and neutralize them. Different types of T cells help recognize and kill pathogens. B cells make new antibodies when the body needs them.

All of these immune-system components have been found in people who recover from SARS-CoV-2, the virus that causes COVID-19. But the details of this immune response and how long it lasts after infection have been unclear. Scattered reports of reinfection with SARS-CoV-2 have raised concerns that the immune response to the virus might not be durable.

Dr. William Schaffner, professor of preventive medicine and infectious diseases at Vanderbilt University Medical Center, said it's not known exactly how long the protection after natural infection will last and how durable that protection will be against a variety of different variants. "There are some people who have the notion that after you've gotten a natural infection, you will be permanently protected against COVID-19 as if this were measles.

But the two viruses that cause these infections are very, very different. The coronavirus protection wanes naturally after a period of time."

Most studies indicate immunity for about six months after a COVID-19 infection. However, immune response can differ in people who get COVID-19 and recover from the illness. This is why getting the vaccine is important, even for those who have been infected.

Vaccines add protection.

- The U.S. Centers for Disease Control and Prevention (CDC) released a report on Oct. 29, 2021, that says getting vaccinated for the coronavirus when you've already had COVID-19 significantly enhances your immune protection and further reduces your risk of reinfection.
- A study published in August 2021 indicates that if you had COVID-19 before and are not vaccinated, your risk of getting re-infected is more than two times higher than for those who got vaccinated after having COVID-19.
- Another study published on Nov. 5, 2021, by the U.S. Centers for Disease Control and Prevention (CDC) looked at adults hospitalized for COVID-like sickness between January and September 2021. This study found that the chances of these adults testing positive for COVID-19 were 5.49 times higher in unvaccinated people who had COVID-

19 in the past than they were for those who had been vaccinated for COVID and had not had an infection before.
- A study from the CDC in September 2021 showed that roughly one-third of those with COVID-19 cases in the study had no apparent natural immunity.

COVID-19 Vaccines—What available and how do they work.

COVID-19 vaccines help our bodies develop immunity to the virus that causes COVID-19 without us having to get the illness. Different types of vaccines work in different ways to offer protection. But with all types of vaccines, the body is left with a supply of "memory" T-lymphocytes as well as B-lymphocytes that will remember how to fight that virus in the future.

It typically takes a few weeks after vaccination for the body to produce T-lymphocytes and B-lymphocytes. Therefore, it is possible that a person could be infected with the virus that causes COVID-19 just before or just after vaccination and then get sick because the vaccine did not have enough time to provide protection.

Sometimes after vaccination, the process of building immunity can cause symptoms, such as fever. These symptoms are normal and are signs that the body is building immunity. The Centers for Disease Control says that you can take over-the-counter pain medicine, such as ibuprofen (like Advil), aspirin, antihistamines or acetaminophen (like Tylenol), if you have side effects after getting vaccinated for Covid. Taking OTC pain medications ahead of the shot to try and decrease symptoms is not recommended by the CDC, because it's not clear how that could affect the vaccine's effectiveness. The concern is that pre-treating with pain medications that reduce fevers and inflammation (like acetaminophen and ibuprofen) could dampen the immune system's response to the vaccine

Below is a description of how each type of vaccine prompts our bodies to recognize and protect us from the virus that causes COVID-19. None of these vaccines can give you COVID-19.

- **mRNA vaccines** contain material from the virus that causes COVID-19 that gives our cells instructions for how to make a harmless protein that is unique to the virus. After our cells make copies of the protein, they destroy the genetic material from the vaccine. Our bodies recognize that the protein should not be there and build T-lymphocytes and B-lymphocytes that will remember how to fight the virus that causes COVID-19 if we are infected in the future. Examples: Pfizer and Moderna vaccines.
- **Vector vaccines** contain a modified version of a different virus than the one that causes COVID-19. Inside the shell of the modified virus, there is material from the virus that causes COVID-19. This is called a "viral vector." Once the viral vector is inside our cells, the genetic material gives cells instructions to make a protein that is unique to the virus that causes COVID-19. Using these instructions, our cells make copies of the protein. This prompts our bodies to build T-lymphocytes and B-lymphocytes that will remember how to fight that virus if we are infected in the future. Example: Johnson & Johnson.

Not approved in US as of 2021, but being used worldwide:

- **Protein subunit vaccines** include harmless pieces (proteins) of the virus that causes COVID-19 instead of the entire germ. Once vaccinated, our bodies recognize that the protein should not be there and build T-lymphocytes and antibodies that will remember how to fight the virus that causes COVID-19 if we are infected in the future.

The advantages of protein subunit vaccines are many. The new crop of protein based COVID vaccines expands the world's choices for protection. The advantages of protein subunit-based vaccines include high efficacy rate, safety, ease of production/distribution, and relatively lower cost. Lastly, protein subunit vaccines vastly expand humanity's armory to fight the pandemic, especially in poor countries.

How does a protein subunit vaccine work?

In a nutshell, a protein subunit vaccine harnesses tiny particles containing multiple engineered spikes grown in cell cultures — and then using them as a vaccine to illicit immune response in the recipient's body. Sinopharm's new recombinant protein vaccine uses the Spike (S) protein that surrounds the SARS-CoV-2 virus. This helps the body identify the virus.

Protein subunit vaccines are already in widespread use (i.e. hep B and acellular pertussis vaccine). In terms of manufacturing, a PS vaccine is based on protein cultivated in factories, which does not require a live (attenuated) or inactivated virus. The first forms of developed protein subunit vaccines aimed to harness the ability of protein antigens to elicit immunoglobulins (aka antibodies). In the 1960s, an early example of an "acellular vaccine" was the anthrax protective antigen.

Covid Vaccines

Currently,(as of July 2022) the three vaccines authorized for use in adults in the United States are from Pfizer-BioNTech, Moderna, and Johnson & Johnson. The Centers for Disease Control and Prevention (CDC) reported that vaccine effectiveness studies of people who develop COVID-19 in the real world, continue to show evidence that mRNA COVID-19 vaccines (Pfizer and Moderna) offer similar protection as they proved to in clinical trial settings.

For instance, in clinical trials, the Moderna vaccine was about 94 percent effective at preventing COVID-19 and the Pfizer-BioNTech vaccine was 95 percent effective. Real-world data also show that Pfizer and Moderna vaccines are effective at reducing the risk of COVID-19, including severe illness, by 90 percent or more in people who are fully vaccinated.

The Johnson & Johnson vaccine is 66 percent effective at preventing COVID-19, which seems like a pretty steep drop-off from the numbers put up by Pfizer and Moderna. The Johnson & Johnson vaccine is considered effective because of how well it prevents severe cases of COVID-19, said Stanford infectious disease doctor Aruna Subramanian, MD. Research has shown that Johnson & Johnson is 85 percent effective in that category, well over the 70 percent threshold Dr. Subramanian said is typically needed to be considered a high-quality vaccine. The Johnson & Johnson vaccine was also 100 percent effective at preventing hospitalization and death from COVID-19, according to clinical trials.

All three vaccines work by helping the body develop immunity to the virus that causes COVID-19 without you having to develop COVID-19. "We know that after you've had natural infection, and then get vaccinated, you get a terrific boost in your antibody levels. And very high antibody levels traditionally have been associated with longer duration of protection. And in the laboratory, it looks as [if] those antibodies also provide a better protection against variants," said Schaffner.

"The vaccines provide very superior protection against Delta, and if there is some erosion of protection against Omicron, remember you'll still in every likelihood have partial protection and partial protection is always better than no protection," Schaffner said. While the Pfizer and Moderna vaccines require two shots a few weeks apart to get full protection, Johnson & Johnson only requires one shot.

Once you have full vaccine protection, your body is left with a supply of T cells as well as B cells that will remember how to fight the virus in the future, just like they do with natural immunity. However, it usually takes a few weeks for the body to produce T cells and B cells after vaccination. During this time, it's possible to acquire the virus that causes COVID-19 until your body can provide protection.

In a Q&A with the World Health Organization (WHO), Dr. Katherine O'Brien, professor at Johns Hopkins Bloomberg School of Public Health, commented on the Pfizer and Moderna vaccines: "We see a good immune response that kicks in within about 2 weeks of that first dose. And it's really the second dose that then boosts that immune response, and we see immunity get even stronger after that second dose, again within a shorter period of time after the second dose."

Booster shots

As of November 2021, the FDA and CDC recommend that everyone over 18 years old get a booster shot. This allows for a single booster dose of the Pfizer and Moderna COVID-19 vaccines that may be administered at least 6 months after completion of the primary series, as well as the use of a single booster dose of the Johnson & Johnson COVID-19 vaccine to be administered at least 2 months after completion of the single-dose primary regimen.

While the CDC states that COVID-19 vaccination remains effective in preventing severe disease, it points to data that suggest vaccination becomes less effective over time, especially in people 65 and older and at preventing infection or milder illness with symptoms. Schaffner added that while the vaccines are explicitly designed to create a large immune response, they are not 100 percent effective, and therefore the need for a booster shot may become standard like it is annually for the flu, especially to protect against new variants of the virus that causes COVID-19.

Additionally, the FDA authorized that each of the available COVID-19 vaccine boosters can be mixed and matched in eligible people following completion of primary vaccination. The FDA took various data into consideration when it authorized the use of boosters.

CDC COVID-19 vaccination schedule for people who are not moderately or severely immunocompromised

May, 2022 (More vaccines for children are under consideration at this time)

TABLE 2: COVID-19 vaccination schedule for people who are not moderately or severely immunocompromised*

Primary series vaccine manufacturer	Age group	Number of doses in primary series	Number of booster doses†	Interval between 1st and 2nd primary doses‡	Interval between primary series and booster dose
Pfizer-BioNTech	5 years and older	2	1-2	3-8 weeks	At least 5 months
Moderna	18 years and older	2	1-2	4-8 weeks	At least 5 months
Janssen	18 years and older	1	1-2	NA	At least 2 months

CDC COVID-19 vaccination schedule for people who are moderately or severely immunocompromised

Table 3: COVID-19 vaccination schedule for people who are moderately or severely immunocompromised

Primary vaccination	Age group	Number of primary vaccine doses	Number of booster doses*	Interval between 1st and 2nd dose	Interval between 2nd and 3rd dose	Interval between 3rd and 4th dose
Pfizer-BioNTech	5 years and older	3	1-2	3 weeks	At least 4 weeks	At least 3 months
Moderna	18 years and older	3	2	4 weeks	At least 4 weeks	At least 3 months
Janssen	18 years and older	1 Janssen, followed by 1 mRNA	2	4 weeks	At least 2 months	At least 4 months

Vaccines in the United States

Manufacturer: Pfizer, Inc., and BioNTech

Number of Shots: 2 shots, 21 days apart
Moderately or severely immunocompromised people ages 12 years and older should get an additional primary shot at least 28 days after their second shot.

Booster Shot: Everyone ages 12 years and older can get a booster shot at least 5 months after completing their Pfizer-BioNTech primary series. Second booster 4 months after first booster. Adults 18 years and older can get any of the COVID-19 vaccines authorized in the United States for their booster shots.

Pfizer pediatric: Children 5-11 can get two doses 21 days apart, and a 3rd dose if immunocompromised 28 days after dose 2.

Pediatric Booster: First booster 5 months after 2nd dose (or third dose if immunosuppressed)

Type of Vaccine: mRNA

How Given: Shot in the muscle of the upper arm

Does NOT Contain: Eggs, preservatives, latex, metals
See Full List of Ingredients Below

Name: BNT162b2

Brand name: COMIRNATY

Who Should Get Vaccinated (as of May 2022)

- The Pfizer-BioNTech vaccine is recommended for people ages 5 years and older.
- Learn more about how the Centers for Disease Control and Prevention (CDC) is making COVID-19 vaccine recommendations.

Who Should NOT Get Vaccinated

- If you have had a severe allergic reaction to any ingredient in the Pfizer-BioNTech COVID-19 vaccine (such as polyethylene glycol), you should not get this vaccine.
- If you had a severe allergic reaction after getting a dose of the Pfizer-BioNTech COVID-19 vaccine, you should not get another dose of an mRNA vaccine.
- A severe allergic reaction can cause a rapid heartbeat, difficulty breathing, swelling of the throat, or a generalized rash or hives. A person with a severe allergic reaction needs to be treated with epinephrine (often given as an EpiPen®) and should seek immediate medical attention.
- If you aren't able to get this vaccine, you may still be able to get a different type of COVID-19 vaccine. Get more information for people with allergies.

Pfizer-BioNTech (COMIRNATY) Name Change

Pfizer-BioNTech (COMIRNATY) received U.S. Food and Drug Administration (FDA) approval on August 23, 2021, for individuals ages 16 years and older. Once vaccines are approved by the FDA, companies can market the vaccines under brand names. COMIRNATY is the brand name for the Pfizer-BioNTech COVID-19 vaccine. After FDA approval, the FDA-authorized Pfizer-BioNTech COVID-19 vaccine for individuals ages 16 years and older was marketed as COMIRNATY. **No change was made to the vaccine's formula** with the name change.

The Pfizer-BioNTech vaccine label remains for individuals ages 5–15 years since the vaccine is authorized but not yet approved for this age group.

Pfizer-BioNTech COVID-19 Vaccine Ingredients

All COVID-19 vaccine ingredients are safe. Nearly all of the ingredients in COVID-19 vaccines are ingredients found in many foods – fats, sugars, and salts. The Pfizer-BioNTech COVID-19 vaccine also contains a harmless piece of messenger RNA (mRNA). The COVID-19 mRNA teaches cells in the body how to create an immune response to the virus that causes COVID-19. This response helps protect you from getting sick with COVID-19 in the future. After the body produces an immune response, it discards all of the vaccine ingredients, just as it would discard any substance that cells no longer need. This process is a part of normal body functioning.

All COVID-19 vaccines are manufactured with as few ingredients as possible and with very small amounts of each ingredient. Each ingredient in the vaccine serves a specific purpose as seen in the table below.

Ingredients in Pfizer-BioNTech COVID-19 vaccine for people ages 12 years and older
The Pfizer-BioNTech COVID-19 vaccine for people ages 12 years and older contains the following ingredients:

Type of Ingredient
Ingredient
Purpose
Messenger ribonucleic acid (mRNA)

- Nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2

Provides instructions the body uses to build a harmless piece of a protein from the virus that causes COVID-19. This protein causes an immune response that helps protect the body from getting sick with COVID-19 in the future.
Lipids (fats)

- 2[(polyethylene glycol (PEG))-2000]-N,N-ditetradecylacetamide
- 1,2-distearoyl-sn-glycero-3-phosphocholine
- Cholesterol (plant derived)
- ((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)
- Dibasic sodium phosphate dihydrate
- Monobasic potassium phosphate
- Potassium chloride (common food salt)
- Sodium chloride (basic table salt)
- Sucrose (basic table sugar) and acid stabilizers

Work together to help keep the vaccine molecules stable while the vaccine is manufactured, frozen, shipped, and stored until it is ready to be given to a vaccine recipient.

Ingredients in Pfizer-BioNTech COVID-19 vaccine for people ages 5–11 years
The Pfizer-BioNTech COVID-19 vaccine for people ages 5 through 11 years old contains the following ingredients:

Type of Ingredient
Ingredient
Purpose
Messenger ribonucleic acid (mRNA)

- Nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2

Provides instructions the body uses to build a harmless piece of a protein from the virus that causes COVID-19. This protein causes an immune response that helps protect the body from getting sick with COVID-19 in the future.
Lipids (fats)

- 2[(polyethylene glycol (PEG))-2000]-N,N-ditetradecylacetamide
- 1,2-distearoyl-sn-glycero-3-phosphocholine
- Cholesterol (plant derived)
- ((4-hydroxybutyl)azanediyl)bis(hexane-6,1-diyl)bis(2-hexyldecanoate)

Work together to help the mRNA enter cells.
Sugar and acid stabilizers

- **Sucrose (table sugar)**
- **Tromethamine**
- **Tromethamine hydrochloride**

Work together to help keep the vaccine molecules stable while the vaccine is manufactured, frozen, shipped, and stored until it is ready to be given to a vaccine recipient.

Ingredients that are NOT used in COVID-19 vaccines

The above table lists ALL ingredients in the Pfizer-BioNTech COVID-19 vaccine. There are NO ingredients in this vaccine beyond what is listed in the table. The Pfizer-BioNTech COVID-19 vaccine has:

- **No preservatives** like thimerosal or mercury or any other preservatives.
- **No antibiotics** like sulfonamide or any other antibiotics.
- **No medicines or therapeutics** like ivermectin or any other medications.
- **No tissue** like aborted fetal cells, gelatin, or any materials from any animal
- **No food proteins** like eggs or egg products, gluten, peanuts, tree nuts, nut products, or any nut byproducts (COVID-19 vaccines are not manufactured in facilities that produce food products).
- **No metals** like iron, nickel, cobalt, titanium, rare earth alloys, or any manufactured products like microelectronics, electrodes, carbon nanotubes or other nanostructures, or nanowire semiconductors.
- **No latex**. The vial stoppers used to hold the vaccine also do not contain latex.

Possible Side Effects

In the arm where you got the shot:

- Pain
- Redness
- Swelling

Throughout the rest of your body:

- Tiredness
- Headache
- Muscle pain
- Chills
- Fever
- Nausea

These side effects are normal signs that your body is building protection and should go away within a few days

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Moderna COVID-19 Vaccine Overview and Safety
Updated June, 2022

General Information

Manufacturer: ModernaTX, Inc.

Number of Shots: 2 shots, 28 days apart
Moderately or severely immunocompromised people should get an additional primary shot (third dose) at least 28 days after their second shot.

Booster Shot: People ages 18 years and older who received a Moderna primary series should get a booster shot at 5 months after completing their primary series. A second booster is allowed 4 months after the first booster for those immunocompromised. You can get any of the COVID-19 vaccines authorized in the United States for your booster shot.

Type of Vaccine: mRNA

How Given: Shot in the muscle of the upper arm

Does NOT Contain: Eggs, preservatives, latex, metals
See Full List of Ingredients Below

Name: mRNA-1273

Who Should NOT Get Vaccinated

- If you have had a severe allergic reaction to any ingredient in an mRNA COVID-19 vaccine (such as polyethylene glycol), you should not get an mRNA COVID-19 vaccine (Moderna or Pfizer-BioNTech).
- If you had a severe allergic reaction after getting the first dose of an mRNA COVID-19 vaccine, you should not get a second dose of either of the mRNA COVID-19 vaccines (Moderna or Pfizer-BioNTech).
- A severe allergic reaction can cause a rapid heartbeat, difficulty breathing, swelling of the throat, or a generalized rash or hives. A person with a severe allergic reaction needs to be treated with epinephrine (often given as an EpiPen®) and should seek immediate medical attention.

If you cannot get an mRNA COVID-19 vaccine, you may still be able to get a different type of COVID-19 vaccine

Moderna COVID-19 Vaccine Ingredients

All COVID-19 vaccine ingredients are safe. Nearly all the ingredients in COVID-19 vaccines are ingredients found in many foods—fats, sugars, and salts. The Moderna COVID-19 vaccine also contains a harmless piece of messenger RNA (mRNA). The COVID-19 mRNA teaches cells in the body how to create an effective immune response to the virus that causes COVID-19. This response helps protect you from getting sick with COVID-19 in the future. After the body produces an immune response, it discards all the vaccine ingredients, just as it would discard any substance that cells no longer need. This process is a part of normal body functioning.

All COVID-19 vaccines are manufactured with as few ingredients as possible and with very small amounts of each ingredient. Each ingredient in the vaccine serves a specific purpose as seen in the table below.

Full list of ingredients
The Moderna COVID-19 vaccine contains the following ingredients:

Type of Ingredient
Ingredient
Purpose
Messenger ribonucleic acid (mRNA)

- Nucleoside-modified mRNA encoding the viral spike (S) glycoprotein of SARS-CoV-2

Provides instructions the body uses to build a harmless piece of a protein from the virus that causes COVID-19. This protein causes an immune response that helps protect the body from getting sick with COVID-19 in the future.
Lipids (fats)

- PEG2000-DMG: 1,2-dimyristoyl-rac-glycerol, methoxypolyethylene glycol
- 1,2-distearoyl-sn-glycero-3-phosphocholine
- BotaniChol® (non-animal origin cholesterol)
- SM-102: heptadecane-9-yl 8-((2-hydroxyethyl) (6-oxo-6-(undecyloxy) hexyl) amino) octanoate

Work together to help the mRNA enter cells.
Salt, sugar, acid stabilizers, and acid

- Sodium acetate
- Sucrose (basic table sugar)
- Tromethamine
- Tromethamine hydrochloride
- Acetic acid (the main ingredient in white household vinegar)

Work together to help keep the vaccine molecules stable while the vaccine is manufactured, frozen, shipped, and stored until it is ready to be given to a vaccine recipient.

Ingredients that are NOT used in COVID-19 vaccines
The above table lists ALL ingredients in the Moderna COVID-19 vaccine. There are NO ingredients in this vaccine beyond what is listed in the table. The Moderna COVID-19 vaccine has

- **No preservatives** like thimerosal or mercury or any other preservatives.
- **No antibiotics** like sulfonamide or any other antibiotics.
- **No medicines or therapeutics** like ivermectin or any other medications.
- **No tissues** like aborted fetal cells, gelatin, or any materials from any animal.
- **No food proteins** like eggs or egg products, gluten, peanuts, tree nuts, nut products, or any nut byproducts (COVID-19 vaccines are not manufactured in facilities that produce food products).
- **No metals** like iron, nickel, cobalt, titanium, rare earth alloys, or any manufactured products like microelectronics, electrodes, carbon nanotubes or other nanostructures, or nanowire semiconductors.
- **No latex**. The vial stoppers used to hold the vaccine also do not contain latex.

Possible Side Effects

In the arm where you got the shot:

- Pain
- Redness
- Swelling

Throughout the rest of your body:

- Tiredness
- Headache
- Muscle pain
- Chills
- Fever
- Nausea

These side effects are normal signs that your body is building protection and should go away within a few days. Talk to a doctor about taking over-the-counter medicine, such as ibuprofen, acetaminophen, aspirin (only for people ages 18 years or older), or antihistamines for any pain or discomfort experienced after getting vaccinated**.**

Other authorized or approved COVID-19 vaccines in the United States and eligible age groups

- Pfizer-BioNTech (ages 5 years and older)
- Johnson & Johnson's Janssen (ages 18 years and older)

You should get a COVID-19 vaccination as soon as possible. All currently approved or authorized COVID-19 vaccines are safe and effective, and CDC does not recommend one vaccine over another.

CDC does not recommend mixing products for a two-dose primary series or additional primary doses. Mixing and matching COVID-19 vaccines is allowed for booster shots for people ages 18 and older.

Safety Data Summary

- Side effects that happen within 7 days of getting vaccinated are common but are mostly mild to moderate. Some people have reactions that affect their ability to do daily activities.
- Side effects throughout the body (such as fever, chills, tiredness, and headache) are more common after the second dose of the vaccine.
- Rare cases of myocarditis and pericarditis in adolescents and young adults have been reported after receipt of one of the two mRNA COVID-19 vaccines, Pfizer-BioNTech or Moderna. These cases occur more often after getting the second dose than after the first dose of one of these vaccines. These reports are rare and the known and potential benefits of COVID-19 vaccination outweigh the known and potential risks, including the possible risk of myocarditis or pericarditis.

All FDA-approved or authorized COVID-19 vaccines have undergone and continue to undergo the most intensive safety monitoring in U.S. history. This monitoring includes using both established and new safety monitoring to make sure that COVID-19 vaccines are safe.

The CDC says there's a preference for the mRNA (Pfizer and Moderna) COVID-19 vaccines over the Johnson & Johnson one. This is based on data from the Advisory Committee on Immunization Practices (ACIP). It discussed vaccine safety, vaccine effectiveness, rare adverse side effects, and U.S. vaccine supply.

It's best to get a booster shot from either Pfizer or Moderna, but any booster is better than none. If you only have access to the Johnson & Johnson booster, you should still take it.

The Pfizer vaccine received full FDA approval on Aug. 23, 2021 and is no longer under emergency use authorization (EUA). It will now be marketed under the name Comirnaty.

Two other vaccines, from Novavax from AstraZeneca, are not available in the U.S. as of July 2022.

Vaccines continue to lower your risk for severe disease, hospitalization, and death, even against the widespread Delta variant of COVID-19.

But each is slightly different. Compare them below. If you're still not sure which vaccine is best for you, talk to your doctor.

The FDA has authorized the emergency use of PAXLOVID, an oral investigational medicine, for the treatment of mild-to-moderate COVID-19 in adults and children (12 years of age and older weighing at least 88 pounds [40 kg]) with a positive test for the virus that causes COVID-19, and who are at high risk for progression to severe COVID-19, including hospitalization or death, under an EUA.

Right now, (May, 2022) worldwide 49% of the population is fully vaccinated, with the United Arab Emirates leading the world at 90%, and Cuba right behind with 85%. Sadly, the United States continues to drag our feet, with only 61% fully vaccinated. Poorer countries, such as those in Africa suffer with only a very small percentage of their people protected. This is mainly due to a poor infrastructure and lack of resources.

How Well the Vaccine Works

- Based on evidence from clinical trials, in people ages 18 years and older, the Moderna COVID-19 vaccine was 94.1% effective at preventing laboratory-confirmed COVID-19 infection in people who received two doses and had no evidence of being previously infected.
- The vaccine was also effective in clinical trials at preventing COVID-19 among people of diverse age, sex, race, and ethnicity categories and among people with underlying medical conditions.
- Evidence shows mRNA COVID-19 vaccines offer similar protection in real-world conditions as they have in clinical trial settings—reducing the risk of COVID-19, including severe illness, by 90% or more among people who are fully vaccinated.
- CDC will continue to provide updates as we learn more.
- AstraZeneca is not approved in the U.S., but is being used in many parts of the world.
- The AstraZeneca-Oxford vaccine has a practical advantage over some others in that it can be stored at two to eight degrees Celsius (35.6-46.6 degrees Fahrenheit) rather than the minus 70 degrees Celsius (-94 degrees Fahrenheit) needed for the Pfizer vaccine, for example.
- AstraZeneca, which has promised it will not make a profit on the vaccine during the pandemic, has reached agreements with governments and international health organizations that put its cost at about $2.50 a dose. Pfizer's vaccine will cost about $20 a dose, while Moderna's will costs $15-25, based on agreements the companies have struck to supply their vaccines to the US government.

Johnson & Johnson's Janssen COVID-19 Vaccine Overview and Safety
Updated June, 2022

CDC has updated its recommendations for COVID-19 vaccines with a preference for people to receive an mRNA COVID-19 vaccine (Pfizer-BioNTech and Moderna).

General Information

Name: JNJ-78436735

Manufacturer: Janssen Pharmaceuticals Companies of Johnson & Johnson

Type of Vaccine: Viral Vector

Number of Shots: 1 shot may be given in some situations.

Booster Shot: Everyone ages 18 years and older should get a booster dose of either Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines) at least 2 months after receiving the Johnson & Johnson's Janssen (J&J/Janssen) vaccine in most situations.

How Given: Shot in the muscle of the upper arm

Does NOT Contain: Eggs, preservatives, latex or metals
See Full List of Ingredients Below

When to Consider J&J/Janssen COVID-19 Vaccine

- In most situations, Pfizer-BioNTech or Moderna COVID-19 vaccines are preferred over the J&J/Janssen COVID-19 vaccine for primary and booster vaccination due to the risk of serious adverse events. Vaccine recipients must be informed of the risks and benefits of J&J/Janssen COVID-19 vaccination. The J&J/Janssen COVID-19 vaccine may be considered in some situations, including for persons who:
- Had a severe reaction after an mRNA vaccine dose or who have a severe allergy to an ingredient of Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines).
- Would otherwise remain unvaccinated for COVID-19 due to limited access to Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines).
- Wants to get the J&J/Janssen COVID-19 vaccine despite the safety concerns.

Who Should Not Get J&J/Janssen COVID-19 vaccine

- If you have had a severe allergic reaction (anaphylaxis) or an immediate allergic reaction, even if it was not severe, to any ingredient in the J&J/Janssen COVID-19 vaccine (such as polysorbate), you should not get the J&J/Janssen COVID-19 vaccine.
- A severe allergic reaction is one that needs to be treated with epinephrine or EpiPen or requiring additional medical care.
- An immediate allergic reaction means a reaction within 4 hours of exposure, including symptoms such as hives, swelling, or wheezing (respiratory distress).
- If you developed thrombosis with thrombocytopenia syndrome after your initial J&J/Janssen vaccine, you should get the Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines) for your booster dose.

Johnson & Johnson (J&J)/Janssen COVID-19 Vaccine Ingredients

The J&J/Janssen COVID-19 vaccine contains a piece of a modified virus that is not the virus that causes COVID-19. This modified virus is called the vector virus. The vector virus cannot reproduce itself, so it cannot cause COVID-19. This vector virus gives instructions to cells in the body to create an immune response. This response helps protect you from getting sick with COVID-19 in the future. After the body produces an immune response, it gets rid of all of the vaccine ingredients just as it would discard any information that cells no longer need. This process is a part of normal body functioning.

All COVID-19 vaccines are manufactured with as few ingredients as possible and with only the necessary amounts of each ingredient. Nearly all of the ingredients in COVID-19 vaccines are also the ingredients in many foods – fats, sugars, and salts. Each ingredient in the vaccine serves a specific purpose as seen in the table below.

Full list of ingredients
The J&J/Janssen COVID-19 vaccine contains the following ingredients:

Type of Ingredient
Ingredient
Purpose

- A harmless version of a virus unrelated to the COVID-19 virus
- Recombinant, replication-incompetent Ad26 vector, encoding a stabilized variant of the SARS-CoV-2 Spike (S) protein

Provides instructions the body uses to build a harmless piece of a protein from the virus that causes COVID-19. This protein causes an immune response that helps protect the body from getting sick with COVID-19 in the future.

Sugars, salts, acid, and acid stabilizer

- Polysorbate-80
- 2-hydroxypropyl-β-cyclodextrin
- Trisodium citrate dihydrate
- Sodium chloride (basic table salt)
- Citric acid monohydrate (closely related to lemon juice)
- Ethanol (a type of alcohol)

Work together to help keep the vaccine molecules stable while the vaccine is manufactured, shipped, and stored until it is ready to be given to a vaccine recipient.

Ingredients that are NOT used in COVID-19 vaccines

The above table lists ALL ingredients in the J&J/Janssen COVID-19 vaccine. There are NO ingredients in this vaccine beyond what is listed in that table. The J&J/Janssen COVID-19 vaccine has

- **No preservatives** like thimerosal or mercury or any other preservatives.
- **No antibiotics** like sulfonamide or any other antibiotics.
- **No medicines or therapeutics** like ivermectin or any other medications.
- **No tissues** like aborted fetal cells, gelatin, or any materials from any animal.
- **No food proteins** like eggs or egg products, gluten, peanuts, tree nuts, nut products, or any nut byproducts (COVID-19 vaccines are not manufactured in facilities that produce food products).
- **No metals** like iron, nickel, cobalt, titanium, rare earth alloys, or any manufactured products like microelectronics, electrodes, carbon nanotubes or other nanostructures, or nanowire semiconductors.
- **No latex**. The vial stoppers used to hold the vaccine also do not contain latex.

Possible Side Effects

In the arm where you got the shot:

- Pain
- Redness
- Swelling
-

Throughout the rest of your body:

- Tiredness
- Headache
- Muscle pain

- Chills
- Fever
- Nausea

These side effects may happen within a day or two of getting the vaccine. They are normal signs that your body is building protection and should go away within a few days.

Fainting After Vaccination

Fainting (syncope) and other events that may be related to anxiety like rapid breathing, low blood pressure, numbness, or tingling can happen after getting any vaccine. Although uncommon, these events are not unexpected, and they are generally not serious.

According to information from the Vaccine Adverse Event Reporting System (VAERS), there were 653 reports of fainting events (fainting and near-fainting) among nearly 8 million doses of J&J/Janssen COVID-19 vaccine administered in the United States in March and April 2021. This translates to a rate of about 8 fainting events for every 100,000 doses of the J&J/Janssen COVID-19 vaccine given. These events occurred during the recommended 15-minute wait after vaccination. It's not clear at this time whether these events were associated with the vaccine or with anxiety, possibly related to preexisting concerns some people who chose to get the one-dose J&J/Janssen COVID-19 vaccine may have about needles or shots.

By comparison, the rate of fainting after flu vaccination in 2019–2020 was 0.05 per 100,000 doses.

Johnson & Johnson's Janssen COVID-19 Vaccine Overview and Safety
Updated Dec. 28, 2021

CDC has updated its recommendations for COVID-19 vaccines with a preference for people to receive an mRNA COVID-19 vaccine (Pfizer-BioNTech and Moderna).

General Information

Name: JNJ-78436735

Manufacturer: Janssen Pharmaceuticals Companies of Johnson & Johnson

Type of Vaccine: Viral Vector

Number of Shots: 1 shot may be given in some situations.

Booster Shot: Everyone ages 18 years and older should get a booster dose of either Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines) at least 2 months after receiving the Johnson & Johnson's Janssen (J&J/Janssen) vaccine in most situations.

How Given: Shot in the muscle of the upper arm

Does NOT Contain: Eggs, preservatives, latex or metals
See Full List of Ingredients Below

When to Consider J&J/Janssen COVID-19 Vaccine

In most situations, Pfizer-BioNTech or Moderna COVID-19 vaccines are preferred over the J&J/Janssen COVID-19 vaccine for primary and booster vaccination due to the risk of serious adverse events. Vaccine recipients must be informed of the risks and benefits of J&J/Janssen COVID-19 vaccination. The J&J/Janssen COVID-19 vaccine may be considered in some situations, including for persons who:

- Had a severe reaction after an mRNA vaccine dose or who have a severe allergy to an ingredient of Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines).
- Would otherwise remain unvaccinated for COVID-19 due to limited access to Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines).
- Wants to get the J&J/Janssen COVID-19 vaccine despite the safety concerns.

Who Should Not Get J&J/Janssen COVID-19 vaccine:

If you have had a severe allergic reaction (anaphylaxis) or an immediate allergic reaction, even if it was not severe, to any ingredient in the J&J/Janssen COVID-19 vaccine (such as polysorbate), you should not get the J&J/Janssen COVID-19 vaccine.

- A severe allergic reaction is one that needs to be treated with epinephrine or EpiPen or requiring additional medical care. Learn about common side effects of COVID-19 vaccines and when to call a doctor.
- An immediate allergic reaction means a reaction within 4 hours of exposure, including symptoms such as hives, swelling, or wheezing (respiratory distress).

If you developed thrombosis with thrombocytopenia syndrome after your initial J&J/Janssen vaccine, you should get the Pfizer-BioNTech or Moderna (mRNA COVID-19 vaccines) for your booster dose.

Johnson & Johnson (J&J)/Janssen COVID-19 Vaccine Ingredients

The J&J/Janssen COVID-19 vaccine contains a piece of a modified virus that is not the virus that causes COVID-19. This modified virus is called the vector virus. The vector virus cannot reproduce itself, so it cannot cause COVID-19. This vector virus gives instructions to cells in the body to create an immune response. This response helps protect you from getting sick with COVID-19 in the future. After the body produces an immune response, it gets rid of all of the vaccine ingredients just as it would discard any information that cells no longer need. This process is a part of normal body functioning.

All COVID-19 vaccines are manufactured with as few ingredients as possible and with only the necessary amounts of each ingredient. Nearly all of the ingredients in COVID-19 vaccines are also the ingredients in many foods – fats, sugars, and salts. Each ingredient in the vaccine serves a specific purpose as seen in the table below.

Full list of ingredients
The J&J/Janssen COVID-19 vaccine contains the following ingredients:

A harmless version of a virus unrelated to the COVID-19 virus

- Recombinant, replication-incompetent Ad26 vector, encoding a stabilized variant of the SARS-CoV-2 Spike (S) protein
- Provides instructions the body uses to build a harmless piece of a protein from the virus that causes COVID-19. This protein causes an immune response that helps protect the body from getting sick with COVID-19 in the future.

Sugars, salts, acid, and acid stabilizer

- Polysorbate-80
- 2-hydroxypropyl-β-cyclodextrin
- Trisodium citrate dihydrate
- Sodium chloride (basic table salt)
- Citric acid monohydrate (closely related to lemon juice)
- Ethanol (a type of alcohol)

Work together to help keep the vaccine molecules stable while the vaccine is manufactured, shipped, and stored until it is ready to be given to a vaccine recipient.

Ingredients that are NOT used in COVID-19 vaccines
The above table lists ALL ingredients in the J&J/Janssen COVID-19 vaccine. There are NO ingredients in this vaccine beyond what is listed in that table. The J&J/Janssen COVID-19 vaccine has

- **No preservatives** like thimerosal or mercury or any other preservatives.
- **No antibiotics** like sulfonamide or any other antibiotics.
- **No medicines or therapeutics** like ivermectin or any other medications.
- **No tissues** like aborted fetal cells, gelatin, or any materials from any animal.
- **No food proteins** like eggs or egg products, gluten, peanuts, tree nuts, nut products, or any nut byproducts (COVID-19 vaccines are not manufactured in facilities that produce food products).
- **No metals** like iron, nickel, cobalt, titanium, rare earth alloys, or any manufactured products like microelectronics, electrodes, carbon nanotubes or other nanostructures, or nanowire semiconductors.
- **No latex**. The vial stoppers used to hold the vaccine also do not contain latex.

There are several other vaccines being used worldwide that are not available in the United States. These include: the AstraZeneica, CoronaVac, Sovaxin, Moravax, and Medicago. At this time five more are under review by the WHO. There is a great need for vaccines that do not need to be stored at extreme temperatures so they can be distributed and used more easily, especially in underdeveloped areas.

Possible Side Effects

In the arm where you got the shot:

- Pain
- Redness
- Swelling

Throughout the rest of your body:

- Tiredness
- Headache
- Muscle pain
- Chills
- Fever
- Nausea

These side effects may happen within a day or two of getting the vaccine. They are normal signs that your body is building protection and should go away within a few days.

Fainting After Vaccination

Fainting (syncope) and other events that may be related to anxiety like rapid breathing, low blood pressure, numbness, or tingling can happen after getting any vaccine. Although uncommon, these events are not unexpected, and they are generally not serious.

According to information from the Vaccine Adverse Event Reporting System (VAERS), there were 653 reports of fainting events (fainting and near-fainting) among nearly 8 million doses of J&J/Janssen COVID-19 vaccine administered in the United States in March and April 2021. This translates to a rate of about 8 fainting events for every 100,000 doses of the J&J/Janssen COVID-19 vaccine given.

These events occurred during the recommended 15-minute wait after vaccination. It's not clear at this time whether these events were associated with the vaccine or with anxiety, possibly related to preexisting concerns some people who chose to get the one-dose J&J/Janssen COVID-19 vaccine may have about needles or shots.

Vaccines for 6 months and older

As of June 2022, children as young as six months old have been approved for the Covid vaccine.

Experts found that the vaccine was 90.7% effective in preventing COVID-19 in children aged 5-11. Now that vaccines are available to younger children, the Moderna and Pfizer COVID-19 vaccines can help more people. If younger people are vaccinated, it'll also help protect older adults who are high risk.

After successful clinical trials, the FDA granted emergency use authorization of the Pfizer COVID-19 vaccines for those 6 months old and older. Children 6 months to 4 years old will get a third dose after at least 8 weeks from their second dose. Children under the age of 5 will get three 3-microgram doses of the Pfizer COVID-19 vaccine. Kids ages 5-11 will receive two 10-micrograms doses. The vaccine for people 12 years old and older includes two 30-micrograms doses.

The FDA also updated the emergency use authorization for the Moderna COVID-19 vaccine. Now, those 6 months to 17 years old (in addition to people 18 and older) can get this vaccine.

Children under the age of 6 can get two 25-microgram doses of the Moderna COVID-19 vaccine. Those 6-12 years of age will get two 50-microgram doses. If you're 12 years and older, you'll receive two 100-microgram doses.

The key differences between Pfizer and Moderna for small children:

- Pfizer is three doses
- Moderna is two doses for most children and three doses for children who are moderately to severely immunocompromised.
    - Moderna reaches the same antibody levels as Pfizer in half the time (eight weeks, versus 13 weeks).
- Each Moderna dose has more active ingredient than each Pfizer dose.
    - Having more active ingredient means the Moderna vaccine may be more likely to cause side effects, such as pain at the injection site and fever.
- Pfizer's vaccine requires more doses with a lower amount of active ingredient so may not cause as many side effects.
- In both trials, side effects were mostly mild and lasted one to two days.
- There were no deaths associated with either vaccine in the trials.
- Serious adverse events were rare, with only one child in each vaccine trial showing a severe reaction.

Long Covid

Many people who've tested positive for COVID-19 have yet to recover. Long COVID is a condition with an array of new or returning health problems that emerge well after an initial COVID-19 infection has ended. They can range from mildly bothersome -- like fatigue, headaches and insomnia -- to more debilitating, including organ damage, blood clots, "brain fog" and problems with mental health.

Some people with COVID-19 have lingering symptoms for weeks or months after they begin to recover. This is now called "long COVID." Experts have coined a new term for it: post-acute sequelae SARS-CoV-2 infection (PASC). Research shows that about 10% of people between ages 18 to 49 who have COVID-19 get long COVID. The odds go up to 22% for those 70 or older. But it can happen to anyone, whether you're otherwise healthy or have other health conditions. Even people with very mild cases can become COVID "long-haulers."

Scientists continue to try to piece together why only some people develop long COVID and how to treat their symptoms: New research suggests vaccination might not only help guard against the condition but alleviate symptoms in people who were not previously vaccinated. Other studies point to the benefits of common over-the-counter antihistamines in treating the condition.

At this point, this is everything we know about treating long COVID, plus the symptoms of the condition, its causes and frequency among COVID patients. COVID-19 vaccines reduce the risk of long COVID by lowering your chance of getting infected in the first place. But, according to a growing body of research, even in breakthrough infections the risk of symptoms that last for a month or more is lowered by roughly 50% in people who've had the primary two shots of an mRNA vaccine like the ones offered by Pfizer and Moderna.

A report by the UK Health Security Agency corroborated that people who received both doses are less likely than unvaccinated people to report dizziness, fatigue, persistent muscle pain, hair loss, shortness of breath, loss of sense of smell and other symptoms in the short, medium and long term. A report compiled from 15 global studies, also found many people who developed long COVID before vaccination reported an improvement in symptoms after vaccination, either immediately or over several weeks.

Researchers have hypothesized that the reason some people with long COVID report feeling much better after getting the vaccine is due to a "reset" of their immune system. It's also possible the vaccine is helping fight off the lingering virus, though that's not the case for everyone.

In the Journal for Nurse Practitioners, researchers at the University of California, Irvine, provided anecdotal evidence that over-the-counter antihistamines may also help relieve the debilitating symptoms of long COVID for some people. They related the cases of two middle-aged women diagnosed with the coronavirus in 2020 who developed a laundry list of lingering effects months after their initial infection cleared -- including rashes, bruising, chest pain, headaches, fatigue and cognitive impairment. Many months after these new symptoms emerged, both women took antihistamines for unrelated allergies and said their long COVID symptoms improved dramatically.

One patient stopped taking antihistamines for 72 hours and found her symptoms reappeared, only to lessen when she took the medication again. Now on a doctor-prescribed daily regimen of antihistamines, she reports regaining 90% of her pre-COVID-19 functionality. The other reported regaining 95% of her pre-illness abilities after taking the medication regularly.

Their experience bolsters a study published in Journal for Nurse Practitioners in which 26 COVID long-haulers were given an antihistamine. Of them, 19 reported their symptoms either completely disappeared or were significantly decreased. In a control group, only six of 23 patients not given the drug reported an improvement in their condition.

Dr. Lawrence Afrin, a senior consultant in hematology and oncology at the AIM Center for Personalized Medicine believes mast cells, a type of immune cells that release histamine in the body, may go into overdrive in some people with COVID-19 and contribute to long COVID. He added that there is evidence antihistamines can quiet mast cells, but more research is needed.

Some lingering symptoms of long COVID-19, per the Centers for Disease Control and Prevention, include:

- Difficulty breathing or shortness of breath
- Tiredness or fatigue
- Symptoms that get worse after physical or mental activities
- Difficulty thinking or concentrating ("brain fog")
- Cough
- Chest or stomach pain
- Headache
- Fast-beating or pounding heart (also known as heart palpitations)
- Joint or muscle pain
- Pins-and-needles feeling
- Diarrhea
- Sleep problems
- Fever
- Dizziness on standing (lightheadedness)
- Rash
- Mood changes
- Change in sense of smell or taste
- Changes in menstrual period cycle

Dr. Nasia Safdar, medical director of infection control at the University of Wisconsin, says that the key to discerning long COVID is to pay attention to new symptoms that develop or ones that never go away, after about 30 days post-infection. "The most common ones that we're seeing are those that are dealing with what's called higher executive functions," Safdar said. "Concentration, memory, being able to do your job the way you could before. Those kinds of symptoms are hard for people to describe, but they've clearly noticed a change from the way they were before."

As of July of 2021, long COVID has been classified a disability under the federal Americans with Disability Act.

At the end of 2021, fatigue and persistent brain fog were still among the most common symptoms of COVID-19: A study in the journal Brain, Behavior, and Immunity found that as many as one in three people were fatigued 12 weeks or more after a COVID-19 diagnosis, and one in five had cognitive impairment. One set of symptoms of COVID-19 that affected many people sick from earlier variants is the loss of their sense of taste and/or smell. For some, ageusia (loss of taste) and anosmia (loss of smell) don't just affect how they enjoy their food or a favorite scent but can meddle with their memories and mental health. Other viruses have caused loss of smell prior to the coronavirus pandemic, but the sheer number of people affected by it because of COVID-19 is a bit of a phenomenon. According to the Mayo Clinic, the reasons for loss of smell and taste aren't entirely understood, but it's likely due to damage to the cells that support olfactory neurons.

There are also symptoms associated with long COVID that are more dangerous, even life-threatening: One study published in the Journal of American Nephrology in September found that kidney damage or disease might be a long-term effect of COVID-19. Damage to other organs including the brain, heart and lungs -- as well as blood clots or blood vessel problems and multisystem inflammatory syndrome -- are also more severe symptoms of long COVID, according to the Mayo Clinic.

A January report by the CDC found that kids under 18 who had COVID-19 more than 30 days prior were more likely to be diagnosed with diabetes compared to kids who didn't have COVID-19. The report is consistent with previous research "demonstrating an association between SARS-CoV-2 infection and diabetes in adults," the CDC said.

A peer-reviewed journal from the British Medical Association, found that people who test positive for COVID-19 were also more likely to report new mental health issues, including anxiety and depression. Researchers looked at data from the US Veteran Affairs national health care database, comparing those who tested positive for COVID-19 between March 2020 and January 2021 to those who didn't. While the risk was highest for those who needed to be hospitalized, even people with milder cases were at increased risk of psychological and cognitive problems -- including sleep disorders and cognitive decline.

Getting hospitalized with any illness may negatively impact someone's mental health. But the authors of the study noted that people hospitalized with COVID-19 had a higher risk of mental health disorders than those being treated for other illnesses.

Exactly how many people develop long COVID -- referred to scientifically as post-acute sequelae of COVID-19, or PASC -- is still a lingering question, with different experts coming to diverse conclusions. Some researchers have put the figure at 10% to 30% while other studies say close to one-half of COVID survivors have lingering symptoms six months after their initial infection. The large number of COVID-19 infections caused by the omicron variant will mean more research into how many people will go on to develop long COVID: As the New York Times reported, omicron's decreased severity compared to delta doesn't necessarily mean a decreased risk for long-term symptoms.

More than 415 million cases of COVID-19 have been reported worldwide, according to Johns Hopkins University, though many believe that's an undercount. Of people who've been sick, a significant portion has yet to feel like their old selves. More research is needed to understand why long COVID manifests, and organizations including the National Institutes for Health have launched efforts to try to understand more about the syndrome.

COVID Symptom Study group identified six clusters of symptoms. They are:

- “Flu-like” with no fever—headache, loss of smell, muscle pains, cough, sore throat, chest pain, no fever
- “Flu-like” with fever—headache, loss of smell, cough, sore throat, hoarseness, fever, loss of appetite
- Gastrointestinal—headache, loss of smell, loss of appetite, diarrhea, sore throat, chest pain, no cough
- Severe level one, fatigue—headache, loss of smell, cough, fever, hoarseness, chest pain, fatigue
- Severe level two, confusion—headache, loss of smell, loss of appetite, cough, fever, hoarseness, sore throat, chest pain, fatigue, confusion, muscle pain
- Severe level three, abdominal and respiratory—headache, loss of smell, loss of appetite, cough, fever, hoarseness, sore throat, chest pain, fatigue, confusion, muscle pain, shortness of breath, diarrhea, abdominal pain

Recovery from mild SARS-CoV-2 infection commonly occurs within 7–10 days after the onset of symptoms in mild disease; it could take 3–6 weeks in severe/critical illness. However, continued follow up of patients who recovered from COVID-19 showed that one or more symptoms persist in a substantial percentage of people, even weeks or months after COVID-19.

Because of the huge number of people living with post-COVID symptoms, we can expect research into its origins to continue for years to come. Certain demographics appear to be at higher risk: A report from the CDC found Black people, women, people age 40 and up and those living with a preexisting medical condition were all more likely to be COVID long-haulers.

Type 2 diabetes, in particular, appears to be a major risk factor for long COVID, according to research in. Other research has also pointed to lower levels of some antibodies in people who develop long COVID.

Another theory on what causes the syndrome involves microscopic blood clots: South African scientist Resia Pretorius found inflammatory molecules trapped in these microclots, which prevented cells from getting enough oxygen to perform bodily functions.

It's also possible, or even likely, that long COVID isn't caused by just one thing.
The inflammation COVID-19 causes in the body can have a myriad of effects, as can each individual damaged organ from the illness. There has also been some evidence to suggest the virus can hide in the body, as seen in the immune system's T-cell activity.

Medications to Treat severe Covid to avoid hospitalization

There are currently two FDA-authorized monoclonal antibody treatments that may be used to treat non-hospitalized adults and children over age 12 with mild to moderate symptoms who have recently tested positive for COVID-19, and who are at risk for developing severe COVID-19 or being hospitalized for it. These therapies must be given intravenously (by IV) soon after developing symptoms.

The monoclonal antibody treatments that have FDA authorization are: sotrovimab, made by GlaxoSmithKline, and bebtelovimab, made by Eli Lilly. Both appear to be effective against the Omicron variant; in laboratory tests, bebtelovimab was also effective against the BA.2 omicron subvariant.

In addition, the FDA has authorized the oral antiviral medications Paxlovid and molnupiravir, which have been shown to lower the risk of hospitalization and death in people who are at increased risk of severe COVID-19 illness

Paxlovid

On December 22, 2021, the FDA authorized an oral antiviral pill, called Paxlovid, for the treatment of mild-to-moderate COVID-19 in people ages 12 and older who are at increased risk for severe illness. The treatment is available by prescription only, after a positive COVID-19 test and within five days of symptom onset. The FDA's authorization was based on study results released by Pfizer, the drug's manufacturer, showing that Paxlovid significantly reduces the risk of COVID-related hospitalization and death compared to a placebo.

The phase 2/3 study, known as EPIC-HR, was randomized, double-blind, and placebo controlled. Study participants had symptomatic, confirmed, early COVID-19, were at increased risk for severe illness due to age or an underlying medical condition, and were not hospitalized. The 2,246 study participants took either a placebo or Paxlovid treatment (three tablets twice a day for five days), beginning treatment within five days of symptom onset.

By 28 days after treatment, those who had taken Paxlovid within five days of the start of symptoms had an 88% reduced risk of COVID-related hospitalization or death compared to placebo. Side effects of Paxlovid and placebo were comparable, and generally mild. They included impaired sense of taste, diarrhea, high blood pressure, and muscle aches.

Paxlovid is a protease inhibitor antiviral therapy made up of a medicine called nirmatrelvir and the HIV drug ritonavir. Nirmatrelvir was developed by Pfizer; it interferes with the ability of the coronavirus to replicate. Ritonavir slows the breakdown of nirmatrelvir, which translates to higher blood levels of nirmatrelvir and greater antiviral action for longer periods of time. Laboratory study results, also announced in a Pfizer press release, suggest that Paxlovid is effective against the Omicron variant.

Paxlovid is not authorized to prevent infection, to prevent illness after exposure (prior to diagnosis), or to treat someone hospitalized with severe COVID-19. Antiviral medication is also not a substitute for getting vaccinated. The COVID vaccine, including boosters, remains more important than ever. We need layers of defense against this viral threat.

Molnupiravir

On December 23, 2021, the FDA authorized molnupiravir, an oral antiviral treatment manufactured by Merck, for the treatment of mild to moderate COVID-19 in people ages 18 years and older who are at increased risk for severe illness. The treatment is available by prescription only, after a positive COVID-19 test and within five days of symptom onset. However, the FDA indicated that use of molnupiravir should be limited to situations in which other COVID-19 treatments "are not accessible or clinically appropriate."

In November, Merck released study results showing that compared to placebo, molnupiravir reduced the risk of hospitalization and death by 30% in people with mild or moderate COVID-19 who were at high risk for severe COVID.

The study results were based on data from 1,433 study participants from the US and around the world. To be eligible for the randomized, placebo-controlled, double-blind study, the participants had to have been diagnosed with mild to moderate COVID-19, have started experiencing symptoms no more than five days prior to their enrollment in the study, and have at least one risk factor that put them at increased risk for a poor outcome from COVID-19. None of the participants were hospitalized at the time they entered the study. About half of the study participants took the antiviral drug molnupiravir: four capsules, twice a day, for five days, by mouth. The remaining study participants took a placebo.

Patients taking molnupiravir were 30% less likely to be hospitalized or die from COVID-19 than those taking a placebo. Over the 29-day study period, 48 out of 709 (6.8%) of participants who took molnupiravir were hospitalized, and one person in this group died. In the placebo group, 68 out of 699 (9.7%) of participants were hospitalized, including nine participants in this group who died. The antiviral drug was effective against several COVID variants, including the Delta variant. Scientists are looking into the effectiveness of molnupiravir against the Omicron variant.

Side effects of molnupiravir include diarrhea, nausea, and dizziness. The drug is not recommended for use during pregnancy. Molnupiravir was developed by Merck and Ridgeback Biotherapeutics. It works by interfering with the COVID virus's ability to replicate.

What are monoclonal antibodies? Can they help treat COVID-19?

Monoclonal antibodies are manmade versions of the antibodies that our bodies naturally make to fight invaders, such as the SARS-CoV-2 virus. There are currently two monoclonal antibody treatments that have been granted emergency use authorization (EUA) by the FDA to treat COVID-19.

The FDA (Federal Drug Administration)-authorized monoclonal antibody treatments are sotrovimab, made by GlaxoSmithKline, and bebtelovimab, made by Eli Lilly. Both may be used to treat non-hospitalized adults and children over age 12 with mild to moderate symptoms who have recently tested positive for COVID-19, and who are at risk for developing severe COVID-19 or being hospitalized for it. EUA for bebtelovimab, which was authorized more recently in February 2022, states that the treatment should be given when "alternative COVID-19 treatment options approved or authorized by the FDA are not accessible or clinically appropriate." The therapies must be given intravenously (by IV) soon after developing symptoms.

Both sotrovimab and bebtelovimab appear to be effective against the Omicron variant, which was responsible for more than 99% of COVID-19 cases in the US in mid-February. In laboratory tests, bebtelovimab was also effective against the BA.2 omicron subvariant.

A different monoclonal antibody treatment may help to save lives in a specific subgroup of hospitalized COVID-19 patients. Some COVID patients get sicker because of an overreaction of the body's immune response (a cytokine storm) to the viral infection. When this happens, the body overproduces interleukin-6 (IL-6) — a protein involved in inflammation — in lung cells. For these very ill hospitalized patients, the FDA has granted EUA for tocilizumab (Actemra), a monoclonal antibody that blocks the action of IL-6, and thereby dampens the exaggerated immune system response.

What is convalescent plasma? Does it help people with COVID-19?

When people recover from COVID-19, their blood contains antibodies that their bodies produced to fight the coronavirus and help them get well. Antibodies are found in plasma, a component of blood.

In August 2020, the FDA issued an emergency use authorization (EUA) for convalescent plasma in patients hospitalized with COVID-19. However, clinical evidence that this treatment is effective has been limited. As a result, the FDA narrowed its authorization in February 2021. Convalescent plasma is now authorized only for people who are immunocompromised, either because of a medical condition or

Myths

As hard as it may be to believe, there was and still is much misinformation being passed off as fact. The confusion it has caused is hard to measure, but it has fueled fear and mistrust to the point of severely restricting the number of people who would have benefited from the Covid vaccine. This includes racial and culture mistrust, as well as a strong push among parents who refuse to allow their children to be vaccinated.

Adding pepper to your meals will prevent or cure COVID-19

Hot peppers in your food, though very tasty, cannot prevent or cure COVID-19. The best way to protect yourself against the new coronavirus is to keep at least one yard away from others and to wash your hands frequently and thoroughly. It is also beneficial for your general health to maintain a balanced diet, stay well hydrated, exercise regularly and sleep well.

COVID-19 is transmitted through houseflies

To date, there is no evidence or information to suggest that the COVID-19 virus transmitted through houseflies. The virus that causes COVID-19 spreads primarily through droplets generated when an infected person coughs, sneezes or speaks. You can also become infected by touching a contaminated surface and then touching your eyes, nose or mouth before washing your hands. To protect yourself, keep at least a one yard distance from others and disinfect frequently-touched surfaces. Clean your hands thoroughly and often and avoid touching your eyes, mouth and nose.

Spraying and introducing bleach or another disinfectant into your body will protect you against COVID-19

Do not under any circumstance spray or introduce bleach or any other disinfectant into your body. These substances can be poisonous if ingested and cause irritation and damage to your skin and eyes.

Bleach and disinfectant should be used carefully to disinfect surfaces only. Remember to keep chlorine (bleach) and other disinfectants out of reach of children.

Water or swimming can transmit the COVID-19 virus

The COVID-19 virus does not transmit through water while swimming. However, the virus spreads between people when someone has close contact with an infected person.

Shoes can spread COVID-19

The likelihood of COVID-19 being spread on shoes and infecting individuals is very low. As a precautionary measure, particularly in homes where infants and small children crawl or play on floors, consider leaving your shoes at the entrance of your home. This will help prevent contact with dirt or any waste that could be carried on the soles of shoes.

Vitamin and mineral supplements can cure COVID-19

Micronutrients, such as vitamins D and C and zinc, are critical for a well-functioning immune system and play a vital role in promoting health and nutritional well-being. There is currently no guidance on the use of micronutrient supplements as a treatment of COVID-19.

Catching COVID-19 means you will have it for life

Most of the people who catch COVID-19 can recover and eliminate the virus from their bodies. If you catch the disease, make sure you treat your symptoms. If you have cough, fever, and difficulty breathing, seek medical care early – but call your health facility by telephone first. Most patients recover thanks to supportive care.

Being able to hold your breath for 10 seconds or more without coughing or feeling discomfort means you are free from COVID-19

The most common symptoms of COVID-19 are dry cough, tiredness and fever. Some people may develop more severe forms of the disease, such as pneumonia. The best way to confirm if you have the virus producing COVID-19 disease is with a laboratory test. You cannot confirm it with this breathing exercise, which can even be dangerous.

Cold weather and snow can kill the COVID-19 virus

There is no reason to believe that cold weather can kill the new coronavirus or other diseases. The normal human body temperature remains around 36.5°C to 37°C, regardless of the external temperature or weather. The most effective way to protect yourself against the new coronavirus is by frequently cleaning your hands with alcohol-based hand rub or washing them with soap and water.

The COVID-19 virus be can be spread through mosquito bites

To date there has been no information nor evidence to suggest that the new coronavirus could be transmitted by mosquitoes. The new coronavirus is a respiratory virus which spreads primarily through droplets generated when an infected person coughs or sneezes, or through droplets of saliva or discharge from the nose. To protect yourself, clean your hands frequently with an alcohol-based hand rub or wash them with soap and water. Also, avoid close contact with anyone who is coughing and sneezing.

Ultra-violet (UV) lamps should be used to disinfect hands or other areas of your skin

UV radiation can cause skin irritation and damage your eyes. Cleaning your hands with alcohol-based hand rub or washing your hands with soap and water are the most effective ways to remove the virus.

Eating garlic prevents COVID-19

Garlic is a healthy food that may have some antimicrobial properties. However, there is no evidence from the current outbreak that eating garlic has protected people from the new coronavirus.

Far reaching impact of Covid

The COVID-19 global lockdown was initiated to stem the spread of the virus and to flatten the curve of the pandemic. However, the impact of the lockdown has had far-reaching effects in different strata of life, including; changes in the accessibility and structure of education delivery to students, food insecurity as a result of unavailability and fluctuation in prices, the depression of the global economy, increase in mental health challenges, wellbeing and quality of life amongst others.

Millions of enterprises face an existential threat. Nearly half of the world's 3.3 billion global workforce are at risk of losing their livelihoods. Informal economy workers are particularly vulnerable because the majority lack social protection and access to quality health care and have lost access to productive assets. Without the means to earn an income during lockdowns, many are unable to feed themselves and their families. For most, no income means no food, or, at best, less food and less nutritious food.

The pandemic has been affecting the entire food system and has laid bare its fragility. Border closures, trade restrictions and confinement measures have been preventing farmers from accessing markets, including for buying inputs and selling their produce, and agricultural workers from harvesting crops, thus disrupting domestic and international food supply chains and reducing access to healthy, safe and diverse diets. The pandemic has decimated jobs and placed millions of livelihoods at risk. As breadwinners lose jobs, fall ill and die, the food security and nutrition of millions of women and men are under threat, with those in low-income countries, particularly the most marginalized populations, which include small-scale farmers and indigenous peoples, being hardest hit.

Reduced supply chain:

The COVID-19 pandemic has had far-reaching economic consequences beyond the spread of the disease itself and efforts to quarantine it. As the SARS-CoV-2 virus has spread around the globe, concerns have shifted from supply-side manufacturing issues to decreased business in the services sector. The pandemic caused the 2nd largest global recession in history, with more than a third of the global population at the time being placed on lockdown. During the earlier stage of the pandemic, supply shortages were expected to affect a number of sectors due to panic buying, increased usage of goods to fight the pandemic, and disruption to factories and logistics in mainland China. There have been instances of price gouging.

There have been widespread reports of shortages of pharmaceuticals, with many areas seeing panic buying and consequent shortages of food and other essential grocery items. The technology industry, in particular, has been warning about delays to shipments of electronic goods.

The impact of the pandemic on world gross domestic product growth is massive. The COVID-19 global recession is the deepest since the end of World War II. The global economy shrunk by 3.5 percent in 2020 according to the April 2021 World Economic Outlook Report. While virtually every country was affected, the downturn was more pronounced in the poorest parts of the world.

The COVID-19 pandemic has changed the business environment for many organizations around the globe, and has highlighted the importance of being able to react, adapt and set up crisis management mechanisms in order to weather situations of uncertainty. As the acute restrictions and lockdowns created many urgent situations that required immediate attention in the early days of the pandemic, many companies have now begun to move to a "recovery mode" and have started planning for the longer term. As companies seek to strengthen operations and business resilience, the importance of supply chain resilience and risk management is more apparent than ever.

The list of areas severely impacted by Covid boggles the mind.

- Travel restrictions and reduced demand resulted in far fewer planes flying, resulting in massive layoffs and in some instances, bankruptcy
- Mandated closure of restaurants caused a massive ripple effect, harming areas of food production, liquor, beer, and wine production, food and beverage shipping, fishing and farming.
- The pandemic has strongly impacted the journalism industry and affected journalists' work. Due to losses in advertising, many journalists were laid off and some publications have folded.
- Retailers and shopping centers were forced to shut down for months, losing money, employees, and often having to close their businesses. On the flip side, online retailers benefited from a major increase in sales as everyone scrambled to find alternative ways to shop and still stay safe.
- Travel restrictions and a huge slump in the number of travelers has massively reduced income in the travel industry.
- Cinemas and movie theaters closed, festivals were canceled, and film releases moved to future dates due to long restrictions on everyone’s choices. Globally, box offices have lost billions. The flip side has a large increase in streaming and in home entertainment.
- Education has been hit hard. Students and teachers scrambled to find new ways to educate and learn. Children were isolated and at the mercy of family support in order to have access to computers and quiet time in order to attend school. Children who had been fed two meals a day at school suffered. Parents who had to juggle a job and caring for children now at home had to make hard choices. The stress resulted in a large range of mental health problems. The results will continue to unfold for years to come.
- The list goes on to include sports programs, television, theater, fashion, and basically every aspect of life as we once knew it.

Recommendations for the future

The story of COVID-19 emergence sends a powerful message. A quantum leap in bat coronavirus surveillance and research is urgently needed. This work must emphasize virologic and behavioral field studies of humans and animals wherever they interface, and especially in disease hotspots, as well as virologic studies related to human and animal spillover risks and the means of reducing them

The Council of Foreign relations created a task force to study our response to the pandemic, and make recommendations for the future. The Task Force finds that pandemics are inevitable, possibly imminent, and likely to be devastating to U.S. health, economic, and strategic interests. World leaders have called the coronavirus pandemic a "once-in-100 year" crisis, but there is no reason to expect that to be true. Pathogens frequently emerge; some jump from animal to human and spread swiftly. Those outbreaks can evolve into epidemics, one of which could explode into a pandemic that spreads worldwide and last months or years. As harmful as this coronavirus has been, a novel influenza could be even worse, transmitting even more easily, killing millions more people, and destabilizing governments and economies alike.

The coronavirus pandemic is a vivid and painful example of the devastation that emerging pathogens can cause to lives and livelihoods worldwide. The global response has exposed the inherent weaknesses and inequalities in pandemic preparedness and response; it should be a transformative moment. The painful lessons learned should make governments wise enough to avoid such costly mistakes and instead take preemptive steps to advance pandemic preparedness in the United States and abroad.

The Task Force calls on the United States to elevate pandemic preparedness to a core national economic and security objective and organize and invest accordingly, revitalize the beleaguered CDC, and clarify federal and state authorities and roles for pandemic response.

Pandemic diseases pose grave and growing risks to Americans that match or exceed those presented by transnational terrorism. The executive branch should acknowledge this reality by elevating the threat of new and reemerging infectious disease in the National Security Strategy mandated by Congress, as well as in the strategic plans of the Departments of State, Homeland Security, Health and Human Services, Defense, and the U.S. Agency for International Development.

The president should designate a focal point within the White House for global health security, including pandemic preparedness and response. This office would have lead responsibility for coordinating the multiple federal departments and agencies in anticipating, preventing, and responding quickly to major disease outbreaks, as well as for liaising with states and municipalities.

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Examination

1. When a virus enters a human cell for the first time, it has very recently been transmitted from cells of some other host, that is, from another animal or an insect vector. This process of transfer from a vertebrate or an insect has been referred to as _____.

   A. mutation
   B. endonuclease enzyme
   C. host-switching, sometimes described as a spillover event.
   D. mutant KRAS

2. A virus' incubation period does not impact how long symptoms and contagiousness last. What does affect these two factors is vaccination status, age, and pre-existing health conditions.

A. True
B. False

3. Viruses constantly change through mutation and sometimes these mutations result in a new variant of the virus. Some variants emerge and disappear while others persist.

A. True
B. False

4. The first well-documented pandemic was the _____, which occurred between 1889 and 1893.

A. Plague
B. Russian flu
C. Cholera
D. Hong Kong flu

5. As of July 2021, Long COVID has been classified a disability under the federal Americans with Disability Act.

A. True
B. False

6. An incubation period is _____.

A. The length of time a person is sick once symptoms appear.
B. The length of time between when a person becomes infected and when they experience symptoms.
C. The time between one vaccine and the next
D. The time between starting a medication and beginning to see its effects.

7. Paxlovid is a medication for the treatment of

A. Severe Covid symptoms once a patient is hospitalized
B. A possible infection with or without symptoms
C. Long covid to be taken on a long term basis
D. Mild-to-moderate COVID-19 in people ages 12 and older who are at increased risk for severe illness

8. Treatment for Covid symptoms may include:

A. Tylenol only as Motrin is contraindicated.
B. Steriods, along with Tylenol, is proven for a quicker recovery.
C. Motrin only, no Tylenol or Aspirin
D. Tylenol or Motrin are both acceptable (unless contraindicated for that patient)

9. Given the small size of bioaerosol droplets (diameter less than the width of a human hair), they can remain suspended in the air for prolonged periods of time. It is imperative that we cover our mouths with our forearms or elbows.

A. True
B. False

10. Choose the false statement below. The components of immunity protection include:

A. Antibodies are proteins that circulate in the blood and recognize foreign substances like viruses and neutralize them.
B. Helper T cells help to recognize pathogens.
C. Killer T cells kill pathogens.
D. Cells make new antibodies when the body needs them.

11. In order to understand Covid and all viruses, it's important to know that they are nonliving self-contained genetic programs capable of redirecting a cell's machinery to produce more of themselves.

A. True
B. False

12. It has been well established that theories about a hypothetical man-made origin of SARS-CoV-2 have been thoroughly discredited by multiple coronavirus experts

A. True
B. False

13. In 2009 the Swine flu appeared, and it was transmitted from:

A. Horses
B. Pigs
C. Chickens
D. Deer

14. Select the factor that does not increase the risk of severe COVID-19 symptoms.

A. Older age
B. Lung problems, including Asthma
C. High blood pressure under control with medications
D. Diabetes

15. The time of onset and the pathogen that will cause the next pandemic are unpredictable. Therefore, pandemic preparedness plans should be shelved until we know what the next threat is.
A. True
B. False

16. Delta and Omicron are examples of:

A. Available vaccines
B. Covid variants
C. Orthopox virus
D. Entero virus

17. A definite diagnosis of Covid-19 can be made with:

A. A physical exam and health history
B. A Laboratory test
C. Proof of exposure to a Covid positive person
D. Shortness of breath and inability to speak

18. Which statement about antibody testing is not true?

A. Home testing is available for antibody testing
B. An antibody test can show if you were previously exposed to or infected with the virus that causes COVID-19, and if your body has created antibodies in an attempt to defend itself.
C. It takes at least 12 days after exposure for your body to make enough antibodies to show up on a test.
D. This is a blood test that must be ordered by a physician.

19. Choose the poorest reason for testing in regard to the following statement: Testing certain asymptomatic individuals may be important for public health or infection control purposes. Some indications for testing asymptomatic individuals include:

A. Prior to surgical procedures or aerosol-generating procedures.
B. Prior to receiving immunosuppressive therapy (including prior to transplantation)
C. Early identification of infection in congregate living facilities that house individuals at risk for severe disease (eg, long-term care facilities, correctional and detention facilities, homeless shelters).
D. Anyone who requests testing

20. Choose the statement which is not true, based on researchers at the University of Bristol who assessed the airborne survival of bacteria in aerosol droplets from coughs and sneezes

A. Talking propels droplets across longer spaces than coughing
B. The average sneeze or cough can send around 100,000 contagious germs into the air at speeds up to 100 miles per hour.
C. A cough can spread viruses, such as influenza, respiratory syncytial virus (RSV) and adenoviruses, and Covid-19.
D. A cough can also carry bacteria, such as *Streptococcus pneumoniae* or *Haemophilus influenzae*.

21. Advice for those with mild Covid includes all the following except:

A. Let your doctor know that you have Covid-19. Some people may be candidates for oral antiviral treatment or intravenous monoclonal antibody therapy, both of which can reduce the risk of hospitalization and death.
B. To reduce fever and ease aches and pains, take acetaminophen or ibuprofen. Be sure to follow directions. If you are taking any combination cold or flu medicine, keep track of all the ingredients and the doses.
C. Stay in bed—you need to rest
D. Stay well hydrated

22. Which of the following ingredients are found in the Pfizer-BioTech COVID-19 vaccine.

A. Preservatives and antibiotics
B. Tissues like fetal cells, gelatin, or any materials from any animal.
C. Food proteins like eggs or egg products, gluten, peanuts, tree nuts, nut products, or any nut byproducts
D. Sugar and acid stabilizers

23. In the Journal for Nurse Practitioners, researchers at the University of California provided anecdotal evidence that over-the-counter antihistamines may help relieve the debilitating symptoms of long COVID for some people.

A. True
B. False

24. The COVID-19 global lockdown was initiated to stem the spread of the virus and flatten the curve of the pandemic. However, the impact of the lockdown has had far-reaching effects in different strata of life, including; changes in the accessibility and structure of education delivery to students, food insecurity as a result of unavailability and fluctuation in prices, the depression of the global economy, increase in mental health challenges, wellbeing and quality of life amongst others.

A. True
B. False

25. Once a person has the Covid infection, they are immune to further infections and don't have to worry about Covid vaccinations.

A. True
B. False