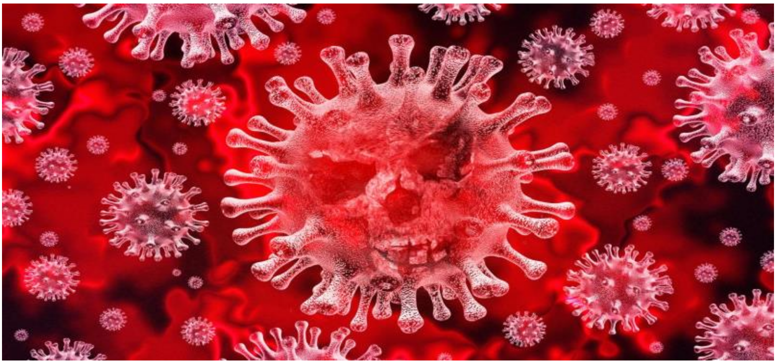
Guide to Survival of the CORONAVIRUS in America



ANTI-VIRUS TOOLS AND TECHNIQUES

By
Tomthunkit

Guide To Survival of the CORONAVIRUS In America

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Dedication

This is dedicated to:

MY ROCK, MY COMPASS, MY STAR JEAN,

WHEREVER YOU ARE.

Table Of Contents

WHY I WROTE THIS BOOK	1
THE ORIGIN OF THE CORONAVIRUS	4
THE HUMAN BODY AND ITS GRAND DESIGN	7
WHAT IS THE CORONAVIRUS?	20
HOW DOES THE NOVEL CORONAVIRUS KILL?	28
INCUBATION PERIOD	35
INCUBATION & LATENCY OF THE CORONAVIRUS	43
SIGNS, DIAGNOSIS, TREATMENT, CURE & VACCINE	49
METHODS OF TRANSMISSION	67
A MESSAGE FROM THE CDC	80
CORONAVIRUS’ TRANSMISSION METHODS	84

HVAC SYSTEMS AND AIRBORNE DISEASES 92

PART II: ANTI-VIRUS TOOLS AND TECHNIQUES 115

MAKING A HOMEMADE PPE 148

DONNING AND DOFFING A PPE 159

MAKE A CONTAGION KIT 165

ENVIRONMENTAL CLEANING FOR COVID19 167

PETS AND THE CORONAVIRUS 174

PART III: HISTORICAL CONTEXT OF THE CORONAVIRUS177

THE SPANISH FLU 197

HOW BAD CAN THIS CORONAVIRUS GET? 201

THE DANGERS OF THE DUALITY OF COVID19 204

Why I Write This Book

I am not a medical professional, a doctor, nor do I have a degree in any of the related fields. I am, however, a concerned citizen with foresight and the ability to curate complicated scientific information and express it in an easily digestible form to the general public.

My sources of this knowledge and information include, but is not limited to the following: the Centers for Disease Control and Prevention (CDC,) the National Institutes of Health Sciences (NIH,) Professional Nurse Training Guidelines, Chinese Government Officials and Medical Professionals, Epidemic Experts, Infectious Disease Doctors, and historical medical reports on viruses among others.

I am writing this book to **save lives and prevent mass hysteria, widespread panic, and chaos.** Without proper planning and preparation, pandamonium may become the rule rather than the exception. This book is based on hypotheticals yet it doesn’t cover (nor is it intended to cover) every possible calamity or situation.

This book begins with personal procedures in which regular citizens should take to avoid the Coronavirus aka COVID19. Then it progresses to suggestions and procedures for essential workers and personnel. The third part of the book is aimed at Government Leaders. There are many drastic measures outlined in this part. Hopefully, we won’t have to resort to such extreme changes to our government and way of life. Yet, if necessary our government must do what is required to protect us and limit the loss of life regardless of the financial costs or political repercussions.

I wrote this book focusing on America because if we fail to effectively combat this Novel Coronavirus and limit the negative repercussions it will not only be detrimental to us but to the world at large. Due to Globalization, our economies are intertwined, inter-connected, and inter-related to each other. If America goes down, so goes the world.

This book is based on facts over fallacies. And truth and logic over propaganda.

The Origin of The Coronavirus

As many of you know correlation does not mean causation. Just because the Coronavirus originated in China doesn't mean they caused it. In other words, China is where it originated but not its origin. To find out why it was created and who created it, you can find those answers in my preceding book, "**Tomthunkit's Theory Of The Universe.**"

Let's examine this logically. Throughout recent decades, doctors, scientists, and infectious disease experts have blamed these deadly viruses on animals. Most notorious of all is the AIDS epidemic. It was blamed on Monkeys in Africa.

Let's explore that. If Monkeys were the cause of the disease, why didn't the disease wipeout millions of monkeys? Surely, such a deadly disease would've wiped out its original host, right? Monkeys didn't start using condoms, nor did they start practicing safe sex.

The recent Novel Coronavirus has been blamed first on Pangolins, then Bats or other animals from the live markets in Wuhan, China. Again, there has not been definite proof yet reported that this is true. Nor have we seen a voluminous animal kill. Bats and Pangolins seem to be doing just fine.

Through deductive reasoning, it's safe to conclude that the Coronavirus and similar other viruses were designed in a lab. They were designed specifically to attack and kill humans, not animals.

There have been reports that this Novel Coronavirus originated in a Chinese Bio-weapons lab, hundreds of feet from the Wuhan live animal market. This is possible but highly improbable. Here's why. China has been around for over 5000 years. Why would they all of a sudden create a virus, release it amongst their own population by accident or with intent, destroy own their economy, become a pariah nation, get ostracized by the international community, quarantine 760 million people, shut down agriculture and food production to feed 1.4 billion people, weld people inside their homes (tombs) to prevent the spread of the virus, and since they are now responsible for 19% of global GDP, why would they destroy the world's economy as well?

I will summarize by admitting that there does exist a correlation with the Coronavirus and China because of the simple fact that, that's where the first cases were discovered. But this doesn't mean they caused it. It's more likely that the Coronavirus was designed in a lab to attack and kill humans, then it was introduced to animals first as transmission vehicles because of the ease of access to these mostly nocturnal animals and the ability to infect them surreptitiously.

The Human Body and Its Grand Design

Human Body Natural Defenses Against Viruses

All living things are subject to constant attacks from disease-causing agents. Subsequently, all animals have innate immune defenses against common pathogens. These first lines of defense include outer barriers like the skin and mucous membranes. Mucus membranes are found in the eyes, eyes, inside the nose, inside the mouth, lips, vaginal opening, urethral opening and anus. When pathogens breach the outer barriers, for example through a cut in the skin or when inhaled into the lungs, they can cause serious harm.

Multicellular animals have dedicated cells or tissues to deal with the threat of infection. Some of these responses happen immediately so that an infecting agent can be quickly contained. Other responses are slower but are more tailored to the infecting agent. Collectively, these protections are known as the immune system. The human immune system is essential for our survival in a world full of potentially dangerous microbes, and serious impairment of even one arm of this system can predispose to severe, even life-threatening, infections.

Natural Lines of Defense

The body has three lines of defense against pathogens. In the first line of defense, the body has barriers that prevent pathogens from entering your body's cells in the first place. These barriers act to trap and kill most pathogens and include the surfaces of the skin, breathing passages, mouth, eye and stomach chemicals and others.

The skin forms a physical and chemical barrier against pathogens. Mucus and cilia (which are found in the lungs, respiratory tract and middle ear) are in your breathing passages. The breathing passages are lined with hair-like projections called cilia that move microbes and debris up and out of the airways, trap and remove most pathogens. A sneeze or a cough can also remove any pathogen stuck in the passageways. Most pathogens that you swallow are destroyed by chemicals in your saliva or by stomach acid.

Defenses Against Infection.

Natural barriers and the immune system defend the body against organisms that can cause infection. Natural barriers include the skin, mucous membranes, tears, earwax, mucus, and stomach acid.

The main job of the innate immune system is to fight harmful substances and germs that enter the body, for instance through the skin or digestive system. The adaptive (specific) immune system makes antibodies and uses them to specifically fight certain germs that the body has previously come into contact with.

Innate immunity refers to nonspecific defense mechanisms that come into play immediately or within hours of an antigen's appearance in the body. These mechanisms include physical barriers such as skin, chemicals in the blood, and immune system cells that attack foreign cells in the body.

The Immune System

The **immune system** is a silent wonder. While we are very aware of our heart beating and the breaths we take, we are much less aware of the immune system that protects us from thousands of potentially deadly attacks every day. The immune system we each posses works around the clock, protecting us from disease and death.

A good way to start understanding the immune system is to liken it to a castle. A castle, like our bodies, is a fortress. A castle has three lines of defense:

First, A **moat and drawbridge**. The first line of defense in our bodies are physical and chemical barriers - our skin, stomach acids, mucus, our tears, vaginal opening, of which the last three mostly produce lysozyme to destroy harmful incoming pathogens.

Second, **Sentries and archers** who stand on the castle wall. In our bodies, the second line of defense is non-specific immune responses - macrophages, neutrophils, interferons, and complement proteins. This line of defense also includes fever and inflammatory response as nonspecific defenses.

Third, **Soldiers within the castle**. Our third line of defense is specific immune responses - T Cells and B Cells. There are many types of each that work as a close-knit team to destroy pathogens.

If pathogens (invaders) try and succeed in penetrating the first line of defense, then the second line of defense is ready to act. If both the first and second lines of defense fail, then the third line of defense will act. It is when all three lines of defense are breached that we get sick and are subject to disease.

So what we are trying to say is that the immune system is a set of mechanisms of defense, protecting an organism from infection by identifying and attacking pathogens. This is a difficult task since pathogens range from viruses to parasitic worms and must be detected with absolute specificity as they are "hidden" amongst normal cells and tissues. Pathogens are also constantly changing themselves to avoid detection and successfully infect and destroy their hosts.

Some people are particularly vulnerable to viruses, especially the Coronavirus. This includes people with a weakened or impaired immune system like those with high blood pressure, diabetes, cancers, HIV, as well as people with poor physical health, the elderly, children and babies. This may be a crucial determining factor in the rate of survival. This doesn't mean guaranteed mortality, but it definitely makes the battle that much harder to win.

The disease can occur when immunity is low or impaired, when virulence of the pathogen (its ability to damage host cells) is high, and when the number of pathogens in the body is great.

Harmful Invaders

When the body is invaded by bacteria, a virus or parasites, an immune alarm goes off, setting off a chain reaction of cellular activity in the immune system. Macrophages or other innate immune cells may be deployed to help attack the invading pathogen. Those cells often do the job, and the invader is destroyed. But sometimes, when the body needs a more sophisticated attack, it turns to its T-cells and B-cells. These cells are the special ops of the immune system — the third line of defense.

The immune system is made up of two armies of cells: innate and acquired. Innate immune cells are the body's first line of defense. They quickly respond to foreign cells to fight infection, battle a virus or defend the body against bacteria. Our acquired immunity—also called adaptive immunity—uses T-cells and B-cells when invading organisms slip through that first line.

T Cells

Some white blood cells (phagocytes) fight pathogens that make it past outer defenses. A phagocyte surrounds a pathogen, takes it in, and neutralizes it. There are two main types of T-cells: helper T-cells and killer T-cells. Helper T-cells stimulate B-cells to make antibodies and help killer cells develop. Killer T-cells directly kill cells that have already been infected by a foreign invader.

Two types of white blood cells called **lymphocytes** are vital to the specific immune response. Lymphocytes are produced in the bone marrow and mature into one of several subtypes. The two most common are **T cells and B cells**.

A useful way to think of T cells and B cells is as follows: B cells have one essential property. They can mature and differentiate into plasma cells that produce a protein called an antibody. This protein is specifically targeted to a particular antigen. However, B cells alone are not very good at making an antibody and rely on T cells to provide a signal that they should begin the process of maturation.

T cells are activated when a particular phagocyte known as an antigen-presenting cell (APC) displays the antigen to which the T cell is specific. This blended cell (mostly human but displaying an antigen to the T cell) is a trigger for the various elements of the specific immune response.

So, T cells are like a built-in home security system. When they detect an invader they trigger an alarm an alert the proper authorities to come and deal with the problem. And when the threat is neutralized the have suppressor T cells which can call off the immune response and tell the responding authorities to stand down.

T Cells vs B Cells

B cells produce and secrete antibodies, activating the immune system to destroy the pathogens. The main difference between T cells and B cells is that T cells can only recognize viral antigens outside the infected cells whereas B cells can recognize the surface antigens of bacteria and viruses. So, T cells are like detectives who discover a crime, then alert the cops, the B cells to come and arrest the criminal.

B cells fight bacteria and viruses by making Y-shaped proteins called antibodies, which are specific to each pathogen and can lock onto the surface of an invading cell and mark it for destruction by other immune cells.

Therefore the B cells are like binding agents or cops.

They come to arrest the violators and hold them so that they can be treated by the proper medical authorities which are the Killer T cells.

There are two main types of T cells: helper T cells and killer T cells. Helper T cells stimulate B cells to make antibodies and help killer cells develop. Killer T cells directly kill cells that have already been infected by a foreign invader. They recognize when a threat has been contained and then send out signals to stop the attack.

T-cells also uses messenger molecules (**cytokines**) to send chemical instructions to the rest of the immune system to ramp up its response.

Antibodies

Antibodies combine chemically with substances that the body recognizes as alien, such as bacteria, viruses, and foreign substances in the blood.

Antibodies, also known as immunoglobulins, are Y-shaped proteins that are produced by the immune system to help stop intruders from harming the body. When an intruder enters the body, the immune system springs into action. These invaders, which are called antigens, can be viruses, bacteria, or other chemicals.

Antibodies bind to viruses, marking them as invaders so that white blood cells can engulf and destroy them.

Antibodies are proteins produced and secreted by B cells. They bind to foreign substances that invade the body, such as pathogens. The term "antibody" refers to its function, which is to bind to an antigen.

Natural Killers

They are named "natural killer cells" because they do not require prior activation to kill cells.

Natural killer cells (also known as NK cells, K cells, and killer cells) are a type of lymphocyte (a white blood cell) and a component of the innate immune system. NK cells play a major role in the host-rejection of both tumors and virally infected cells.

Pathogens

Pathogenic organisms are of five main types: viruses, bacteria, fungi, protozoa, and worms. The definition of a pathogenic organism is an organism capable of causing disease in its host. A human pathogen is capable of causing illness in humans.

In biology, a pathogen in the oldest and broadest sense is anything that can produce disease. A pathogen may also be referred to as an infectious agent, or simply a germ.

Pathogens that do get into your body can trigger the second line of defense, known as the

inflammatory response. In the inflammatory response, fluid and white blood cells leak from blood vessels into nearby tissues that have become infected. The white blood cells then fight the pathogens. The white blood cells involved in the inflammatory response are called phagocytes. A phagocyte is a very large cell that engulfs and destroys pathogens by breaking them down. During the inflammatory response, the affected area becomes red, swollen, and warm. The inflammatory response may also cause a general fever.

Depending on the infectious disease, symptoms can vary greatly. Fever is a common response to infection: a higher body temperature can heighten the immune response and provide a hostile environment for pathogens. Inflammation, or swelling caused by an increase in fluid in the infected area, is a sign that white blood cells are on the attack and releasing substances involved in the immune response.

Antigens

An antigen is a foreign material that triggers a response from T and B cells. The human body has B and T cells specific to millions of different antigens. It is any substance foreign to the body that evokes an immune response either alone or after forming a complex with a larger molecule (such as a protein) and that is capable of binding with a product (such as an antibody or T cell) of the immune response.

Pathogens are microbes that can infect the body and cause illness. Antigens are parts of the pathogen that alert the body to an infection. Immune cells can recognize antigens to target and remove a pathogen from the body, thereby stopping or even preventing illness. Antigens are substances (usually proteins) on the surface of cells, viruses, fungi, or bacteria. The immune system recognizes and destroys, or tries to destroy, substances that contain antigens.

A virus antigen is a toxin or other substance given off by a virus that causes an immune response in its host.

What Is the Coronavirus?

According to the **Centers for Disease Control and Prevention** (CDC), there were seven types of coronavirus known to man to date.

These common human coronaviruses, including types 229E, NL63, OC43, and HKU1, usually cause mild to moderate upper-respiratory tract illnesses, like the common cold. Most people get infected with one or more of these viruses at some point in their lives. This information applies to common human coronaviruses and **should not be confused with** coronavirus disease of 2019 (formerly referred to as **2019 Novel Coronavirus**).

In the United States, people usually get infected with common human coronaviruses in the fall and winter, but you can get infected at any time of the year. Young children are most likely to get infected, but people can have multiple infections in their lifetime.

Human coronaviruses can sometimes cause lower-respiratory tract illnesses, such as pneumonia or bronchitis. This is more common in people with cardiopulmonary disease, people with weakened immune systems, infants, and older adults.

Coronaviruses are named for the crown-like spikes on their surface. There are four main sub-groupings of coronaviruses, known as alpha, beta, gamma, and delta.

Human coronaviruses were first identified in the mid-1960s. The seven coronaviruses that can infect people are:

1. 229E (alpha coronavirus)
2. NL63 (alpha coronavirus)
3. OC43 (beta coronavirus)
4. HKU1 (beta coronavirus)
5. MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome, or MERS)

6. SARS-CoV (the beta coronavirus that causes the severe acute respiratory syndrome, or SARS)
7. SARS-CoV-2 (the novel coronavirus that causes coronavirus disease 2019, or COVID-12)

People around the world commonly get infected with human coronaviruses 229E, NL63, OC43, and HKU1. Sometimes coronaviruses that infect animals can evolve and make people sick and become a new human coronavirus. Three recent examples of this are 2019-nCoV, SARS-CoV, and MERS-CoV.

What is a novel coronavirus?

A novel coronavirus is a **new coronavirus** that has not been previously identified. The virus causing coronavirus disease 2019 (COVID-19), is not that same as the coronaviruses that commonly circulate among humans and cause mild illness, like the common cold.

The **World Health Organization** (WHO) announced an official name for the disease that is causing the 2019 novel coronavirus outbreak, first identified in Wuhan, China. The new name of this disease is coronavirus disease 2019, abbreviated as COVID-19.

In **COVID-19**, 'CO' stands for 'corona,' 'VI' for 'virus,' and 'D' for the disease. Formerly, this disease was referred to as “2019 novel coronavirus” or “2019-nCoV.”

The **International Committee on Taxonomy of Viruses**, charged with naming new viruses, named the novel coronavirus, first identified in Wuhan, China, severe acute respiratory syndrome coronavirus 2, shortened to SARS-CoV-2.

As the name indicates, the virus is related to the SARS-associated coronavirus (SARS-CoV) that caused an outbreak of severe acute respiratory syndrome (SARS) in 2002-2003, however, it is not the same virus.

What is the source of the virus?

Public health officials and partners are working hard to identify the original animal source of the virus that causes COVID-19. Coronaviruses are a large family of viruses, some causing illness in people and others that circulate among animals, including camels, cats, and bats.

So, what they are saying is they really don't know yet. And maybe they never will.

This Novel Coronavirus Is A Deadly Enigma

The World Health Organization cautioned years ago that a mysterious “**Disease X**” could spark an international contagion. The new coronavirus, with its ability to quickly morph from mild to deadly, is emerging as a contender.

From recent reports about the stealthy ways the so-called Covid-19 virus spreads and maims, a picture is emerging of an enigmatic pathogen whose effects are mainly mild, but which occasionally -- and unpredictably -- turns deadly in the second week.

Covid-19 is less deadly than SARS, which had a case fatality rate of 9.5%, but appears more contagious. Both viruses attack the respiratory and gastrointestinal tracts, via which they can potentially spread.

While more than 80% of patients are reported to have a mild version of the disease and will recover, about one in seven develops pneumonia, difficulty breathing and other severe symptoms. About 5% of patients have a critical illness, including respiratory failure, septic shock, and multi-organ failure.

“Unlike SARS, Covid-19 infection has a broader spectrum of severity ranging from asymptomatic to mildly symptomatic to severe illness that requires mechanical ventilation,” doctors in Singapore said. “Clinical progression of the illness appears similar to SARS: patients developed pneumonia around the end of the first week to the beginning of the second week of illness."

Unpredictable Illness

Older adults, especially those with chronic conditions, such as hypertension and diabetes, have been found to have a higher risk of severe illness. Still, "the experience to date in Singapore is that patients without significant comorbid conditions can also develop severe illness," they said.

Li Wenliang, the 34-year-old ophthalmologist who was one of eight doctors first to warn about the coronavirus in Wuhan (and was arrested by Chinese authorities and forced to sign a retraction for rumor spreading,) **died** earlier this month **after receiving antibodies, antivirals, antibiotics, oxygen and having his blood pumped through an artificial lung.**

Gregory A. Poland is the Mary Lowell Leary emeritus professor of medicine, infectious diseases, and molecular pharmacology and experimental therapeutics at the Mayo Clinic in Rochester, Minnesota. He said "Whenever you have an infection, you have a battle going on. And that battle is a battle between the damage that the virus is doing, and the damage the body can do when it tries to fight it off.”

Mild Symptoms

Doctors studying a 50-year-old man who died in China last month found Covid-19 gave him mild chills and dry cough at the start, enabling him to continue working. But on his ninth day of illness, he was hospitalized with fatigue and shortness of breath, and treated with a barrage of germ-fighting and immune system-modulating treatments.

He died five days later with lung damage reminiscent of **SARS** and **MERS**, another coronavirus-related outbreak.

SARS

Severe acute respiratory syndrome (SARS) was a viral respiratory disease of zoonotic origin caused by the SARS coronavirus (SARS-CoV). Between November 2002 and July 2003, an outbreak of SARS in southern China eventually caused 8,098 cases, resulting in 774 deaths reported in 17 countries.

Initial symptoms are flu-like and may include fever, muscle pain, lethargy symptoms, cough, sore throat, and other nonspecific symptoms. The only symptom common to all patients appears to be a fever above 38 °C (100 °F). SARS may eventually lead to shortness of breath and pneumonia; either direct viral pneumonia or secondary bacterial pneumonia.

The primary route of transmission for SARS is the contact of the mucous membranes with respiratory droplets or fomites. Whilst diarrhea is common in people with SARS, the fecal-oral route does not appear to be a common mode of transmission.

Related But Not The Same

Unlike SARS, its viral cousin, the Covid-19 virus replicates at high concentrations in the nose and throat akin to the common cold and appears capable of spreading from those who show no, or mild, symptoms. That makes it impossible to control using the fever-checking measures that helped stop SARS 17 years ago.

How Does the Novel Coronavirus Kill?

No one knows exactly how or why the novel coronavirus leads to death in just a small percentage of patients — about 2 percent of those infected, according to preliminary numbers. Based on what we know about related illnesses, including severe acute respiratory syndrome (SARS), experts hypothesize that the difference between a lethal infection and one that feels like a bad cold probably hinges on the interaction between the virus and a person's immune system.

While the virus attacks and kills cells in all cases, the serious illness will depend on how the immune system responds, and that can be influenced by age, gender, genetics, and underlying medical conditions. The initial damage caused by the virus can trigger a powerful and counterproductive overreaction by the immune system itself.

The Coronavirus and Other Outbreaks Are Hard to Contain. Here's Why.

As of early February 2020, tens of thousands of people worldwide were infected with a new strain of coronavirus. Officials are taking "unprecedented" actions. (Amber Ferguson, Jayne Orenstein/The Washington Post)

“What you get is the initial damage and rush of inflammatory cells, but the damage is so extensive that the body’s immune response is completely overwhelmed — which causes even more immune response, more immune cells and more damage,” said Matthew Frieman, a virologist at the University of Maryland School of Medicine. This is a result of the T cells and B cells doing their thing.

With infection, the virus probably begins to multiply inside cells lining the airway, which are fringed with hairlike structures (cilia.) Coronaviruses that cause common colds are excellent at infecting the upper airway, while SARS tended to go deeper in the lungs.

As the coronavirus gains strength, Frieman said, dead cells are sloughed off and collect in the airway, making breathing difficult.

“If the virus replicates very quickly before your body has a chance to try and prevent it with an immune response, or if the immune response comes in too late, then it can’t control the virus and starts going berserk,” said Anthony Fehr, a virologist at the University of Kansas.

The Storm That Kills

This is what scientists refer to as a “**cytokine storm**,” which causes the immune system to start sending cells ready to do battle into the lung. Remember cytokines are messenger molecules sent by T cells to trigger the B cells to begin to do battle. At that point, it’s not just the virus doing damage to the body; the immune system begins wreaking havoc on the infected person — also known as the “host” in medical parlance. This is because the T cells activate Killer T cells which not only kill the virus but the host cell itself.

As the battle wages on and cells die, the inflammation process starts and fluid begins to build in the lungs. This fluid build-up causes pneumonia. Pneumonia caused by the virus is called viral pneumonia. The battle can also trigger secondary bacterial pneumonia. Bacterial pneumonia can be treated with anti-biotics however viral pneumonia can not.

Bifurcated Method Of Death

The novel coronavirus has **two ways to kill a human host.** It can enter a body, begin replicating, and start attacking the lungs, and other major organs. And it can also trigger an overwhelming immune system response which causes the body to send T cells, B cells, Killer T cells and cytokine causing a storm that produces pneumonia. This army is designed to protect the human body but it can also kill it.

Who's At Risk?

The general risk factors for this mismatch between the immune system and any respiratory illness include advanced age and underlying chronic illnesses, including diabetes and high blood pressure, though public health experts are eager to understand more about who is most vulnerable in the current outbreak. Yet, young and healthy people have succumbed to the virus.

“The experience with other respiratory viruses would suggest it is a combination of the virus doing damage to the airways, secondary infections and the interplay with the host immune response," said Erica S. Shenoy, an infectious diseases specialist at Massachusetts General Hospital.

"Every individual is different," Fehr said, and there are differences in how young and old or male and female immune systems react. "There are lots of dynamics at play when you talk about each individual and how they might die from this virus or why they might survive."

Problems can also stack up. Vineet Menachery, a virologist at the University of Texas Medical Branch, suspects that the coronavirus may work much like SARS. When the virus gets deep into the lungs, it can damage alveoli, the air sacs that take in oxygen. As cellular damage accumulates, lung tissue begins to stiffen. The heart must work harder to get limited oxygen to the rest of the organs.

"What makes this new virus so damaging is you're losing lung function, and that puts a strain on every organ in your body," Menachery said.

Reinfection Can Lead To Instant Death From Heart Failure

In the patients who recover, the immune system's response has worked: It has cleared the virus, with inflammation receding. Yet experts don't know the long-term outcome for these individuals.

There have been many reports of individuals who have recovered from the novel Coronavirus dropping dead from a heart attack or heart failure upon getting reinfected. This is because the heart must work hard to circulated the less-oxygenated blood throughout the body to much-needed organs to keep them functioning. This added workload does damage to the heart tissue making it susceptible to future failure or a heart attack.

Chinese doctors say the novel Coronavirus can reinfect people, and **the second infection can lead to heart failure.**

Doctors in China say patients who recover from coronavirus can be reinfected — and if that happens, they become significantly more likely to suffer fatal heart attacks due to the nature of the virus and the effect of the medicine used to treat it, according to the Taiwan News.

"It's highly possible to get infected a second time," a doctor told the Taiwan News. "A few people recovered from the first time by their own immune system, but the meds they use are damaging their heart tissue, and when they get it the second time, the antibody doesn't help but makes it worse, and they die a sudden death from heart failure."

A doctor also told Taiwan News that the virus can be present in a person without symptoms for up to 24 days and that the virus has "outsmarted all of us." If true, many people could be both unknowingly infected, and potentially infecting others, creating huge problems for public health officials desperately attempting to stop the spread.

Respiratory Infections Raise Heart Attack Risk By 17 Times

Every year, hundreds of thousands of people have a heart attack. Research suggests that both mild and severe **respiratory infections might make some people more susceptible to heart attacks.**

A study – published in the **Internal Medicine Journal** – found that respiratory infections such as **pneumonia**, common **influenza**, and **bronchitis** all seem to **increase the chances of having a heart attack.**

Incubation Period

This section will discuss the incubation period and why it's important. But first, we must do a **Biology 101** refresher on human cells and viruses.

The cell (from Latin cella, meaning "small room") is the basic structural, functional, and biological unit of all known organisms. A cell is the smallest unit of life. Cells are often called the "building blocks of life."

A virus is a small infectious agent that replicates only inside the living cells of an organism. Viruses can infect all types of life forms, from animals and plants to microorganisms, including bacteria

A progeny - The organism or organisms resulting from sexual or asexual reproduction. It is the product or offspring of a virus and a host cell.

Viral Life Cycle

There are **4 main stages** of the viral life cycle: **entry, replication, latency, and shedding.**

Viral Entry

For the virus to reproduce and thereby establish infection, it must enter cells of the host organism and use those cells' materials. To enter the cells, proteins on the surface of the virus interact with proteins of the cell. Attachment, or adsorption, occurs between the viral particle and the host cell membrane. A hole forms in the cell membrane, then the virus particle or its genetic contents are released into the host cell, where replication of the viral genome may commence.

Viral Replication

Next, a **virus must take control** of the host cell's replication mechanisms. It is at this stage a distinction between susceptibility and permissibility of a host cell is made. Permissibility determines the outcome of the infection. After control is established and the environment is set for the virus to begin making copies of itself, **replication occurs quickly by the millions.**

Viral Shedding

After a virus has made many copies of itself, it has usually exhausted the cell of its resources. The host cell is now no longer useful to the virus, therefore the cell often dies and the newly produced viruses (the progeny) must find a new host. The process by which virus progeny are released to find new hosts is called shedding. This is the final stage of the viral life cycle.

Viral Latency

Some viruses can "hide" within a cell, either to evade the host cell defenses or immune system or simply because it is not in the best interest of the virus to continually replicate. This hiding is called latency. During this time, the virus does not produce any progeny, it remains inactive until external stimuli—such as light or stress—prompts it to activate.

Viruses Need Live Host Cells To Make Babies

Viruses are **only able to replicate themselves by commandeering the reproductive apparatus of cells** and making them reproduce the virus's genetic structure instead. Thus, a virus cannot function or reproduce outside a cell, thereby making them dependent on a host cell to survive.

The Coronavirus (has an Intelligent design) is smart. It doesn't kill its host cell immediately or quickly.

Incubation Period

In medicine, the incubation period is the time from the moment of exposure to an infectious agent until signs and symptoms of the disease appear. The incubation period of a viral infection -- whether or not an infected person is contagious (i.e. is shedding virus) during the incubation period depends on the virus. For example, Ebola virus-infected patients do not pass the virus on to others during the incubation period. Some people are contagious during the incubation period and some are not.

Why Is The Incubation Period Important?

The incubation period is the time elapsed between exposure to a pathogen, and when symptoms and signs start to show. In a typical infectious disease, the incubation period signifies the period taken by the multiplying organism to reach a threshold necessary to produce symptoms in the host. Or trigger the home security system known as the T cells.

The incubation period provides clues about the source of an outbreak. For example, the incubation period can help distinguish infections acquired from within a hospital (healthcare-acquired infections) from those imported from outside the healthcare setting and that is important for infection control. This can also help determine where a person was infected and who else they may have infected during that period.

Latency

There is a difference between latency or contagiousness, and the incubation period, which is determined by how long it takes for symptoms to appear. While latent or latency period may be synonymous, a distinction must be made between the **incubation period**, the period between infection and onset of the disease, and the **latent period**, the time from infection to infectiousness. Which is shorter depends on the disease.

A person may carry disease, such as Streptococcus for weeks in the throat, without exhibiting any symptoms. Depending on the disease, the person may or may not be contagious during the incubation period. Other contagious viral diseases that are contagious during the incubation period include the flu, the common cold, HIV, and herpes. These can be transmitted with having or showing any symptoms.

HIV The T Cell Killer

HIV stands for **human immunodeficiency virus.** It harms your immune system by destroying the white blood cells (T cells) that fight infection. This puts you at risk for serious infections and certain cancers.

HIV is the only virus that **can kill T cells**. It invades a host body, then deactivates the home security system, the T cells, which prevents the T cells from triggering the alarm and notifying the authorities, namely the B cells and the Killer T cells.

Without an alarm, the host body is unaware of the HIV viral infection so it takes no action. This allows the HIV cells to reproduce and multiply unbeknownst to the host yet the host is highly contagious during this incubation period. When HIV reaches the maturation if its life cycle, it is so prevalent inside the host, the host becomes completely defenseless. Consequently, the host develops **AIDS**. AIDS stands for **acquired immunodeficiency syndrome.** It is the final stage of infection with HIV.

Viral Latency

During latency, an infection is subclinical (**asymptomatic**.) With respect to viral infections, in incubation, the virus is replicating. This is in contrast to viral latency, a form of dormancy in which the virus does not replicate.

So, during latency, the virus is replicating or reproducing and during viral latency, the virus is not replicating. It's just dormant. It invades the host and goes to sleep.

An example of latency is HIV infection. HIV may at first have no symptoms and show no signs of AIDS, despite HIV replicating in the lymphatic system and rapidly accumulating a large viral load. These persons may be infectious.

Dormancy

When a virus gets into a body and goes to sleep it's called Dormancy. Dormancy is a period in an organism's life cycle when growth, development, and (in animals) physical activity are temporarily stopped. This minimizes metabolic activity and therefore helps an organism to conserve energy. It also allows the virus to live inside the host cell without starting a battle or killing the host.

During this period the virus is not replicating nor has it triggered an alarm. With no alarm, the T cells don't go into action. They don't trigger the B cells and Killer T cells meanwhile the infected person continues without symptoms but still may be contagious.

Incubation & Latency Of The Coronavirus

The incubation and latency periods of the Coronavirus are still being investigated and has yet to be conclusively determined based on epidemiological evidence. At first, the incubation period was thought to be 14 days. Then reports emerged that it was a high as 24 days.

A doctor told Taiwan News that the virus can be present in a person without symptoms for up to 24 days and that the virus has "outsmarted all of us." If true, many people could be both unknowingly infected, and potentially infecting others, creating huge problems for public health officials desperately attempting to stop the spread.

This is worrisome for multiple reasons. The main reason is that most governments instituted a 14-day quarantine policy for suspected carriers of the virus. This presents a major dilemma: what if many people who went through the initial prescribed 14-day quarantine were infected with a dormant coronavirus? There was one report from China where one lady was diagnosed with the coronavirus 42 days after leaving Wuhan.

The Coronavirus Has A Duality

You can call it a twin, a combo, or a pair, but it is undoubtedly bifurcated. It is not one virus but two. This may or may not be known to scientists studying the disease at the time this book is published, but logic bears this out from reports of the baffling behavior of this novel coronavirus. Many experts studying the disease are confused about why it kills some and not others.

This Explains Why

Sometimes, the coronavirus infects a host body and immediately starts replicating and attacking the host. This causes the host body to trigger alarms from the T cells that cause a "cytokine storm" which wreaks havoc on the lungs and is sometimes fatal to the host.

Then, there are many reported cases of people being diagnosed with the coronavirus which is determined by tests, yet who are asymptomatic. Furthermore, there are people infected with the dormant coronavirus that infects the host body and summarily goes to sleep. The reported range of this sleep is between 14 and 24 days.

Therefore, I contend that these are two distinct viruses. They are identical, yet they are dissimilar in one predominant characteristic. The latency stage. One virus is aggressive and attacks immediately. And the other twin virus invades and goes to sleep. These dual coronaviruses are similar to the Herpes simplex virus we know today.

Herpes simplex virus 1 and 2 (HSV-1 and HSV-2), are two members of the human Herpesviridae family, a set of viruses that produce viral infections in the majority of humans. Both HSV-1 (which produces most cold sores) and HSV-2 (which produces most genital herpes) are common and contagious.

Herpes simplex virus 1 and 2 are twin viruses with one distinguishing characteristic. Their difference is the location of the attack. One attacks the mouth, and the other attacks the genitals. The coronavirus has two different latency periods. One is long and the other is short.

The Duality Analogy

The coronavirus is like a guy who breaks into your house and goes berserk. He trashes the house. Sets your bed on fire. Stops up your tub and floods your bathroom. Then he finds your gun and starts shooting at the neighbors. Obviously, the authorities will be notified. The fire department, the police department, EMTs, water company, swat team, hostage negotiators, etc.

This is analogous to the "**cytokine storm"** which is triggered by T cells. When they finish with your house, it will be wrecked and may or may not be salvageable.

Then, there is the coronavirus' twin that is more stealthy and patient. He breaks into your house without setting off your home security alarm system (T cells.) Climbs into the attic and goes to sleep. He's there to kill too but you just don't know when.

Can these two people be one person? Can these two twins be just one virus with a split personality? Viruses don't have personalities. They don't have brains. They can't think. Once they are designed (bio-engineered) their DNA is hardwired and programmed to do one thing. Either it is to kill or sleep. Not both.

So, the coronavirus is either a homicidal maniac or a sleeper agent, but not both. That's why I concluded that they are twins.

Thankfully, the coronavirus doesn't resemble HPV with a latency of many years. HIV can have a latency of up to 9 years before an infected person develops full-blown AIDS.

Human papillomavirus infection (**HPV infection**) is an infection caused by the *human papillomavirus* (HPV). About 90% of HPV infections cause no symptoms and resolve spontaneously within two years. HPV is contagious during this time period. Imagine if the Coronavirus was similar. Let's hope that it's not.

Latency and Activity Level Of Host

I believe there is a connection between the activity level of the infected person and the viral latency period or the length of time the dormancy lasts. I suspect that how long a virus stays asleep is determined by whether a person in quarantine or hospitalized confined to a small area, or confined in a ship's cabin, being immobile and less active than normal.

Doctors studying a 50-year-old man who died in China last month found Covid-19 gave him mild chills and dry cough at the start, enabling him to continue working.

But on his ninth day of illness, he was hospitalized with fatigue and shortness of breath, and treated with a barrage of germ-fighting and immune system-modulating treatments.

He died five days later with lung damage reminiscent of SARS and MERS, another coronavirus-related outbreak, doctors at the Fifth Medical Center of PLA General Hospital in Beijing said in Feb. 16 study in the Lancet medical journal. Blood tests showed an over-activation of a type of infection-fighting cell that accounted for part of the "severe immune injury" he sustained, the authors said.

Signs, Diagnosis, Treatment, Cure & Vaccine

Signs And Symptoms

Initial symptoms are flu-like and may include fever, muscle pain, lethargy symptoms, cough, sore throat, and other nonspecific symptoms.

Unlike its closely related cousin SARS, the Coronavirus (COVID19) can be present without the existence of a fever. With SARS, all patients will develop a fever above 38 °C (100 °F).

For confirmed coronavirus disease 2019 (COVID-19) cases, reported illnesses have ranged from mild symptoms to severe illness and death. Symptoms can include fever, cough, and shortness of breath. Although many cases are asymptomatic because of the dormancy of the twin coronavirus previously discussed.

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19 may eventually lead to shortness of breath and pneumonia; either direct viral pneumonia or secondary bacterial pneumonia

CDC believes at this time that symptoms of COVID-19 may appear in as few as 2 days or as long as 14 days after exposure. This is based on what has been seen previously as the incubation period of MERS-CoV viruses.

Thermal scanners are effective in detecting people who have developed a fever (i.e. have a higher than normal body temperature) because of infection with the new coronavirus.

However, they cannot detect people who are infected but are not yet sick with a fever. This is because it takes between 2 and 10 days before people who are infected become sick and develop a fever.

Pneumonia appears to be the most frequent

manifestation of infection, characterized primarily by fever, cough, shortness of breath, and bilateral infiltrates on chest imaging. Experts say people infected with the coronavirus would be likely to have lesions in both lungs.

Although many of the reported infections are not severe, approximately 20 percent of confirmed patients have had a critical illness (**including respiratory failure, septic shock, or other organ failure requiring intensive care.**)

What are the possible complications from COVID-19?

The most serious complication of COVID-19 is a type of pneumonia that's been called 2019 novel coronavirus-infected pneumonia (NCIP).

Results from a 2020 study of 138 people admitted into hospitals in Wuhan, China with NCIP found that 26 percent of those admitted had severe cases and needed to be treated in the intensive care unit (ICU). About 4.3 percent of these people who were admitted to the ICU died from this type of pneumonia.

So far, NCIP is the only complication specifically linked to the 2019 coronavirus. But researchers have seen the following complications in people who have developed a coronavirus:

- Acute respiratory distress syndrome (ARDS)
- Irregular heartbeat (arrhythmia)
- Cardiovascular shock
- Severe muscle pain (myalgia)
- Fatigue
- Heart damage or heart attack

Some of the more serious damage caused by COVID-19 may be due to the body's immune system reacting in what is known as the cytokine storm.

Diagnosis

The 2019 coronavirus can be diagnosed similarly to other viral infections: using a blood, saliva, or tissue sample. In the United States, only the CDC currently can diagnose a COVID-19 infection.

A lab technician will either draw a sample of your blood with a needle or use a cotton swab to take a small sample of saliva or respiratory secretions from your nose or the back of your throat. The sample is then sent to a testing facility to confirm the presence of viral material or antibodies that respond to the virus.

The CDC states:

The test will not be available in U.S. hospitals or other primary care settings. At this time, diagnostic testing for COVID-19 can be conducted only at CDC.

The U.S. Secretary of Health and Human Services declared the SARS-CoV-2 virus a U.S. public health emergency on Friday, January 31, 2020. FDA issued the EUA on February 4, 2020. The International Reagent Resourceexternal (IRR) began distribution of the test kits to states, but shortly thereafter performance issues were identified related to a problem in the manufacturing of one of the reagents which led to laboratories not being able to verify the test performance.

CDC is remanufacturing the reagents with more robust quality control measures. New tests will be distributed once this issue has been addressed. CDC continues to perform initial and confirmatory testing.

CDC Tests for COVID-19

CDC has developed **a new laboratory test kit** for use in testing patient specimens for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the virus that causes COVID-19. The test kit is called the "Centers for Disease Control and Prevention (CDC)

2019-Novel Coronavirus (2019-nCoV) Real-Time Reverse Transcriptase (RT)-PCR Diagnostic Panel."

This test is intended for use with upper and lower respiratory specimens collected from persons who meet CDC criteria for COVID-19 testing. CDC's test kit is intended for use by laboratories designated by the CDC as qualified and in the United States.

Are Coronavirus Tests Accurate?

Some have questioned the accuracy of the statistics released by the Chinese government regarding the reported number of cases and deaths due to the outbreak. **Now there are concerns about the accuracy of the laboratory tests used to confirm diagnoses.**

Reports suggest some people test negative up to six times even though they are infected with the virus, according to the BBC and Chinese media.

Such was the case with **Dr. Li Wenliang,** the ophthalmologist who first identified the outbreak (who has been hailed as a hero and martyr in China after dying from it) but was originally reprimanded by Chinese authorities when he tried to warn others.

Dr. Wenliang developed a cough and fever after unknowingly treating an infected patient. He was hospitalized, testing negative for coronavirus several times before eventually receiving a positive result. On Jan. 30 the doctor posted: "Today nucleic acid testing came back with a positive result, the dust has settled, finally diagnosed," **according to the BBC. Dr. Wenliang passed away on February 7** in Wuhan, the epicenter of the outbreak.

Worldwide Problem Of False Negatives

There are deep concerns laboratory tests are incorrectly telling people they are free of the coronavirus. Stories in several countries suggest people are having up to six negative results before finally being diagnosed.

Chinese journalists have been warning the world medical community that there were problems with the accuracy and efficacy of the tests being used to detect the coronavirus.

They have uncovered other cases of people testing negative six times before a seventh test confirmed they had the disease. And similar issues have been raised in other affected countries, including Singapore and Thailand.

In the US, meanwhile, **Dr. Nancy Messonnier**, of the Centers for Disease Control and Prevention, says some of its tests are producing "inconclusive" results.

False-negative test results, where patients are told they do not have a condition when they do, can cause several problems. Patients may be turned away from hospitals and medical facilities when they require care. They may also infect others at home, work, school, or in the community. Patients' conditions may also worsen without treatment leading to death.

When faced with a highly infectious, potentially deadly pathogen, even a small number of false negatives can have a potentially serious and widespread impact on the larger population.

Using CT Scans

Meanwhile, in China, there just aren't enough testing kits to go around. Per **the New York Times:**

Therefore, doctors in China started using CT scans to investigate and diagnose possible cases of the coronavirus.

A major bottleneck has been a shortage of nucleic acid testing kits used to confirm the presence of the coronavirus. So Dr. Zhang, who works in a hospital in Wuhan, proposed that doctors could first use CT scans to detect pneumonia and quickly isolate and treat patients who have it. CT scans are convenient and can produce immediate results, Dr. Zhang said. Experts say people infected with the coronavirus would be likely to have lesions in both lungs.

Dr. Zhang Xiaochun, was in dismay by one of her patients who had been running a fever for nine days, and **a CT scan showed signs of pneumonia** — but a test to confirm the diagnosis would take at least two days. To Dr. Zhang, that meant a delay in isolating her patient — and getting potentially lifesaving treatment.

A chest X-ray showing increased opacity in both lungs, indicative of pneumonia, in a patient with the coronavirus is a better indicator that the disease is present. For a case to be considered probable, a chest X-ray must be positive for atypical pneumonia or respiratory distress syndrome.

Faulty Test Kits, And Short Supply

The **coronavirus (COVID) test kits are broken in America,** scarce in China, and inaccurate. Inaccurate or inconclusive results put a major strain on the medical community on the front lines trying to battle this epidemic. To fight effectively, they need proper tools.

The most dangerous problem in containing the

COVID-19 coronavirus epidemic has been, of course, detecting it. Testing needed to be developed and CDC rushed to get them out. That turned out to be a mistake because they were faulty. Another problem is supply keeping up with the demand for tests and distributing those tests all over the world.

The CDC gave journalists the lowdown:

"Some of the kits ended up being shipped with faults and issues that deliver inconclusive results. That doesn't mean they were producing false positives or false negatives, but that they just weren't producing the results the CDC needed them to produce — a non-result."

That said, the tests need not just be conclusive, with an answer, but a correct answer.

Dangers Of Faulty Tests

Per Dr. Nancy Messonnier, the Director of CDC's National Center for Immunization and Respiratory Diseases:

"Some public health labs at states were getting inconclusive results and what that means is that test results were not coming back as false positive or false negatives, but they were being read as inconclusive. "

- **A false positive** could theoretically expose someone without coronavirus to a hospital setting where they run the risk of being exposed to other types of illnesses, or far worse, a quarantine setting with other patients who have tested positive for coronavirus, where (given how contagious it is) they would most certainly catch it.
- **A false negative** means that someone with COVID-19 is theoretically released back into the world to expose otherwise healthy people to the virus, putting entire swaths of the world on edge (with the presumption that, of course, they're healthy).

According to the CDC's numbers, the current CDC testing kit situation is not going well:

- **only 200 kits total were shipped across all fifty states.**
- **only 200 more kits were spread out across 30 countries.**
- **with 700 to 800 samples come out of each kit.**

If there is a major outbreak in the United States, there is no way the CDC would be able to keep up with the demand for tests. Even if they were able to match the quantity needed, the quality of the test results are still in doubt. This begs the question of the efficacy of testing as a tool at all. Unreliable tests can do more harm to the public psyche and sense of confidence in the government which could lead to mass hysteria and widespread panic.

Treatment And Cure

What treatments are available?

There's currently no treatment specifically approved for the 2019 coronavirus, and no cure for an infection, although treatments and vaccines are currently under study. Instead, treatment focuses on managing symptoms as the virus runs its course.

Subsequently, there are no current treatments recommended for coronavirus infections except for supportive care as needed. Several antivirals and other agents were used during the severe acute respiratory syndrome coronavirus (SARS-CoV) outbreak, but the efficacy of these drugs has not been established.

Chloroquine, which has potent antiviral activity against the SARS-CoV, has been shown to have similar activity against HCoV-229E in cultured cells and against HCoV-OC43 both in cultured cells and in a mouse model. However, there have been **no studies of efficacy in humans**.

Other coronaviruses like SARS and MERS do have vaccines and treatments. Some treatments for these similar viruses include:

- **Antiviral or retroviral medications**
- **Breathing support like mechanical ventilation**
- **Steroids to reduce lung swelling**
- **Blood plasma transfusions**

Antibiotics are ineffective, as SARS, is a viral disease. Treatment of SARS is mainly supportive with antipyretics (fever-reducing drugs,) supplemental oxygen, and mechanical ventilation as needed. Antiviral medications are used as well as high doses of steroids to reduce swelling in the lungs.

People with SARS must be isolated, preferably in negative pressure rooms, with complete barrier nursing precautions taken for any necessary contact with these patients, to limit the chances of medical personnel getting infected with SARS.

Vaccine

There is no cure or specific treatment for the Ebola virus disease, a disease that was first identified in 1976, that is currently approved for the market, although various experimental treatments are being developed. Until recently, there were no vaccines for Ebola. Ebola vaccines are a number of vaccines to prevent Ebola that is either approved or in development. The first vaccine to be approved in the United States was in December of 2019.

Severe acute respiratory syndrome (SARS) originally appeared in November 2002. In an outbreak of SARS in southern China caused eventual 8,098 cases, resulting in 774 deaths reported in 17 countries (9.6% fatality rate) there is still no SARS vaccine available.

Middle East respiratory syndrome (MERS)] is a viral respiratory infection caused by the MERS-coronavirus (MERS-CoV). As of 2020, there is no specific vaccine or treatment for the disease; several antiviral medications were being studied.

As of 2020, there is no cure or protective vaccine for SARS that has been shown to be both safe and effective in humans. According to research papers published in 2005 and 2006, the identification and development of novel vaccines and medicines to treat SARS is a priority for governments and public health agencies around the world.

Health Experts Warn Life-Saving Coronavirus Vaccine Still Years Away

The global health threat posed by the coronavirus has kicked the world's scientific community into overdrive as **it races to develop a life-saving vaccine** to fight the epidemic that has killed more than 2,300 people to date.

"It's a kind of race, not against other scientists, but against the virus itself," said **Olivier Schwartz,** the head of viruses and immunities at the Pasteur Institute in Paris.

Dr. Anthony Fauci, the director of the National Institute of Allergy and Infectious Diseases at the National Institutes of Health (NIAID), confirmed that a Phase 1 trial of a candidate vaccine would likely begin in early April 2020.

"Going into a Phase 1 trial does not mean you have a vaccine," Fauci said. "It means you have taken the first step towards the vaccine, which by anybody's calculation is going to be at least a year to a year and a half at best, and that is if we proceed under the emergency authorization of the regulatory agencies."

Rachel Grant, the director of communications and advocacy at the Coalition for Epidemic Preparedness Innovations (CEPI), said in a **statement to ABC News** that the organization was working with partners to deliver a vaccine for broader use **within the next 12 to 18 months**.

"Of course, there are no guarantees of success," Grant said. "Even to propose such a timeline at this point must be regarded as hugely aspirational."

Fauci called the interest from pharmaceutical companies in developing a vaccine for the novel coronavirus "much more intense" than it had been for the global SARS epidemic, which occurred in 2002-2003. Still, the development of a vaccine is not the only hurdle in the process of combating a disease outbreak like COVID-19.

"One of the things that people don't take into account is how long it's going to take to manufacture hundreds of millions of doses that the world is going to need," **Fauci told ABC News.**

The production component will present a challenge for scientists and institutions. Even if a candidate vaccine is created within the anticipated timelines, Fauci said pharmaceutical companies may not be ready to scale the production of those life-saving therapeutics.

"You could find yourself where you have a vaccine candidate in a year and a half, a year and three quarters, but it takes another year to scale up to get enough doses to be meaningful to anyone," Fauci said.

In the event the WHO declares the novel coronavirus a pandemic, the number of doses needed to fight it would be staggering. Fauci says the U.S. would need hundreds of millions of doses, and more so for around the world.

"If it's really a global pandemic," Fauci said, "you're going to need billions of doses."

Since there is currently no vaccine to prevent coronavirus disease 2019 (COVID-19), **the best way to prevent illness is to avoid being exposed to this virus.**

Known Unknowns

Myriad uncertainties still surround the trajectory of the epidemic. On the positive side, containment efforts outside of China appear, so far at least, to be successful. The number of confirmed cases in other countries remains low, and there is little evidence at this point of widespread community transmission.

In China, however, and particularly in Hubei province — the epicenter of the outbreak, which remains in lockdown — the picture is still unclear. The majority of cases have not yet resolved. Moreover, the size of the ‘iceberg’ is undefined: it is still too early to know whether further undetected reservoirs of infection remain. There is no immediate end in sight to the extraordinary ordeal millions of people are enduring in the cities of Hubei.

Methods Of Transmission

First, we will take a macro view of viruses and their methods of transmission. Then we will follow with a micro view and focus specifically on the coronavirus (COVID19) and its known methods of transmission.

A virus is a small infectious agent that replicates only inside the living cells of an organism. Viruses can infect all types of life forms, from animals and plants to microorganisms, including bacteria. The study of viruses is known as virology, a sub-specialty of microbiology. There are about 5,000 virus species known to date.

Viruses spread in many ways. One transmission pathway is through disease-bearing organisms known as vectors: for example, viruses are often transmitted from plant to plant by insects that feed on plant sap, such as aphids; and viruses in animals can be carried by blood-sucking insects.

Influenza viruses are spread by coughing and sneezing. Norovirus and rotavirus, common causes of viral gastroenteritis, are transmitted by the fecal–oral route, passed by contact and entering the body in food or water. HIV is one of several viruses transmitted through sexual contact and by exposure to infected blood.

Transmission

Transmission is the passing of a pathogen causing communicable disease from an infected host individual or group to a particular individual or group, regardless of whether the other individual was previously infected.

- The term strictly refers to the transmission of microorganisms directly from one individual to another by one or more of the following means:
- **Droplet contact** – coughing or sneezing on another individual

- **Direct physical contact –** touching an infected individual, including sexual contact
- **Indirect physical contact** – usually by touching a contaminated surface, including soil (**Fomite**)
- **Airborne transmission** – if the microorganism can remain in the air for long periods

Fecal-oral transmission – usually from unwashed hands, contaminated food or water sources due to lack of sanitation and hygiene, an important transmission route in pediatrics, veterinary medicine, and developing countries.

For infecting organisms to survive and repeat the infection cycle in other hosts, they (or their progeny) must leave an existing reservoir and cause infection elsewhere. Infection transmission can take place via many potential routes:

Transmission can also be indirect, via another organism, either a vector (e.g. a mosquito or fly) or an intermediate host (e.g. tapeworm in pigs can be transmitted to humans who ingest improperly cooked pork).

An infectious disease agent can be transmitted in three ways:

1. as horizontal disease agent transmission from one individual to another in the same generation (peers in the same age group) by either direct contact (licking, touching, biting),
2. or indirect contact through air – cough or sneeze (vectors or fomites that allow the transmission of the agent causing the disease without physical contact)
3. or by vertical disease transmission, passing the agent causing the disease from parent to offspring, such as in prenatal or perinatal transmission.

The term infectivity describes the ability of an organism to enter, survive and multiply in the host, while the infectiousness of a disease agent indicates the comparative ease with which the disease agent is transmitted to other hosts.

Transmission of a pathogen can occur in various ways including physical contact, contaminated food, body fluids, objects, airborne inhalation, or through vector organisms.

Transmission Methods

Droplet contact, also known as the respiratory route, and the resultant infection can be termed airborne disease. If an infected person coughs or sneezes on another person the microorganisms, suspended in warm, moist droplets, may enter the body through the nose, mouth or eye surfaces.

Fecal-oral transmission, wherein foodstuffs or water become contaminated (by people not washing their hands before preparing food, or untreated sewage being released into a drinking water supply) and the people who eat and drink them become infected.

Sexual transmission, with the resulting disease being called a sexually transmitted disease.

Oral transmission, Diseases that are transmitted primarily by oral means may be caught through direct oral contact such as kissing, or by indirect contacts such as by sharing a drinking glass or a cigarette.

Contact Transmission are diseases that are transmissible by direct contact or indirect contact.

Vehicle transmission, transmission by an inanimate reservoir (food, water, soil).

Vertical transmission, directly from the mother to an embryo, fetus or baby during pregnancy or childbirth.

Latrogenic transmission, due to medical procedures such as injection or transplantation of infected material.

Vector-borne transmission, transmitted by a vector, which is an organism that does not cause disease itself but that transmits infection by conveying pathogens from one host to another. It's like an Uber for viruses.

The relationship between virulence versus transmissibility is complex; if a disease is rapidly fatal, the host may die before the microbe can be passed along to another host.

Airborne

"Airborne transmission occurs when respiratory droplets generated via coughing, sneezing are expelled or aspirated by mouth into the air. The germ or virus survives the drying out process and becomes a dangerous droplet nuclei. Consequently, the airborne transmission also refers to infectious agents that are spread via droplet nuclei (residual residue from evaporated droplets) containing infective microorganisms.

The pathogen-containing particles are reduced by evaporation to droplet nuclei – small, dry particles that can remain airborne for long periods.

These organisms can survive outside the body and not only remain suspended in the air for long periods of time but can be moved easily around by the ventilation system. They infect others via the upper and lower respiratory tracts.

Diseases that are commonly spread by coughing or sneezing include bacterial meningitis, chickenpox, common cold, influenza, mumps, strep throat, tuberculosis, measles, rubella, whooping cough, SARS and leprosy.

Droplet nuclei are transmitted by the air and are ingested by another person through inhalation. Once these droplet nuclei are inhaled they get into the respiratory tract and start to live and grow.

Droplet particles are so small and invisible to the naked eye that infected-patients required special ventilation to clean the air in their hospital room. Because the transmission is through inhalation hospitals use special rooms call Airborne Infection Isolation Rooms which change the air 6-12 times per hour. And maintain negative pressure inside the room than outer rooms to prevent particles from escaping.

Droplet

Droplet transmission occurs when respiratory droplets generated via coughing, sneezing or talking contact susceptible mucus membranes, such as the eyes, nose or mouth. Even when you talk you aspirate droplets of water. Inside these water droplets contain the virus of an infected person. Transmission may also occur indirectly via contact with contaminated fomites with hands and then mucus membranes. Mucus membranes are found in the eyes, eyes, inside the nose, inside the mouth, lips, vaginal opening, urethral opening and anus.

Respiratory droplets are large and are not able to remain suspended in the air thus they are usually dispersed over short distances. This distance is usually up to 3 feet or 1 meter. These droplets enter through another person's mucus membranes. So maintaining a distance of 4 feet is a common safety precaution.

Organisms spread by droplet transmission include respiratory viruses like influenza, SARS, MERS, and other coronaviruses including COVID19.

Fecal–Oral

In the fecal-oral route, pathogens in fecal particles pass from one person to the mouth of another person. The main causes of fecal-oral disease transmission include lack of adequate sanitation and poor hygiene practices - which can take various forms.

Fecal oral transmission can be via foodstuffs or water that has become contaminated. This can happen when people do not adequately wash their hands after using the toilet and before preparing food or tending to patients.

Sexual

This refers to any disease that can be caught during sexual activity with another person, including vaginal or anal sex or (less commonly) through oral sex. Transmission is either directly between surfaces in contact during intercourse (the usual route for bacterial infections and those infections causing sores) or from secretions (semen or the fluid secreted by the excited female) which carry infectious agents that get into the partner's bloodstream through tiny tears in the penis, vagina or rectum (this is a more usual route for viruses).

In this second case, anal sex is considerably more hazardous since the penis opens more tears in the rectum than the vagina, as the vagina is more elastic and more accommodating.

Some diseases transmissible by the sexual route include HIV/AIDS, chlamydia, genital warts, gonorrhea, hepatitis B, syphilis, herpes, and trichomoniasis.

Oral Sexual

Sexually transmitted diseases such as HIV and hepatitis B are thought to not normally be transmitted through mouth-to-mouth contact, although it is possible to transmit some STDs between the genitals and the mouth, during oral sex. In the case of HIV, this possibility has been established.

It is also responsible for the increased incidence of herpes simplex virus 1 (which is usually responsible for oral infections) in genital infections and the increased incidence of the type 2 virus (more common genitally) in oral infections.

Oral

Diseases that are transmitted primarily by oral means may be caught through direct oral contact such as kissing, or by indirect contacts such as by sharing a drinking glass or a cigarette.

Diseases that are known to be transmissible by kissing or by other direct or indirect oral contact include all of the diseases transmissible by droplet contact and (at least) all forms of herpes viruses, (especially **HSV-1**) and infectious mononucleosis.

Direct Contact

Contact transmission is either by making direct contact with the virus or indirectly by touching something an infected person touched or contaminated.

Diseases that can be transmitted by direct contact are called contagious (contagious is not the same as infectious; although all contagious diseases are infectious, not all infectious diseases are contagious).

These diseases can also be transmitted by sharing a towel (where the towel is rubbed vigorously on both bodies) or items of clothing in close contact with the body (socks, for example) if they are not washed thoroughly between uses. For this reason, contagious diseases often break out in schools, where towels are shared and personal items of clothing accidentally swapped in the changing rooms.

Some diseases that are transmissible by direct contact include athlete's foot, impetigo, syphilis, warts, and conjunctivitis.

Vertical

This is from mother to child (more rarely father to child), often in utero, during childbirth (also referred to as perinatal infection) or during postnatal physical contact between parents and offspring.

In mammals, including humans, it occurs also via breast milk (transmammary transmission). Infectious diseases that can be transmitted in this way include **HIV, Hepatitis B, and Syphilis**.

Latrogenic

Transmission due to medical procedures, such as touching a wound, an injection or transplantation of infected material. These are usually viruses picked up while in the hospital or a medical setting.

The most popular of these diseases that can be transmitted iatrogenically is **MRSA**.

Vector-Borne

A vector is an organism that does not cause disease itself but that transmits infection by conveying pathogens from one host to another. This is a disease transmitted by a transporter. Vectors are like Ubers for viruses.

Vectors may be mechanical or biological. A mechanical vector picks up an infectious agent on the outside of its body and transmits it in a passive manner.

An example of a mechanical vector is a housefly, which lands on cow dung, contaminating its appendages with bacteria from the feces, and then lands on food prior to consumption. The pathogen never enters the body of the fly.

In contrast, biological vectors harbor pathogens within their bodies and deliver pathogens to new hosts in an active manner, usually a bite. Biological vectors are often responsible for serious blood-borne diseases, such as Malaria, viral Encephalitis, Chagas disease, Lyme disease, and Zika.

Biological vectors are usually, though not exclusively, arthropods, such as mosquitoes, ticks, fleas, and lice. Vectors are often required in the life cycle of a pathogen. A common strategy used to control vector-borne infectious diseases is to interrupt the life cycle of a pathogen by killing the vector.

A Message From The CDC

Coronavirus Disease 2019 (COVID-19) Situation Summary

Background

CDC is responding to an outbreak of respiratory disease caused by a novel (new) coronavirus that was first detected in Wuhan City, Hubei Province, China and which has now been detected in 32 locations internationally, including cases in the United States. The virus has been named "SARS-CoV-2" and the disease it causes has been named “coronavirus disease 2019” (abbreviated “COVID-19”.)

Risk Assessment

Outbreaks of novel virus infections among people are always of public health concern. **The risk from these outbreaks** depends on the characteristics of the virus, including how well it spreads between people, the severity of resulting illness, and the medical or other measures available to control the impact of the virus (for example, vaccine or treatment medications.)

The fact that this disease has caused illness, including illness resulting in death, and sustained person-to-person spread is concerning. These factors meet two of the criteria of a pandemic. As community spread is detected in more and more countries, the world moves closer toward meeting the third criteria, the worldwide spread of the new virus.

The potential public health threat posed by COVID-19 is high, both globally and to the United States. But the individual risk is dependent on exposure. If you don't catch it, you're good.

As of Feb. 23, 2020, for the general American public, who are unlikely to be exposed to this virus at this time, the immediate health risk from COVID-19 is considered low.

Under current circumstances, certain people will have an increased risk of infection, for example, healthcare workers caring for patients with COVID-19 and other close contacts of persons with COVID-19. CDC has developed guidance to help in the risk assessment and management of people with potential exposures to COVID-19.

However, **it's important to note that current global circumstances suggest it is likely that this virus will cause a pandemic.** In that case, the risk assessment would be different.

What May Happen

More cases are likely to be identified in the coming days, including more cases in the United States. **It's also likely that person-to-person spread will continue** to occur, including in the United States. Widespread transmission of COVID-19 in the United States would translate into large numbers of people needing medical care at the same time.

Schools, childcare centers, workplaces, and other places for mass gatherings may experience more absenteeism. Public health and healthcare systems may become overloaded, with elevated rates of hospitalizations and deaths. Other critical infrastructures, such as law enforcement, emergency medical services, and the transportation industry may also be affected. Health care providers and hospitals may be overwhelmed.

At this time, there is no vaccine to protect against COVID-19 and no medications approved to treat it. **Nonpharmaceutical interventions** would be the most important response strategy.

Nonpharmaceutical Interventions (NPIs) are actions, apart from getting vaccinated and taking medicine, that people and communities can take to help slow the spread of illnesses like pandemic influenza (flu). NPIs are also known as community mitigation strategies.

When a new flu virus spreads among people, causing illness worldwide, **it is called pandemic flu.** Because a pandemic flu virus is new, the **human population has little or no immunity against it.** This allows the virus to spread quickly from person to person worldwide. NPIs are among the best ways of controlling pandemic flu when vaccines are not yet available.

Coronavirus' Transmission Methods

These Are Preliminary Findings.

Scientists are still trying to determine how the coronavirus that's triggered a global health emergency spreads. Pinpointing where, when and how the pneumonia-causing virus transmits is key to formulating the most effective ways to protect people and stop the epidemic.

In the absence of detailed, rigorously gathered and validated data, the current understanding of how the virus that causes Covid-19 spreads is largely based on what is known about similar coronaviruses. Doctors in China have investigated, and seemingly discarded, the possibility it could be passed in utero after the infection appeared in babies born to mothers with the disease.

We don't yet know if the virus can be passed by insects or by the sweat of infected people. We know that pets are immune to the coronavirus but they can become vectors (Ubers) if their exteriors are contaminated by contact with an unshielded carrier of the virus (contact transmission) or an infected person sneezes or coughs on the pet (droplet transmission.)

We also know that live animals that are used for human consumption are vectors. That's how this outbreak got started. That means that people who work on animal farms, live meat markets, or meat processing plants are substantial dangers to the general public at large. We've already had many nationwide outbreaks of contamination from e. Coli and Salmonella. If an infected person goes to work in a processing plant, they can easily infect hundreds or thousands before it is discovered.

Here are the main hypotheses about how it does spread:

Respiratory Droplets

It’s widely assumed that the virus spreads in respiratory droplets -- spatters of liquid that is sometimes visible to the naked eye -- forcefully expelled from an infected person's cough or sneeze or our saliva. As we talk, most people expel small droplets of saliva (spit.) These are usually heavy enough to fall immediately to the ground or surrounding surfaces.

An infection could occur if the droplets reach the mouth, nose or possibly the eye of someone nearby, perhaps from an unwashed hand that's touched a contaminated surface. The World Health Organization recommends avoiding close contact with anyone who has a fever and a cough or other respiratory symptoms. That means keeping at least 1 meter (3 feet) from a sick person and avoiding shaking hands, hugging and kissing people with the symptoms.

The possibility of transmission through the eyes hasn't been thoroughly investigated, but **Guangfa Wang,** a member of China's national expert panel on pneumonia, has said he thought he'd contracted the disease that way during an inspection of patients in which he wore a face mask.

A group of ophthalmologists has supported his hypothesis in a letter to The Lancet. The tissue known as the conjunctiva that lines the inside of the eyelids and covers the whites of the eye has been shown to be the gateway for other infections. The eye doctors writing to The Lancet called for their colleagues examining suspected cases to wear protective eyewear.

Tiny Aerosol Particles

When people sneeze, cough or even breathe, they also emit particles so small that instead of falling right to the ground, these aerosols can float for a time through the air. These respiratory droplets start as droplets described above but the water or fluid around them evaporates leaving behind the aforementioned droplet nuclei. This aerosolized droplet is invisible to the naked eye. It's not like spray from hairspray or a spray can of paint.

These aerosolized droplet nuclei are particularly dangerous because they are not only airborne but can remain so for many hours. What's even more troubling is that these aerosolized droplets can be **moved around a room or building by the HVAC system**. Hospitals have special rooms to prevent this called Airborne Infection Isolation Rooms. But not all hospitals have such rooms nor will there be enough of them if we have a major outbreak.

When a virus is carried by such particulates, its odds of infecting people are higher because of the potential for them to be inhaled. More studies are needed to determine if this is the case with the Covid-19 virus. If it is, it might mean health-care workers interacting with infected people require extra precautions, similar to those taken when treating other infectious diseases that travel in this way, such as tuberculosis, according to **Benjamin Cowling,** a professor of public health at the University of Hong Kong.

For the hordes of regular people rushing out to buy masks, however, Cowling says it's less clear how helpful they would be even if this is the primary mode through which the novel coronavirus spreads. The confusion has prompted shortages of protective gear, from face masks to surgical gloves, to hand sanitizer and even toilet paper around the world.

Fecal-To-Oral

Another possible route of transmission is infected people improperly washing their hands after using the toilet, and then touching surfaces or preparing food that comes in contact with healthy people. Recent research suggests this fecal-oral route may be an important and under-recognized pathway for the novel coronavirus.

It may also explain how the virus has spread among hundreds of passengers and crew aboard cruise ships. If that's the case, regular hand-washing and sanitizing bathrooms, food preparation and serving areas could be more effective in slowing the virus than outfitting people with face masks, according to **John Nicholls,** a professor of pathology at Hong Kong University, who was part of the research team that isolated and characterized the virus responsible for the 2002-2003 epidemic of severe acute respiratory syndrome, or SARS. "Masks will be of benefit in this condition only because they stop you from putting contaminated fingers in your mouth," he said.

That theory is highly plausible but I have another one. I think the cruise ships which I call "floating incubators" may have poorly designed HVAC systems or inadequate filtration. These systems allow for the coronavirus to be picked from the room of an infected person and moved to the rooms of uninfected people. More on this later.

Fomites

Water, food, and so-called fomites -- inanimate objects or materials, such as clothing or utensils -- may be a source of infection, especially if they have been contaminated by an infected person's respiratory secretions or feces.

In recognition of that risk, Chinese health officials recommend measures to strengthen sanitation and hygiene in epidemic areas. These include drinking boiled water, avoiding eating raw food, washing hands frequently, disinfecting toilets, and preventing water and food from being contaminated by patients.

Zoonotic Fallacy

Many scientists have insisted that these coronaviruses like SARS, MERS, and COVID19 are zoonotic. That means that they came from animals. That the animals were the original source and then through contact with these animals humans were infected, became contagious and unknowingly began spreading the disease to other humans.

I contend that these animals are mere vectors or transporters of the virus. I've described vectors earlier as **Ubers for viruses.** These animals are not infected internally by the viruses and suffer no ill consequences. They don't develop any wide-scale pneumonia nor do they become contagious to other animals.

I believe only their exteriors become contaminated with the virus that was bio-engineered and designed in a lab to kill humans and spread surreptitiously to other humans. Scientists, virologists, and other experts have been able to identify and determine the ground zero sources of a particle virus.

They can determine with pinpoint accuracy which market and which animal started a particular outbreak. But they have yet to prove or provide epidemiological evidence beyond a reasonable doubt that these mostly nocturnal animals were the creators or originators of the viruses.

HVAC Systems and Airborne Diseases

When I discovered the connection between HVAC systems and the transmissibility of airborne diseases such as the coronavirus (COVID19,) I began doing research. I was surprised to find so much information readily available. That means hospitals have known for quite some time of this connection. Yet, for some unknown reasons, maybe economic, they were unable or unwilling to tackle this problem. Especially in many older buildings and facilities.

I have attached links to the sources of this information and data. If you have the time and it's important enough to you, you can verify it. Or you can take it at face value and begin preparing to save your life and evade or avoid this novel coronavirus. Most of the data is lifted verbatim. I did not summarize it. Not because of laziness but for accuracy. I could not have explained this information any better than the experts themselves.

Here's what I learned:

Airborne illness this time of year because we all spend more time indoors, often in buildings with poor ventilation and poorly maintained HVAC systems.

Many modern buildings, especially in New York City, are tightly sealed to conserve energy. Unfortunately, if building systems are not properly maintained, the air can become stagnant and contaminants such as bacteria, viruses and even dangerous mold are trapped inside. Even worse, they are circulated throughout the building through the heating and air conditioning ducts. No wonder so many people are sick!

According to the Occupational Safety and Health Administration (OSHA), some of the most common causes of poor indoor air quality include high humidity caused by poor upkeep of ventilation, heating, and air conditioning (HVAC) systems. Bacteria and viruses that cause respiratory infections can more easily multiply and spread in uncontrolled humidity conditions.

What's That In The Air?

"Environmental opportunistic infections" are developing faster than ever before, pointed out Andrew Streifel, University of Minnesota hospital environmental specialist, Minneapolis/St. Paul.

An opportunistic infection can be relatively harmless in a healthy person - that is, it may cause symptoms, but the body's immune system can fight it.

However, it could cause severe problems, even death, for people whose immune systems are weakened or compromised, Streifel explained. These people include those undergoing chemotherapy, which essentially shuts down the immune system, and people with certain illnesses that work directly on the immune system, such as AIDS.

Also at greater risk are the very young, whose immune systems are still developing, and the old, whose immune systems are starting to decline. Human infectious agents can include tuberculosis (TB), chickenpox, herpes zoster, measles, smallpox, monkeypox, and severe acute respiratory syndrome (SARS).

Stopping the spread of such diseases requires isolation, and possibly negative-pressure, airborne-infection isolation rooms, said Streifel.

Air Pressurization

Streifel pointed out that there are several things to keep in mind when designing or working with negative-pressure isolation rooms or areas.

Don't cut corners if you're going to use a portable HEPA filter in a negative-pressure isolation room. "You can't go on the cheap," he said.

Be careful to ensure that exhaust air from such an area blows out of the building rather than entering into the hospital's total ventilation system. For this purpose, consider using a portable, negative-pressure anteroom to prevent contaminants from being drawn out when the room's door is opened.

Make sure maintenance administration and training are supported with on-site documentation. Verify the ventilation parameters. For testing, use the proper equipment (i.e., air balance hood and micromanometer).

"Filtration works when it's properly installed and maintained," Streifel said. However, this is not being done, at least not often enough. He also indicated frustration that all air filters currently are being tested in labs, so their ratings do not reflect real-world results. Low-pressure-drop HEPA filters are good products, he said.

Make use of mechanical and natural zones. Understand control issues. Maintain the system to design criteria. Train employees on the system's operation and maintenance.

Michael R. Strommen, Ph.D., is an atmospheric chemist with 3M, St. Paul, MN. His talk titled "Characteristics and Control of Airborne Microorganisms - Airborne Particle Characteristics" had some graphics that looked like a major airline's flight trajectories.

These showed the movement of spores and other particles in-side a room. Computer modeling showed movements with various hospital room configurations.

"Spores can be transmitted in the air," he said. Some infectious diseases, like TB, are transmitted in droplet nuclei. "Viruses on rare occasions seem to be transmitted through the air," he said.

For particle filtration, he recommended putting nonwoven media in the path of the airstream. These filters should have synthetic and glass fibers. "There is a critical need to ensure the integrity of the filter seal," he said.

The Airborne Transmission of Respiratory Pathogens

Introduction

The **airborne transmission of respiratory pathogens** such as measles, tuberculosis, severe acute respiratory syndrome (SARS), influenza, rhinovirus, and others in indoor environments

and the associated risk of infection presented to uninfected occupants are governed by several complex physical and biological processes. Communicable respiratory illnesses lead to large excesses in expenses associated with healthcare, absence from work, and lost worker productivity, but the control of airborne infectious disease transmission in indoor

environments are not yet entirely understood.

Several studies have shown that building design and operational characteristics such as increased outdoor air ventilation rates, lower occupant density, and use of UV germicidal irradiation (UVGI) can reduce the risk of infectious disease transmission inside buildings.

Similarly, commonly available particle filters in recirculating heating, ventilating, and air-conditioning (HVAC) systems may also be used to reduce the risk of airborne infectious disease transmission, depending on the nature of infectious aerosols and some important building characteristics.

However, key questions remain about (i) the effectiveness of particle filtration for

controlling airborne infectious aerosols, (ii) the associated risk reductions achievable with

HVAC filtration, and (iii) the relative costs of risk reduction by HVAC filtration versus other

control mechanisms such as increased outdoor air ventilation rates.

Estimating Risks of Airborne Disease Transmission

Aerosol transmission has been shown to be a predominant route of transmission for several communicable diseases, including rhinovirus, influenza, tuberculosis, and SARS. There is also growing empirical evidence that increased outdoor air ventilation rates in buildings can reduce the transmission of some of these same diseases, which further confirms the likely importance of airborne transmission via infectious aerosols in indoor environments.

Airborne Pathogens' Unique Challenge

Exposure to airborne pathogens is a common denominator of all human life. With the improvement of research methods for studying airborne pathogens has come evidence indicating that microorganisms (e.g., viruses, bacteria, and fungal spores) from an infectious source may disperse over very great distances by air currents and ultimately be inhaled, ingested, or come into contact with individuals who have had no contact with the infectious source.

Airborne pathogens present a unique challenge in infectious disease and infection control, for a small percentage of infectious individuals appear to be responsible for disseminating the majority of infectious particles.

This paper begins by reviewing the crucial elements of aerobiology and physics that allow infectious particles to be transmitted via airborne and droplet means. Building on the basics of aerobiology, we then explore the common origins of droplet and airborne infections, as these are factors critical to understanding the epidemiology of diverse airborne pathogens.

We then discuss several environmental considerations that influence the airborne transmission of disease, for these greatly impact particular environments in which airborne pathogens are commonly believed to be problematic.

Finally, we discuss airborne pathogens in the context of several specific examples: healthcare facilities, office buildings, and travel and leisure settings (e.g., commercial airplanes, cruise ships, and hotels.)

Aerobiology

Aerobiology is the study of the processes involved in the movement of microorganisms in the atmosphere from one geographical location to another, including the aerosolized transmission of disease like the coronavirus (COVID19) also known as SARS Cov-2.

The aerosolized transmission of disease occurs through both "droplet" and "airborne" means. Droplet transmission is defined as the transmission of diseases by expelled particles that are likely to settle to a surface quickly, typically within three feet of the source.

Thus, for example, for an infection to be caused by droplet transmission, a susceptible individual must be close enough to the source of the infection (e.g., an infected individual) for the droplet (containing the infectious microorganism) to make contact with the susceptible individual's respiratory tract, eyes, mouth, nasal passages, and so forth.

In contrast, airborne transmission is defined as the transmission of infection by expelled particles that are comparatively smaller in size and thus can remain suspended in the air for long periods of time. Airborne particles are particularly worrisome simply because they can remain suspended in the air for extended periods of time.

Seminal studies from the 1930s and 1940s demonstrated that airborne particles can remain airborne for as long as one week after initial aerosolization, and suggested further that these particles likely remained airborne for much longer.

They thus potentially expose a much higher number of susceptible individuals at a much greater distance from the source of infection. Depending on environmental factors (e.g., meteorological conditions outdoors and fluid dynamic effects and pressure differentials indoors), airborne particles are easily measured 20 meters (60 ft) from their source.

These factors would be of no concern but for the fact that airborne bacterial, viral, and fungal particles are often infectious.

A complicating factor is the heterogeneous nature of droplet and airborne releases, which generally consist of mixtures of both single and multiple cells, spores, and viruses carried by both respiratory secretions and inert particles (e.g., dust). The origins of droplet or airborne infectious microorganisms are also heterogeneous: infectious particles may be generated from, for example, infectious persons, heating, ventilation, and air conditioning (HVAC) systems, and cooling tower water in hospitals. All of these sources can produce airborne infectious particles.

Transmission of infectious disease by the airborne route is dependent on the interplay of several critical factors, primarily particle size (i.e., the diameter of the particle) and the extent of desiccation (evaporation.) The literature suggests that a particle's size is of central importance in determining whether it becomes and remains airborne and infectious.

Thus, when investigating the origins of a droplet and airborne infections, there are several well-known primary sources of infectious particles (see below): vomiting, toilet flushing (i.e., toilet water aerosolization), sneezing, coughing, and talking. Moreover, toilet bowls, the water in them, and toilet seats may harbor infectious particles after the initial flush, making additional aerosolization of infectious particles possible with additional flushes for as long as 30 minutes after the initial flush.

A single sneeze, for example, generates as many as 40,000 large droplet particles; most will desiccate immediately into small, infectious droplet nuclei, with 80% of the particles being smaller than 100 μm.

Droplet or airborne microorganisms released from various activities:

Activity approximate particle count in units

- Sneezing 40,000 Per sneeze
- Bowel evacuation 20,000 Per event
- Vomiting 1,000 Per event
- Coughing 710 Per cough
- Talking Per 100 words

Environmental Considerations

While the airborne transmission of the disease depends on several physical variables endemic to the infectious particle, environmental factors substantially influence the efficacy of airborne disease transmission.

The environmental factors most often cited as modifying the airborne transmission of disease are temperature and relative humidity.

Together, they help determine whether or not an airborne particle can remain infectious. For example, the size of infectious particles can change depending on relative humidity and temperature (i.e., factors that influence desiccation or hygroscopicity). An added complication is the fact that temperature and humidity influence viral, bacterial, and fungal particles differently.

Temperature is an important factor affecting virus survival. Generally, as the temperature rises, virus survival decreases. For example, low temperatures (i.e., 44.6°F–46.4°F) have been suggested to be ideal for airborne influenza survival, with survival decreasing progressively at moderate (i.e., 68.9°F–75.2°F) and high temperatures (i.e., >86°F.)

This relationship holds across a range of relative humidities (i.e., 23%–81%.) Influenza has also been shown to be transmissible via an airborne vector (Ubers) under cold, dry conditions. While relative humidity is recognized to be a factor in the viability of airborne and droplet viral transmissions, the exact relationship is presently not well understood.

In general, bacteria are more resistant to temperature than viruses. Temperatures above 75.2°F are required to reduce airborne bacterial survival.

Airborne Pathogens in an Office Building Setting

The current common denominator affecting the transmission and/or reduction of transmission of airborne particles in a building is its HVAC system. HVAC systems are intended to provide for the health, comfort, and safety of occupants by maintaining thermal and air quality conditions that are acceptable to the occupants through energy-efficient and cost-effective methods under normal conditions. And, to the extent possible, they are expected to be responsive to hazardous exposures under extraordinary conditions.

A typical HVAC system has three basic components: (1) outdoor air intake and air exhaust ducts and controls, (2) air handling units (i.e., systems of fans, heating, and cooling coils, air filters, and controls), and (3) air distribution systems (i.e., air ducts, diffusers and controls, return and exhaust air collectors, grilles, and registers, return and exhaust air ducts and plenums.)

HVAC systems perform multiple functions simultaneously, including controlling three known central variables in the airborne transmission of infectious particles: temperature, relative humidity, and air currents.

The introduction of airborne infectious agents into an office or commercial building varies with the microorganism. Bacteria, molds, and allergens can easily enter a building through an HVAC air intake, spreading throughout via the air-handling system. Building materials, carpets, clothing, food, pets, and pests are also known sources of introduction of airborne particles into an office or commercial building.

Viruses that are spread easily via an airborne transmission (e.g., Influenza A) can be brought into a building by infected individuals and potentially enter the return air system and be spread throughout a building by the HVAC system.

Such infected individuals may show no symptoms and thus hamper infection control measures (e.g., 30%–50% of humans infected with Influenza A show no symptoms.) In general, however, it should be noted that the extent to which HVAC systems contribute to the airborne transmission of the disease has not been quantified.

Airborne Pathogens in a Healthcare Facility Setting

While healthcare facilities are subject to the same infectious challenges common to all office and commercial buildings, they face an additional, unique challenge: high-density populations of potentially contagious and immunocompromised people. This fact presents a unique challenge regarding infection control, as all respiratory pathogens can cause hospital-acquired infections. In hospitals especially, viruses and bacteria spread easily via airborne transmission.

Large quantities of infectious airborne particles are expelled during many routine patient bodily functions (as listed above) endemic to healthcare facilities, and viruses and bacteria that can spread via airborne or droplet means are diverse.

In the hospital setting, airborne infectious particles can have varied compositions. They can be single bacterial cells or spores, fungal spores, or viruses. They can be aggregates of several cells, spores, or viruses. They can also be biologic material carried by other nonbiologic particles (e.g., dust.)

Additionally, airborne infectious particles in hospitals span a wide range of sizes. Bacterial cells and spores range from 0.3 to 10 μm in diameter. Fungal spores range from 2.0 to 5.0 μm. Viruses range from 0.02 to 0.30 μm in diameter. Most infectious particles generated from human respiratory sources occur primarily as droplet nuclei, with a diameter of 0.5–5.0 μm, allowing them to remain airborne—and highly infectious—for extended periods of time.

Influenza A illustrates the difficulty hospitals have to contain highly infectious airborne particles that remain airborne and infectious for prolonged periods. Influenza A causes disease primarily in the lungs (like the coronavirus,) so sterile hands, instruments, and equipment cannot prevent an infectious person from transmitting, or a susceptible individual from acquiring, the virus.

And since 30%–50% of those infected with Influenza A are asymptomatic, it is often unknown when an infectious person is present. The dormancy or the asymptomatic yet contagious period is also common in the coronavirus (COVID19.) We just don't yet know the percentage.

Furthermore, in public areas like emergency rooms, over 50% of detectable Influenza A viral particles are aerosolized. This could be a nightmare for an emergency room full of coronavirus-infected and those who are not infected. Because the human infectious dose of this virus is very low, it is thus easy for individuals to become infected in such an environment.

Airborne Pathogens in a Travel/Leisure Setting

Airplanes

An enclosed passenger cabin of a commercial airplane is an environment conducive to the airborne spread of pathogens carried by passengers or crew members. However, as the environmental control systems used in commercial aircraft appear to restrict the transmission of airborne pathogens, the perceived risk by the public of airborne transmission of infectious disease on an airplane appears to be greater than the actual risk.

Nevertheless, a finite risk exists of droplet and airborne disease transmission while traveling on a commercial airplane. While there are four routes for the spread of microorganisms aboard an aircraft (e.g., contact, airborne, common vehicle, and vector-borne,) large droplet and airborne transmissions are thought in all likelihood to represent the greatest risk for travelers.

The high density of occupants and their close proximity to one another are believed to contribute to this risk. In this context, the ubiquity of commercial airline travel (over 1 billion passengers travel by air annually and 50 million of these travel to the developing world, may thus promote the spread of airborne pathogens over great distances.

One of the most critical factors in airborne disease transmission on an aircraft is cabin ventilation (or the lack thereof.) One air change per hour of well-mixed air in any space is thought to remove 63% of the airborne organisms in that space. Typically, modern commercial aircraft cabins experience 15–20 changes of air each hour.

Hence, proper ventilation on commercial aircraft helps to reduce the transmission of airborne infectious particles, and thus it is not surprising that increased ventilation, as well as the filtration of recirculated air through high-efficiency filters, has helped to reduce the spread of airborne pathogens on airplanes.

At the very least, the recirculation of cabin air is known not to be a risk factor for contracting upper respiratory tract infections. In contrast, airborne transmission becomes widespread in passenger cabins with no ventilation, as shown by an influenza outbreak when passengers were kept aboard a grounded aircraft with an inoperative ventilation system.

Hotels and Cruise Ships

Hotels and cruise ships share the same concerns as an office building or aircraft cabin, as these venues have in common enclosed spaces with large, dense populations. They are thus susceptible to airborne and droplet transmission via any of the mechanisms described above.

Aerobiology is now an active discipline, employing contemporary techniques including computational fluid dynamics to study airborne particle flow, polymerase chain reaction (PCR) methodologies to identify infectious agents and quantify airborne particle concentrations in various settings, and epidemiology to track the spread of disease.

However, the knowledge base is still limited, and translation to practice is in its infancy. For example, while the identity and concentration of airborne infectious particles under some conditions can be determined, few studies have thus far translated this information to useable estimates of infection rates for particular airborne particle sizes and concentrations, airflow conditions, exposure intervals, and pathogen virulence (among other variables). Such information would be of great value in helping to reduce the airborne transmission of infectious particles in all settings.

Practitioners of all kinds agree that the airborne transmission of infectious disease is a problem. Just how big or urgent a problem, however, continues to be debated. For example, there is currently a wide range in the reported frequencies of airborne transmission in hospital-acquired infections (10–33%).

A better understanding of the true contribution of airborne transmission to infection rates would allow hospital administrators to determine the degree to which they should commit resources to minimize this vector of disease transmission. The same issue applies to similar environmental contexts, such as office buildings, aircraft cabins, cruise ships, and hotels.

Practitioners of, and those responsible for, infection control in all settings are currently forced to use suboptimal (for the purpose), dated technologies to attempt to contain and eliminate the transmission of airborne infections (e.g., HEPA filtration systems were developed in the 1940s).

High-efficiency air filtration systems can be expensive to operate and easily fall victim to leakage and bypass problems that compromise the overall effectiveness of the system. However, as there is a lack of industry standards for evaluating new technologies that attempt to solve the airborne particle transmission problem, high-efficiency filtration remains the most widely deployed technology for this purpose.

Poorly Ventilated Buildings

Poorly ventilated buildings affect air quality and can contribute to the spread of disease. Microorganisms, such as those causing tuberculosis and legionellosis, can be transmitted by air-conditioning systems, particularly when they are poorly maintained or when the number of air exchanges per hour in a room is insufficient.

In health facilities where there is a high concentration of infectious patients, evidence shows that poorly ventilated buildings have higher risks of infectious disease transmission for patients, workers, and visitors.

Well-designed natural ventilation systems can often be more effective than air conditioning in promoting effective infection control, by increasing the number of air exchanges. For this reason, natural ventilation systems, or hybrid systems of natural ventilation and air conditioning, are increasingly being used in some clinics and hospital wards, such as those caring for TB patients, as a measure both for reducing infection risks as well as energy consumption. On the plus side, effective ventilation design can also enhance thermal comfort (e.g. promoting cooling), to improve patient and worker well-being.

Although natural ventilation can sometimes reduce the risk of airborne diseases, natural ventilation is not suitable for all hospital settings, for instance, laboratory or operating rooms where temperature conditions must be very strictly controlled.

Natural ventilation also can pose risks if outdoor air is polluted, or the environs are affected by security and crime. Screens also must be used in malaria and dengue-endemic areas to protect against mosquitoes and other vectors.

Part II: Anti-Virus Tools and Techniques

In the first part of this book, I enumerated the complexity and severity of this novel coronavirus (COVID19.) If you read it, you'll better understand the challenges we face. This part of the book will cover anti-virus tools and techniques you can use to avoid catching this novel coronavirus. I will cover several topics and areas of your daily life that will be impacted by the outbreak, and what you can do to save your life, the lives of your loved ones, and pets.

In 1918, the **Spanish Flu** went around the world three times in 18 months without any commercial air travel. This was right after WWI so commercial air travel wasn't created yet. Approximately, **100 million**

people died. Imagine how our current airline industry could exacerbate the global spread and the likelihood of this coronavirus becoming a pandemic.

Our daily lives as we know it will change drastically and dramatically. We will not be able to congregate in any private or public forums. Schools and public events will be banned and closed. **Millions of people would have to self-quarantine.** Marshall Law may have to be declared to effectuate a curfew to prevent looting and crime. Law enforcement, hospitals, healthcare providers, and other emergency service personnel will be overwhelmed by this unprecedented catastrophe we are facing.

During this time of the coronavirus outbreak, there will still be national weather emergencies. Also, **our election process must continue.** I propose that the US government take the readily available facial-recognition software, that they already use, and create an app so that people could be able to vote by phone. This software could also be used to distribute other government services such as food vouchers.

How our government handles this first wave of the coronavirus, will determine how long it lasts, and how extensive the damage will be to our country. The **government's standard plan is to isolate and**

contain. They want to **isolate infected people,** place them in medical facilities and separate them from the public. As part of an **attempt to contain** the virus, they will use quarantines. They will set up internment-style military camps to house **people "suspected" of being infected.** This will not result in positive effects. The "suspected" will get mixed in with the infected. Besides, we have more guns than people. We don't need rolling gunbattles.

This government-mandated program will fail to contain the coronavirus. Moreover, this quarantine will **drive people** who show symptoms or are "suspected" of being infected, **underground.** Additionally, by rounding up people and putting them on busses to quarantine camps will undoubtedly **conjoin infected people with non-infected people.** Because of the lack of segregation, inadequate supply of test kits, the time it takes to get results (1-2 days,) and the lack of personal protective gear, **this will help spread the disease faster.**

If you can **self-quarantine,** only leaving the house once a week to get food and medical supplies or for an emergency, **maintain a virus-free home zone, you can survive this first wave.** This coronavirus is like an avalanche. It's unstoppable but not unavoidable. If you were on the side of a mountain on a snowmobile, you could possibly survive an avalanche, avoiding it by driving perpendicularly, horizontally across the mountain. You can't outrun it and you can't hide from it. But **you can evade it by not catching it.**

Read this book. Share it. Many people will not be able or willing to read it. But **they deserve a chance to survive too.** Join forums to share reliable tips, tools, and techniques. Don't quarantine useful information. Be creative. Create ideas, and solutions to solve our problems we will face in everyday life. I can't cover all the possible scenarios and situations which may arise. But I will try to cover many of the important ones to help save your life by avoiding this novel coronavirus.

Don't try to ignore it, explore it. If you ignore the coronavirus, that will not make it go away or save your life. Get to know as much as you can about the virus. Research from reliable sources. Collaborate with others on solutions. **Do your due diligence. Get ready.**

Don't fear it, respect it. Being afraid won't keep you safe or help you make good decisions. Fear is not your friend. Don't let it consume you. Don't overthink this either. **Analysis paralysis** is when you think so much, and come up with so many options, that you do nothing at all. This **can kill you.** Respect your adversary -- this novel coronavirus. The following sections will help you to prepare for battle and survival.

Don't discriminate. The coronavirus doesn't discriminate at all. Everyone is a potential victim and everyone is a potential carrier who without any symptoms can be highly contagious. Don't take chances. **Protect yourself at all times** in the public no matter what you think or how you feel about the person.

Unmasking The Problems With Masks

We already know this novel coronavirus covid19 has shown the capability to penetrate, infiltrate, infect, and wreak havoc on our natural-defenses immune system. To protect ourselves we must add additional layers of security to our immune system defenses. We do this by using personal protective equipment like gloves, goggles, masks, and other gear that prevents the coronavirus from ever touching our bodies.

The two most common transmission threats posed by the coronavirus are aerosolized respiratory droplets that are small and inhaled, and the larger respiratory droplets which infect people through their mucus membranes. So what we have to do to survive is to block these menacing molecules from ever touching our bodies.

First, we will examine in great detail a crucial piece of equipment that is widely misunderstood and has been giving people a false sense of security. We will cover the myths, mystery, and methodology of how to use the masks. All masks are not the same and most won't protect you from getting the coronavirus.

Here's Why:

Cloth masks don’t protect you. Cloth masks don’t block small particles. The sort of mask that does is an N95 respirator, which filters out 95% of smaller air particles and is often specially fitted for healthcare workers.

Viruses and other pathogens travel either through the air; in droplets such as saliva or phlegm from coughing, sneezing, speaking, or breathing, or on surfaces.

"The coronavirus-carrying droplets, expelled from coughing, sneezing, speaking or breathing, can stay on the surface of the masks," Choi told Business Insider. "The biggest technical challenge of the current surgical mask and n95 respirator is that they cannot kill the virus sitting on their surface, which increases the chance of the contact transmission."

People are racing to buy face masks amid the coronavirus outbreak, but they probably won't protect you from illness.

Types of Masks

There are pretty much 3 types of masks: the accordion-style flat paper masks, the cup-shaped surgical masks, and half-face respirator masks with dual filters on each side of the face.

The ubiquitous paper masks are the most common but are not effective at protecting against the coronavirus. The surgical masks are good protection only if they rated N95 or above. This rating is also important for respirators.

Ratings of Masks

Masks are rated based on specifications from the National Institue for Occupation Safety and Health (NIOSH.) The rating system contains a combination letter and number to make up a code. The letters are N, R, or P. The numbers will either be 95, 99, or 100. The letter represents the "resistance" to oil. N is not oil resistant, R stands for resistance, and the P stands for oil proof.

The number tells you what percentage of airborne particles can be filtered out in a bad situation. 95 filters out 95% of airborne particles. 99 filters 99% of particles. 100 almost filters 100% but not quite. It filters out 99.97%. So a P100 would be the best protection.

Suffice it to say that masks without ratings are little more than splash-proof dust masks. This means that they prevent you from infecting others by blocking your ability to splash or spray your respiratory particles on others with a cough or sneeze. But they are porous and DO NOT protect you from inhaling airborne particles at all. They also act as a barrier or shield to preclude you from putting your hands in your mouth or nose.

Problems With The Masks

- There is a global shortage. They may be impossible to find.
- Only N95 and up, rated-masks will protect against airborne aerosolized respiratory particles.
- Most paper and non-rated masks only really prevent you from spreading the disease.

- Non-rated masks give a false sense of security.
- Non-rated masks are no protection against airborne coronavirus.
- Most people wear masks incorrectly. Masks can be ineffective if not sealed properly.
- People touch their faces 3.6 times per hour sometimes removing the mask.
- People often remove the mask to eat, smoke, drink, or talk on the phone.
- Masks are not made for small children or pets.
- Respirator masks make it very difficult to breathe. It can cause lightheadedness, dizziness, or headaches. It requires practice to build lung capacity. Do this before you need them.
- N 95 masks have a peculiar odor.
- Disposal masks are only useful for about 4 hours.
- Dual filter mask filters last about 40 hours or 30 days whichever is first.
- Dual filter respirator mask replacement cartridges cost almost as much as the mask.

- People have been hoarding masks and reselling at outrageous mark-ups.
- The US needs 300 million N95 respirator masks for medical and law enforcement personnel alone. They have only about 30M and most are made in China.
- You can't wear any jewelry or have any facial hair with a mask.
- When they become wet from the moisture in the mouth they become porous.
- Disposable masks are not reusable.
- Users must watch a training video on Youtube to learn how to properly put on a mask.

Possible Solutions

With the impending outbreak looming, fear and panic are starting to set in. Especially since the news conference from the CDC where Dr. Nancy Messonnier, the director of CDC's National Center for Immunization and Respiratory Diseases, said in the briefing: **It's not a matter of "if" but "when" the new coronavirus, SARS-CoV-2, will spread in the United States.** She said in a news conference on Feb. 25.

She further added:

The CDC is recommending that people begin to start planning for such an event by taking steps such as asking school systems what their strategy will be to mitigate the spread. For example, schools might consider dividing students into smaller groups or even using internet-based teleschooling, she said. On a larger scale, communities and cities may need to change or postpone mass gatherings, she added.

"Local communities will need to make decisions," Messonnier said. "Now's the time for businesses, hospitals, community schools, and everyday people to begin preparing."

We need about 300 million protective N95 respirator masks for the medical and emergency staff alone. With only 30 million on hand, we are woefully under-prepared. And the fact that most manufacturers of the mask are from in and around China and they have a shortage. They will not be exporting any to the US.

Here's What We Can Do

Try to buy at least two dual-filter respirators, P-100 or P-95 masks. One will suffice if you live alone. Try to buy two extra replacement filter cartridges. This will give you about 80 hours or 60 days of limited use. After using them, they should be cleaned and stored in a container or Ziploc bag after they are dry. (See Youtube on cleaning instructions.) This is because the carbon filters inside continue to work once opened.

Practice wearing your mask around the house before you ever try to use them outside. Start with 10 minutes then increase in 10-minute intervals until you can get up to 1 hour. These respirators are very taxing on the lungs. Your lungs must be trained and you must build up lung capacity to be able to use them outdoors. You may get dizzy, lightheaded, or get a headache at first.

Watch a training video on proper donning (which is putting on) and doffing (which is taking off the mask.) Don't take these two previous steps for granted. They are extremely important for your safety. You wouldn't want to pass out while driving to get groceries, would you?

During the upcoming outbreak, **I recommend all non-essential workers self-quarantine.** We should only leave the house for food, medical supplies or in the case of a medical emergency. We should try to limit that to once a week. This will prolong the life of your masks and limit the chances of you bringing the coronavirus into your virus-free home.

Don't go out in pairs or as a group. One person per household will suffice for the reasons listed above. Keep an extra mask in case of an emergency and you must drive someone to the hospital. That person will need a mask.

Also, it can be used if a person in the house shows signs or symptoms of respiratory illness. If you suspect it might be the coronavirus and don't want to take that chance of going to the hospital and being exposed to highly-probable infected people, you can build your own isolation room. You can use the two masks for limited interaction between the two people.

What To Do If You Don't Have A Mask

First, DON'T PANIC. Masks are only one weapon or tool in our arsenal we will use to fight this upcoming battle. **You can survive without one.** The mask is an added barrier to protect us from self-infection by touching fomites and putting our hands in our mouth or nose. They also prevent us from spreading the virus to others or someone spreading large respiratory droplets on our mucus membranes in our mouth or nose. The most important thing they do is protect us from inhaling aerosolized airborne respiratory droplets.

We must adopt evasion and avoidance procedures. Avoid going to any areas where there are potentially sick or infected people. No communal gatherings large or small, public or private. Hospitals are particularly dangerous. Only go if it's absolutely necessary.

Institue a "4 and 6" evasion rule. A 4 feet evasion rule will help protect you from large respiratory droplets which usually fall within 3 feet. The 6 feet rule is to help protect against smaller aerosolized airborne droplets. It's true, they can indeed linger in the air for hours but they usually settle on surrounding surfaces within 10 minutes.

So unless someone without a mask or facial covering who is within 6 feet of you sneezes or coughs on you or in your direction, the chances are small you will be exposed to airborne particles. Also, you can evade them if they sneeze unmasked in your area. Just run away.

Now you should, **cover your face with some type of fabric.** A long scarf will be ideal because you can wrap it multiple times around your face and neck and it's thin enough to allow you to breathe easily.

Another option is to create a plastic veil. Using a large piece of heavy-duty clear plastic you can place it on top of your head and secure it with a couple of large rubber bands (use two in case one break,) or a hair scrungy or headband. Rubberbands can be disposable or cleaned chemically using wipes, but scrungys and headbands must be boiled for 10 minutes.

This veil should reach and cover your shoulders. This will protect you further. It is another layer or barrier to the coronavirus and can be used in conjunction with the scarf.

I hope this info helps keep the calm. We are smart and resourceful people and we will get through this first wave if we work together and work smartly instead of emotionally.

Many others will come up with ideas to use instead of masks. Share them quickly and freely to all. Don't quarantine information and don't discriminate about sharing it.

Cautionary Tales About Masks

Face masks are designed to catch large contaminants and particles. There are two common kinds: surgical masks and N95 respirators. There are N95 cup-style surgical masks made. These are most common in hospitals and healthcare facilities when dealing with known or suspected cases of airborne infectious diseases.

Half-face dual-filtered, N95 respirators filter out most airborne particles from the surrounding air, preventing wearers from breathing in particles down to 0.3 microns in diameter. These types of masks are often used when air quality is poor due to wildfire smoke or pollution, and they're designed to fit tightly against one's face.

However, the coronavirus measures between .05 and 0.2 microns in diameter, according to a recent article in **The Lancet.**

Surgical masks, meanwhile, are designed to keep droplets and splatter from passing from a person's mouth to nearby surfaces or people. So they're primarily meant to keep healthcare providers from spreading their mouth-borne germs to patients.

Many people do not wear either type of face mask properly — wearers often move the masks to the side to touch their faces throughout the day, breaking the barrier that the mask is supposed to create. This makes the protection ineffective.

A Proper Seal Is Most Important

Two main types of face masks are being used to protect against the coronavirus. One is a standard surgical mask – the kind worn by surgeons during operations. These masks are designed to block liquid droplets and might lower the chance of catching the virus from another person.

But these masks don't offer full protection against airborne viruses. For a start, they don't fully seal off the nose and mouth – particles can still get in. And very small particles can simply pass through the material of the mask. These masks also leave the wearer's eyes exposed – and there's a chance the virus can infect that way. "They might help, but it's not clear they give you total protection," says Mark Woolhouse at the University of Edinburgh, UK.

One-Use Masks

The **World Health Organization** recommends that all healthcare workers treating people with the virus wear these surgical masks, along with gloves, goggles, and gowns. Surgical masks are thought to be more effective in a clinical setting because they are accompanied by other protective equipment and stringent hygiene practices. The masks are also frequently replaced – surgical masks are not designed to be used more than once.

N95 respirators offer more protection. Such devices are designed to prevent 95 percent of small particles from entering the nose and mouth area. But they only work if they fit properly, and aren't suitable for children or people with facial hair.

Adalja applauded the CDC's recommendation on face masks. "Even during H1N1 (flu epidemic), there was no recommendation to wear face masks," he said. They "end up creating a false sense of security and most people don't wear them appropriately," he added.

People not in the medical field who wear the masks often come in contact with germs when they lift the mask up to eat or slip their fingers under the mask to blow their nose, he said.

In some Asian countries, such as Japan and China, it's not uncommon to see people wearing surgical masks in public to protect against pathogens and pollution. But those masks don't help much in the context of a virus, Schaffner said. "They're not designed to keep out viral particles, and they're not nearly as tightly fitted around your nose and cheeks," as an N95 respirator, he said.

Fomite Problem

Though viruses spread through droplets in the air, a bigger worry to me was always transmission via what doctors call “fomites,” or infected items and surfaces. A virus gets on a surface — a cell phone, a shoe, a doorknob, or a pen in a hospital, for example. You touch the surface and then next touch your face or rub your nose.

Humans touch their faces on average 3.6 times every waking hour. And in between those touches, they touch other surfaces 3.3 times per hour on average. This means the risks of contact transmission via fomites are very high. This is why the mask must stay on once it's on.

The coronavirus - known as COVID-19 - spreads from person to person in close proximity, similar to other respiratory illnesses, such as the flu. Droplets of bodily fluids - such as saliva or mucus - from an infected person are dispersed in the air or on surfaces by coughing or sneezing.

These droplets can come into direct contact with other people or can infect those who pick them up by touching infected surfaces and then their faces. **According to scientists, coughs and sneezes can travel several feet and stay suspended in the air for up to 10 minutes.**

It is not yet known how long the virus can survive outside a host but, in other viruses, it ranges from a few hours to months.

Breathing Is Harder With The Respirator Masks

Specialists receive retraining annually on how to properly fit these respirators around the nose, cheeks, and chin, ensuring that wearers don't breathe around the edges of the respirator. "When you do that, it turns out that the work of breathing, since you're going through very thick material, is harder. You have to work to breathe in and out. It's a bit claustrophobic. It can get moist and hot in there," Schaffner said.

"I know that I can wear them when I need to for about a half-hour," he added. "But then I have to go out of the isolation room, take it off and take some deep breaths, kind of cool off before I can go back in."

Surgical Masks

The thinner surgical mask is intended for surgeons because these products do a good job of keeping pathogens from the doctor's nose and mouth from entering the surgical field, Schaffner said.

Specialized respirators are key to stopping the spread of coronavirus to medical staff. Specialized respirators appear to protect medical staff against COVID-19, but they must be worn to work.

A certain type of respirator effectively protects medical workers from catching COVID-19, the viral disease that has sickened more than 75,000 people since December 2019.

Caused by the newfound coronavirus SARS-CoV-2, COVID-19 can spread to new hosts when infected people expel bits of the virus through their sneezes and coughs. Those who come into close contact with infected people face the highest risk of infection; that means that the medical staff treating sick patients are among the most likely to catch the disease.

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The Masks Do Save Lives

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The high rate of infection may be blamed, in part, on inadequate hand disinfection and sparse use of N95 respirators, which are designed to filter out virus particles, according to a study.

The "N95" designation means that the respirators block out at least 95 percent of tiny particles that come into contact with them, on the scale of 0.0001 inches (0.3 microns) in diameter, according to the U.S. Food and Drug Administration.

About 280 medical staff in the hospital's Respiratory, ICU and Infectious Diseases departments wore N95 respirators and washed their hands frequently, while about 215 in the departments of Hepatobiliary Pancreatic Surgery, Trauma and Microsurgery, and Urology wore no masks and disinfected their hands less frequently. **Although the respirator group encountered confirmed cases more often than the unmasked group — more than 730% more often — no one in the respirator group became infected.**

In comparison, 10 people in the unmasked group contracted the novel disease, despite treating fewer infected patients.

Proper Training Is Required

Medical staff requires training to properly fit N95 respirators around their noses, cheeks, and chins to ensure that no air can sneak around the edges of the mask, Live Science previously reported.

To breathe through the thick respirators, wearers work much harder than normal to inhale and exhale and must occasionally take breaks from wearing the equipment. Each time they take the respirator off, the wearer must double-check that it hasn't been soiled or damaged before donning (putting it on) it again.

Although people must be trained before wearing an N95 respirator, "one could conjure up circumstances" where civilians could be trained to use the respirators at home, say, if hospitals became overrun with patients and those with mild symptoms came to rely on home care instead, Schaffner said. Without adequate training, though, the measure would be no more effective at blocking the virus than an average surgical mask, he added.

"It would appear that N95 respirators, no surprise, protect against health care acquisition of the virus," said **Dr. William Schaffner,** an infectious-diseases specialist at Vanderbilt University in Tennessee, who was not involved in the current study. The small study is "reassuring in that sense," although there was no reason to think that N95 respirators wouldn't block out the novel coronavirus effectively, he added.

Only Proper Use Will Protect You

Dr. Julie Vaishampayan, chairwoman of the public health committee for the Infectious Diseases Society of America, said surgical masks are really "the last line of defense."

"We worry about people feeling they're getting more protection from the mask than they are," she said. "**Washing your hands and avoiding people who are ill is way more important than wearing a mask.**"

The masks will, however, block most large respiratory droplets from other people's sneezes and coughs from entering your mouth and nose, said **Dr. Amesh Adalja,** an infectious disease physician at the Johns Hopkins Center for Health Security. Coronaviruses are primarily spread through droplets, he said.

The bigger problem is that people don't use masks properly. “Most people will put their hand underneath the mask to scratch their face or rub their nose,” bringing contaminants in contact with the nose and mouth, said Dr. Adalja. “You can’t take it off when you get a phone call.”

But washing hands — frequently and before eating — is universally recommended. Hand sanitizer is effective against respiratory viruses. Experts also recommend washing hands with soap and water for at least 20 seconds, rubbing the hands together and ensuring all parts of the hands — the palms as well as the back of the hands — are washed.

“It’s also important to keep your hands away from your face,” said Dr. Vaishampayan. “Respiratory viruses don’t infect through your skin, they infect through your mucous membranes: the eyes, nose, and mouth.”

Mask Are Sold Out Almost Everywhere

Protecting yourself from coronavirus: The two types of face masks that can help.

Although disposable face masks block large particles from entering your mouth, a more tight-fitting N95 respirator mask is far more effective at protecting you from airborne illnesses. While both of these masks can help protect you from getting a viral infection, **Dr. Nancy Messonnier,** Director National Center for Immunization and Respiratory Diseases said in a Centers for Disease Control and Prevention presser.

If you still want to buy a mask to protect yourself from Coronavirus or any other viral infection (like the flu), you might have a hard time finding them. As of February 5, 2020, both face masks and N95 respirator masks are either sold out online or marked up significantly, especially on Amazon and Walmart.com.

Many options are either sold out or are sold by third-party sellers for steep prices. You might have better luck heading to your local drugstore for surgical face masks and your local hardware store for N95 masks.

Masks help prevent you from spreading your illness to someone else. Face masks can also help prevent hand-to-mouth viral transmissions (self-infection) because you can't directly touch your mouth while wearing one. However, virologists say that surgical face masks cannot block airborne viruses from entering your body.

For that, you'll need a respirator, a tight-fitting protective device worn around the face. When people say "respirator," they're usually referring to the N95 respirator. The N95 respirator gets its name from the fact that it blocks at least 95% of tiny particles.

Several brands manufacture N95 respirators, and they come in all different sizes. When shopping for this kind of mask, be sure the packaging says "N95" -- some masks will only say "respirator" but if they aren't marked as N95, you won't get the full level of protection.

Do Respirators Actually Prevent Viral Infections?

The answer to this is yes, but the exact effect is difficult to define. Studies have shown that they're highly effective in preventing viral illnesses, but only in people that actually wore the masks correctly, which is rare.

N95 masks are difficult to put on for people who aren't medical professionals. If you've put the mask on right, it gets hot and stuffy, so a lot of people take it off before it can do any good.

Another study showed that respiratory masks are helpful in preventing viral infections, but only when combined with frequent handwashing.

The bottom line? **A government-approved N95 mask can lower your chance of viral illness, but only if you use it correctly.** Plus, you should continue other common-sense preventative measures, like washing your hands frequently, not touching your mouth or nose and avoiding other sick people.

If you don't have access to an N95 mask, a surgical face mask will suffice. Though, as noted, you'll get less protection from airborne viruses if you wear a face mask. Hall says that **wrapping a scarf or other cotton fiber around your nose and mouth can also work in a bind.**

How to Buy a Respirator

Hall tells CNET that N95 masks are difficult to find because many brands have left the market. However, if you live near a store like CVS, Target or Walmart you may be able to pick one up. The key is to make sure the mask is approved by NIOSH (National Institute for Occupational Safety and Health.)

The CDC's website has a comprehensive list of all the NIOSH-approved N95 masks, which you can use to cross-check any mask before you buy it. These masks filter out at least 95% of airborne particles, so again, if you wear them correctly they're fairly effective.

If you'd prefer to go the face mask route, those are easy to find. Just Google "face masks near me" -- most drugstores should stock them. Make sure to look at the product details to make sure it's FDA-approved -- there are a lot of face masks on the market that haven't been cleared by the FDA.

Respiratory Protection From The CDC

What is a Respirator?

A respirator is a personal protective device that is worn on the face or head and covers at least the nose and mouth. A respirator is used to reduce the wearer’s risk of inhaling hazardous airborne particles (including infectious agents), gases or vapors. Respirators, including those intended for use in healthcare settings, are certified by the CDC/NIOSH.

What is an N95 Filtering Facepiece Respirator (FFR)?

An N95 FFR is a type of respirator which removes particles from the air that are breathed through it. These respirators filter out at least 95% of very small (0.3 microns) particles. N95 FFRs are capable of filtering out all types of particles, including bacteria and viruses.

What makes N95 respirators different from facemasks (sometimes called a surgical mask)?

N95 respirators reduce the wearer's exposure to airborne particles, from small particle aerosols to large droplets. N95 respirators are tight-fitting respirators that filter out at least 95% of particles in the air, including large and small particles.

Not everyone can wear a respirator due to medical conditions that may be made worse when breathing through a respirator. Before using a respirator or getting fit-tested, workers must have a medical evaluation to make sure that they can wear a respirator safely.

Achieving an adequate seal to the face is essential. United States regulations require that workers undergo an annual fit test and conduct a user seal check each time the respirator is used. Workers must pass a fit test to confirm a proper seal before using a respirator in the workplace.

When properly fitted and worn, minimal leakage occurs around edges of the respirator when the user inhales. This means almost all of the air is directed through the filter media.

Unlike NIOSH-approved N95s, facemasks are loosefitting and provide only barrier protection against droplets, including large respiratory particles.

No fit testing or seal check is necessary with facemasks. **Most facemasks do not effectively filter small particles from the air** and do not prevent leakage around the edge of the mask when the user inhales.

The role of facemasks is for patient source control, to prevent contamination of the surrounding area when a person coughs or sneezes.? Patients with confirmed or suspected COVID-19 should wear a facemask until they are isolated in a hospital or at home. The patient does not need to wear a facemask while isolated.

What is a Surgical N95 Respirator and Who Needs to Wear It?

According to the CDC:

A surgical N95 (also referred to as a medical respirator) is recommended only for use by healthcare personnel (HCP) who need protection from both airborne and fluid hazards (e.g., splashes, sprays). These respirators are not used or needed outside of healthcare settings.

In times of shortage, only HCP who are working in a sterile field or who may be exposed to high-velocity splashes, sprays, or splatters of blood or body fluids should wear these respirators, such as inoperative or procedural settings. Most HCP caring for confirmed or suspected COVID-19 patients should not need to use surgical N95 respirators and can use standard N95 respirators.

If a surgical N95 is not available for use in operative or procedural settings, then an unvalved N95 respirator may be used with a face shield to help block high-velocity streams of blood and body fluids.

My employees complain that Surgical N95 respirators are hot and uncomfortable – what can I do?

The requirements for surgical N95 respirators that make them resistant to high-velocity streams of body fluids and help protect the sterile field can result in a design that has a higher breathing resistance (**makes it more difficult to breath**) than a typical N95 respirator.

Also, surgical N95 respirators are designed without exhalation valves which are sometimes perceived as warmer inside the mask than typical N95 respirators. If you are receiving complaints, you may consider having employees who are not doing surgery, not working in a sterile field, or not potentially exposed to high-velocity streams of body fluids wear a standard

N95 with an exhalation valve.

My N95 respirator has an exhalation valve, is that okay?

An N95 respirator with an exhalation valve does provide the same level of protection to the wearer as one that does not have a valve. The presence of an exhalation valve reduces exhalation resistance, which makes it easier to breathe (exhale). Some users feel that a respirator with an exhalation valve keeps the face cooler and reduces moisture build-up inside the facepiece.

However, respirators with exhalation valves should not be used in situations where a sterile field must be maintained (e.g., during an invasive procedure in an operating or procedure room) because the exhalation valve allows unfiltered exhaled air to escape into the sterile field.

Making A Homemade PPE

PPE stands for personal protective equipment. It' s what hospitals use to protect employees against infectious diseases and viruses like the coronavirus (COVID19.) There is currently a worldwide shortage of these hazmat looking suits. Most of these PPE's are made in China and surrounding countries and they even have enough supply for their needed demand and most of their factories are closed. So, consequently, they along with Singapore, and Hong Kong have banned exports of PPE's and medical equipment.

WHO Warns of Global Shortage of Face Masks and Protective Suits

The fight against the coronavirus epidemic is being hampered by serious global shortages of face masks and protective suits, according to the World Health Organization's director-general, who said there was "widespread inappropriate use" by those not on the frontline caring for patients.

There are delays of four to six months in supply, said Tedros. "The world is facing severe disruption in the market for personal protective equipment (PPE.) Demand is up to 100 times higher than normal, and prices are up to 20 times higher. This situation has been exacerbated by widespread inappropriate use of PPE outside patient care.

The WHO estimated frontline workers would need approximately 7-10% of the world's supply of surgical masks, and possibly more. "Global stocks of masks and respirators are now insufficient to meet the needs of WHO and our partners," he said.

"The first priority is health workers. The second priority is those who are sick or caring for someone who is sick."

Frontline Workers Need Them The Most

As worldwide efforts to contain the virus continue, the International Council of Nurses has raised concerns with the World Health Organization (WHO) over an “urgent need” for more PPE's to prevent the further spread of the disease and support the nurses working to manage the situation.

The WHO has since admitted that despite sending testing kits, masks, gloves, respirators and gowns to countries in every region, “**the world is facing severe disruption**” in the market for PPE. A ban has been imposed on the export of these products from China.

Director-general at the WHO, **Dr. Tedros Adhanom Ghebreyesus,** said global stocks of masks and respirators were now “insufficient to meet the needs of WHO and our partners”.

He also said the situation had been “exacerbated by widespread, inappropriate use of PPE”. He assured that he had spoken with the Pandemic Supply Chain Network, which includes manufacturers, distributors and logistics providers, “to ensure that PPE supplies get to those who need them”.

Mike Ryan, MD, who heads the WHO's health emergency program, said there are many stakeholders across the PPE network, including raw-materials providers, manufacturers, wholesalers, distributors, and retailers. "**This is not an easy problem to solve,**" he said, adding that the public and private sector need to cooperate closely so that health workers who need it aren't without PPE.

Ryan said disruption isn't a sign that the private sector failed, "but there are normal market forces that need to be managed." Health officials are hoping to define a minimum amount of supply that needs to be protected so the right materials get to the right people at the right time, he added.

So without an adequate supply for frontline workers, what will they do? And what about regular citizens who must venture out of their homes to get food and medical supplies? They will need to use some personal protective equipment to prevent them from bringing the virus into their virus-free home.

You Can Make Your Own

You can make your own PPE at a relatively small cost. A PPE consists of 5 things: gloves (2 pair, 1 disposable and 1 reusable,) goggles, an N95 respirator mask, boots, and clothing protection. The hospitals use disposable Tyvek suits as shown below. But that would be an expensive choice so I recommend buying a rain suit.

You can make your own PPE with the following pieces of equipment. These items are readily available online or in stores and your purchases won't impact the global shortage of PPE's needed for the frontline workers.

For the masks, you can use either an N95 surgical mask, a half-face 3M dual filter P100, or a full face 3M P100 mask. See below:


3M


3M
8210V
NIOSH
N95
WARNING


3M

For the gloves, you can use either long rubber or dishwashing gloves, or BeeKeeper gloves and a pair of disposable gloves underneath. Many people are allergic to latex. Make sure you're not or buy a box of non-latex gloves. See below:

Now all you need to add are goggles and some boots and you have a completely functional and reusable homemade PPE. You can now travel with safety and confidence.

Donning And Doffing A PPE

Donning is the action of putting on your PPE. Doffing refers to taking off your PPE. This is an important procedure that must be done in a particular sequence to not contaminate yourself, your underlying clothing or inhale any dangerous particles.

It is recommended that you have a partner watch you, but not assist you, to make sure you don't forget a step or make a mistake. If you don't have a partner, you can do it alone especially if you use a mirror.

Make A Decontamination Buffer Zone

Before you use your PPE, you should designate a

decontamination buffer zone somewhere near the entrance of your home. You can make it in the garage, driveway, foyer, or hallway right inside your front door. It doesn't have to be a big area maybe about 5x5 feet. You will need room for a chair, two large bins for groceries and supplies, somewhere to hang your rain suit and disinfectant supplies.

You can easily construct this area out of some cheap shower curtains from the dollar store and some nylon rope or twine. If you use your garage or backyard just use a small area. That way when you need other things from your garage, you don't have to worry about them being contaminated.

Donning Your PPE

There are some things you must do before you begin the donning procedure. You must remove all jewelry, especially rings and valuables. This will not only protect your PPE but by leaving valuables home they remain safe and you may be less of a target for criminals.

Women should tie up their hair and cover it. Men should remove facial hair because it hinders the ability to get a proper seal on your mask. And remember if your mask is not properly sealed to your face, it's practically useless.

The first thing to do is to perform hand hygiene using hand sanitizer and put on a pair of disposable gloves before you touch anything else. Then, put on your rain gear without the hood including your boots. Next, you put on your mask. Make sure you have a good seal by doing a negative and positive pressure check (watch a training video on Youtube for your mask.) Follow that by putting on your goggles. Then lastly, you put on your dishwashing or rubber gloves.

Most rain suits have no pockets, so you would need some kind of pouch, fanny pack or purse that you can hand around your neck for one credit card, ID, and cellphone. You should probably wear your pouch under your suit. Make sure your keys are ready with you in your decon area. Then you are good to go. Put on your hood and tie it unless you're driving.

If you are driving, you may want to wait until you reach your destination before you put on your outer gloves, goggles, and mask. Just make sure you follow the proper procedures. And once they are on try not to take them off until you reach home in your decontamination area unless they interfere with your driving ability. And **DO NOT lift your mask to touch your face.**

Carry disposable plastic bags in your car so that you can put your mask and goggles in while you drive home so that you don't have to clean your car every time you go out.

Doffing Your PPE

You've made it. Congratulations. Just a few more steps and you can enjoy the fruits of your labor. You should have two bins in your decon area. They should be labeled "unclean" and "clean." When you first return, place all of your groceries, pouch, keys, and supplies in the unclean bin. Then you can begin the doffing procedure.

Doffing is done in alphabetical order. Boots, gloves, goggles, masks, rain suit. Have a seat and remove your boots. Then your outer gloves, goggles, and mask. Then stand up and remove your rain suit. Hang on something or across the chair with the front-facing you. You will only need to clean the front unless someone sneezed or coughed on your back.

Using sanitary wipes, like baby wipes or Lysol wipes, or a prepared bottle of bleach solution and paper towels wipe down your gear. No need to do the boots. Then you must wipe down everything in your unclean bin, one at a time. You can discard plastic bags. But remember any item can be a vector (**Uber for**

viruses) and the outside surface could be contaminated.

Place each item in the clean bin after you wipe them down. Make sure to wipe down your keys, credit card, ID, and most importantly your cell phone before you take it in your virus-free home. After all things are cleaned it's time to remove your disposable gloves.

Using your thumb and index fingers, on one hand, pinch the top cuff of the glove on the other hand. Pull the glove off inside out and ball it up inside the gloved-hand. Then using your index finger of your naked hand, place it inside the top of the gloved-hand and pull it off, again rolling it down so it's inside out. Remember the insides of the gloves are clean so don't touch the outsides. Then discard them in the trash. Use hand sanitizer.

One other important thing to note. When you return from a trip outside your home, you will probably contaminate your inside and outside doorknob. As well as the inside and outside door handle on your car, the steering wheel, and anything else you touched. Therefore after you settle in, you should come back out with gloves on and sanitize those areas.

Once you've finished filling up your clean bin. Take it inside then go take a shower and change clothes. Now relax. Mission accomplished. Hopefully, we will only have to resort to such measures **for a few months until this first wave of the coronavirus (COVID19) passes**.

Make A Contagion KIt

This is something I found on a prepper channel on YouTube. I think this may be useful. This is courtesy of the Sensible Prepper.

Practice Proper Hygiene

Most importantly is to wash your hands regularly and correctly. Using hot water and good soap, wash your hands for at least 20 seconds. Try to keep your hands away from your face and definitely out of your mouth.

Carry around tissue or a handkerchief to sneeze or cough in. That will keep you from contaminating your hands and spreading to other surfaces if you are contagious. If you are in a work, or home setting and don't need a mask you can use a bandana to cover your mouth to help remind you to keep your hands out of your mouth.

Good Supplies To Have On Hand:

- Hand sanitizers
- Baby wipes
- Clorox or Lysol wipes
- Lysol Spray and Liquid Disinfectant
- PineSol Disinfectant
- Dawn Dishwashing Soap
- Bleach
- Tylenol, Advil, and Aspirin
- A Good Multivitamin
- Tamiflu
- Emergen-C
- Chicken Soup
- Orange Juice
- Cayenne Pepper For Soups
- A Thermometer
- And a First Aid Kit

Environmental Cleaning For COVID19

Environmental Cleaning

There are three ways that the coronavirus (COVID19) is being spread according to reports. Through human to human contact, through respiratory droplets both large and small aerosolized airborne ones and fomites (which are contaminated surfaces.) Therefore, we must learn how to clean common surfaces like cell phones, keys, pens, and other ubiquitous items.

The use of surface disinfectants is an important issue in infection control since coronaviruses appear to survive for one or more days after drying on surfaces such as stainless steel, plastic, or cloth.

The efficacy of various disinfectants was examined both on viruses in liquid suspension and on viruses dried on surfaces. Human coronaviruses, including CoV-229E and SARS-CoV, as well as several animal coronaviruses (eg, mouse hepatitis virus and transmissible gastroenteritis virus of pigs), were studied. These viruses (both in suspension and dried on surfaces) were very susceptible to 70% ethanol (alcohol.)

It appears that susceptibility of coronaviruses to 6% sodium hypochlorite (the active agent in bleach) solutions has been variable, but satisfactory killing was achieved with concentrations of 1:40 or higher.

COVID-19

The causative agent involved in the current outbreaks of coronavirus disease 2019 (COVID-19), SARS-CoV-2, belongs to the family of Coronaviridae, a large family of enveloped, positive-sense, single-stranded RNA viruses. Coronaviruses are transmitted in most instances through large respiratory droplets and contact transmission, but other modes of transmission have also been proposed.

The time of survival and the conditions affecting SARS-CoV-2 viability in the environment are currently unknown. According to studies assessing the environmental stability of other coronaviruses, the severe acute respiratory syndrome coronavirus (SARS-CoV) is estimated to survive several days in the environment, and the Middle East respiratory syndrome-related coronavirus (MERS-CoV) can withstand more than 48 hours at average room temperature (68 °F) on different surfaces.

Environmental Cleaning Options

Due to the potential survival of the virus in the environment for several days, the premises and areas potentially contaminated with SARS-CoV-2 should be cleaned before their re-use, using products containing antimicrobial agents known to be effective against coronaviruses.

Although there is a lack of specific evidence for their effectiveness against SARS-CoV-2, cleaning with water and household detergents and the use of common disinfectant products should be sufficient for general precautionary cleaning.

Several antimicrobial agents have been tested against different coronaviruses. Some of the active ingredients, e.g. sodium hypochlorite (contained in the household bleach) and ethanol (which is alcohol) are widely available in non-healthcare and non-laboratory settings. A Ten percent bleach solution or using pure 70% alcohol will kill the coronavirus.

Cleaning Approaches

The use of 0.1% sodium after cleaning with a neutral detergent is suggested for decontamination purposes, although no data on the effectiveness against the SARS-CoV-2 are available. For surfaces that could be damaged by sodium hypochlorite (bleach,) 70% concentration of ethanol (alcohol) is needed for decontamination after cleaning with a neutral detergent.

Non-single use PPE should be decontaminated using the available products (e.g. 0.1% sodium hypochlorite or 70% ethanol). When other chemical products are used, the manufacturer's recommendation should be followed and the products prepared and applied according to them.

When using chemical products for cleaning, it is important to keep the facility ventilated (e.g. by opening the windows) to protect the health of cleaning personnel.

The following PPE items are suggested for use when cleaning facilities likely to be contaminated by SARS-

CoV-2:

- Filtering facepieces (N95) respirators
- Goggles or face shield
- Disposable long-sleeved water-resistant gown
- Disposable gloves

All frequently touched areas, such as all accessible surfaces of walls and windows, the toilet bowl and bathroom surfaces, should be also carefully cleaned. All textiles (e.g. bed linens, curtains, etc.) should be washed using a hot-water cycle (90 °C) and adding laundry detergent. If a hot-water cycle cannot be used due to the characteristics of the tissues, specific chemicals should be added when washing the textiles (e.g. bleach or laundry products containing sodium hypochlorite, or decontamination products specifically developed for use on textiles).

Best Approach to Disinfecting Surfaces Amid Novel Coronavirus Outbreak

Human coronaviruses can remain active on surfaces such as metal, glass, or plastic for up to 9 days after exposure. The best way to deal with that problem is by cleaning those surfaces with a solution that's 62% to 72% ethanol, .5% hydrogen peroxide, or 0.1% sodium hypochlorite (bleach) within 1 minute of contamination, according to investigators with University Medicine Greifswald and Ruhr University Bochum in Germany.

The viral load of coronaviruses on inanimate objects during an outbreak is unknown, but it's plausible that disinfection methods should help, especially when applied to frequently touched surfaces where you might expect the viral load to be most potent, according to the study.

The investigators cite the World Health Organization, which advises "that environmental cleaning and disinfection procedures are followed consistently and correctly. Thoroughly cleaning environmental surfaces with water and detergent and applying commonly used hospital-level disinfectants (such as sodium hypochlorite aka bleach) are effective and sufficient procedures."

The investigators could not find data that describe how often and how much hands can be contaminated with coronaviruses after contacting an infected surface or patient. "In Taiwan, however, it was described that installing hand wash stations in the emergency department was the only infection control measure which was significantly associated with the protection

[of] healthcare workers from acquiring the SARS-CoV, indicating that hand hygiene can have a protective effect," the study states.

Also, even though hand hygiene compliance appears to be significantly higher during an outbreak, there still seems to be a lack of total buy-in among physicians, the study states, adding that transmission can be successfully prevented when appropriate measures are consistently performed.

"Ethanol at concentrations between 62% and 71% reduced coronavirus infectivity within 1 min exposure time," according to the study. "Concentrations of 0.1-0.5% sodium hypochlorite (bleach) was also quite effective.

The endemic human coronavirus strain (HCoV-) 229E can remain infectious on certain surfaces for as little as 2 hours or up to 9 days.

Pets And The Coronavirus

A Dog Tests Positive For Coronavirus

After Hong Kong officials confirmed Friday that **a dog has tested positive for the coronavirus,** as a precaution, the Hong Kong government declared cats, dogs and other domesticated mammals whose owners test positive and are quarantined for COVID-19 would be collected and delivered to a "designated animal keeping" facility for quarantine and veterinary surveillance.

The Hong Kong Agriculture, Fisheries and Conservation Department said in a statement that **the dog tested a very "weak positive" for the virus,** meaning there were low traces of the virus found.

Health officials are not sure if the dog is infected itself or if the positive test is the result of "environmental contamination," the department said. Officials said they don't "have any evidence" that animals can be infected with the coronavirus "or can be a source of infection to people."

"We're working with [scientists in Hong Kong] to understand the results, to understand what further testing they are doing and to understand how they are going to care for these animals," said Dr. Maria Van Kerkhove, a technical lead in the World Health Organization's emergencies program, according to CNBC.

Pets Are Safe

Throughout the world, there are almost 100,000 "reported" cases of people infected with the coronavirus. I put that in quotes because many experts believe that number is drastically understated. They believe the number of infected people to be much higher. Nevertheless, here's one case of one dog in the entire world that has tested positive.

As I have explained in great detail, **animals are vectors (Ubers for viruses.)** That's how this all started. None of the animals themselves suffered any respiratory illnesses. There are no reports of animals dying from pneumonia. This dog is not even sick or showing any symptoms. They found the coronavirus on his body through a swab.

Pets Can Be A Danger To You And Your Family

You must however **take precautions not to let your pets get contaminated.** There is a difference between being contaminated and infected. If your animal is exposed to an infected person, that person can contaminate your pet by sneezing, coughing, or touching your pet with contaminated hands. Another way your pet can be contaminated is through another vector.

To prevent that, try to keep your pet indoors or in a segregated area like a backyard or kennel. Don't let them roam free. If they do, you must bathe or wipe them down with sanitary wipes before letting them back into your virus-free home. Don't take chances. Be safe.

Part III: Historical Context of the Coronavirus

There have been 7 coronaviruses identified by scientists since the 1960s. Coronavirus (COVID19) also known as SARS-CoV-2 is the latest one, the most transmissible, as well as the deadliest in the shortest amount of time — just a few months. To put this novel coronavirus in perspective I will give it a historical context. If the past is prologue, then knowing the history of deadly viruses may help us prepare for future possible outcomes.

Out of the 7 coronaviruses, the first four are pretty innocuous. They are no more than the common cold.

Almost every adult on the planet has had them in their lifetime. The first 4 are: 229E(alpha,) NL63(alpha,) OC43 (beta,) and HKU1 (beta.) Most of the time these cause little to no symptoms. However, they are highly contagious.

When they do cause symptoms, they are usually minor upper respiratory infections that lead to a running nose, sore throat, tickle in the throat (some coughing,) and sneezing. Sometimes also headaches, body chills, fever, and sinus congestion. Most of the time, these go away in less than a week unless it develops into lower respiratory complications.

These lower respiratory complications come from the drainage from the sinuses of mucus fighting the virus. This drainage settles in the lower lungs and begins to cause fluid buildup that leads to bronchitis, pneumonia, or double pneumonia. Infected people with weakened or impaired immune systems have a harder time fighting this battle without medical assistance. Furthermore, what started out as a common cold could develop a bacterial infection in the lungs which is another battle to win.

Then There Were 5

The fifth coronavirus appeared in February

2003. Its name is SARS-CoV (the beta coronavirus that causes severe acute respiratory syndrome, or SARS.) Between November 2002 and July 2003, an outbreak of SARS in southern China caused an eventual 8,098 cases, resulting in 774 deaths reported in 17 countries (9.6% fatality rate,) with the majority of cases in mainland China and Hong Kong. No cases of SARS have been reported worldwide since 2004.

The World Health Organization declared severe acute respiratory syndrome contained on July 5, 2003. In the following years, four SARS cases were reported in China between December 2003 and January 2004. There were also three separate laboratory accidents that resulted in infection. In one of these cases, an ill lab worker spread the virus to several other people.

SARS was here one day and gone in about 8 months. What happened? Why did it just disappear? It didn't. It was isolated and contained by a concerted global effort of the medical community. They discovered it. Notified the world of its existence. Developed a test to identify it. This test was mainly a thermal scan or temperature check.

The only symptom common to all people suspected of having SARS appears to be a fever above 38 °C (100 °F.)

So, with thermal scans and contact tracing (investigating contact, sexual or casual, with someone with a diagnosis of SARS within the last 10 days) they were able to quickly identify the infected people.

Then they isolated those people from the general public to prevent further transmission. That's how they contained the virus. Isolation and containment work if you can identify all the infected people and isolate them to prevent further transmission thereby containing the virus. Remember, there was no cure, treatment, or vaccine. And that remains true today.

The people who got the disease either one or two things happened. Either their body's immune system was strong enough to fight the virus in which the outcome was positive and they survived. Or the virus won and they didn't survive the battle.

Why Does Isolation And Containment Work?

To understand this we must go back to the Viral Life Cycle of a virus. There are 4 main stages: entry (attachment or absorption into the cell membrane,) replication (commandeering the sexual organs of the cell to make babies also known as progeny,) latency (the time it takes between infections and visible symptoms,) and shedding (the end of life cycle for the virus.)

Viral shedding is key to determining the life or continued existence of a virus. Once a virus invades a cell, it starts making copies of itself. These copies are called progeny and are made in the millions. After that process, the host cell is usually exhausted and no longer useful to the invader virus.

So, the viral cell often dies as it has no more host to live on. However, the millions of progeny cells (those dirty little bastards) start looking for new host cells to continue their families line of work. They are made to invade, attack, reproduce like crazy, then kill and die. That's the life cycle of a virus.

The way to stop it is to find a vaccine or cure or prevent the shedding from spreading to new host human bodies with new host cells to invade and attack. A virus CANNOT reproduce without a living cell. They need the cell's reproductive organs to make babies.

Therefore, if the progeny (those nasty little babies) can't get out of the body they are in and find a new human host, then they must remain where they were born. When this happens, the outcome is binary. The infected human either wins the battle with the progeny and lives on or the progeny are victorious which means the host fails.

So, to stop a global pandemic we must identify, isolate, and contain every infected person until the virus dies off. This is an extraordinarily monumental task.

Along Came Number 6

Deadly number 6, MERS-CoV (the beta coronavirus that causes Middle East Respiratory Syndrome or MERS) first appeared in Saudia Arabia in June 2012. Since then, there have been 2506 laboratory-confirmed cases with 862 deaths, a mortality rate of 34% according to WHO.

Early reports compared the viruses to severe acute respiratory syndrome (SARS), and it has been referred to as Saudi Arabia's SARS-like virus. The first person, in June 2012, had a "seven-day history of fever, cough, expectoration, and shortness of breath. MERS can range from asymptomatic disease to severe pneumonia leading to acute respiratory distress syndrome (ARDS) https://en.wikipedia.org/wiki/Middle_East_respiratory_syndrome

One review of 47 laboratory-confirmed cases in Saudi Arabia gave the most common presenting symptoms as fever in 98%, cough in 83%, shortness of breath 72%, and myalgia in 32% of people. There were also frequent gastrointestinal symptoms with diarrhea in 26%, vomiting in 21%, abdominal pain in 17% of people. 72% of people required mechanical ventilation. There were also 3.3 males for every female.

Middle East respiratory syndrome is caused by the newly identified MERS coronavirus (MERS-CoV), a species with single-stranded RNA belonging to the genus betacoronavirus which is distinct from SARS coronavirus and the common-cold coronavirus. And it has an extremely higher mortality rate of 34%.

Like SARS and the other 4 relatives of MERS, there is no cure, treatment, or vaccine. However, the global medical community has not yet been successful in isolating and containing this deadly disease.

Total laboratory-confirmed cases of MERS worldwide per year have been as follows:

- 2019 212
- 2018 147
- 2017 250
- 2016 249
- 2015 492
- 2014 381
- 2013 100

- 2012 14

A Common Killer

Influenza, commonly known as "the flu," is an infectious disease caused by an influenza virus. Symptoms can be mild to severe. The most common symptoms include high fever, runny nose, sore throat, muscle and joint pain, headache, coughing, and feeling tired. These symptoms typically begin two days after exposure to the virus and most last less than a week. The cough, however, may last for more than two weeks.

Complications of influenza may include viral pneumonia, secondary bacterial pneumonia, sinus infections, and worsening of previous health problems such as asthma or heart failure.

Three of the four types of influenza viruses affect humans: Type A, Type B, and Type C. Type D has not been known to infect humans but is believed to have the potential to do so.

Usually, the virus is spread through the air from coughs or sneezes. This is believed to occur mostly over relatively short distances. It can also be spread by touching surfaces contaminated by the virus and then touching the eyes, nose, or mouth. A person may be infectious to others both before and during the time they are showing symptoms

Frequent hand washing reduces the risk of viral spread. Wearing a surgical mask is also useful. Yearly vaccinations against influenza are recommended by the WHO for those at high risk, and by the CDC for those six months of age and older. The vaccine is usually effective against three or four types of influenza. It is usually well tolerated. A vaccine made for one year may not be useful in the following year since the virus evolves rapidly.

Influenza spreads around the world in yearly outbreaks, resulting in about three to five million cases of severe illness and about 290,000 to 650,000 deaths. In the 20th century, three influenza pandemics occurred: Spanish influenza in 1918 (17–100 million deaths,) Asian influenza in 1957 (two million deaths,) and Hong Kong influenza in 1968 (one million deaths.)

Transmission Of Influenza

When an infected person sneezes or coughs more than half a million virus particles can be spread to those close by (that's a lot of babies — progeny.) In otherwise healthy adults, influenza virus shedding (the time during which a person might be infectious to another person) increases sharply one-half to one day after infection, peaks on day 2 and persists for an average total duration of 5 days — but can persist as long as 9 days.

As the influenza virus can persist outside of the body, it can also be transmitted by contaminated surfaces (fomites) such as paper money, doorknobs, light switches, elevator buttons, and other household items.

The length of time the virus will persist on a surface varies, with the virus surviving for one to two days on hard, non-porous surfaces such as plastic or metal, for about fifteen minutes on dry paper tissues, and only five minutes on the skin. However, if the virus is present in mucus, this can protect it for longer periods (up to 17 days on paper money)

Influenza can be spread in three main ways: by direct transmission (when an infected person sneezes mucus directly into the eyes, nose or mouth of another person); the airborne route (when someone inhales the aerosolized respiratory particles produced by an infected person coughing, sneezing or spitting) and through hand-to-eye, hand-to-nose, or hand-to-mouth transmission (aka self-infection,) either from contaminated surfaces or from direct personal contact such as a handshake. The relative importance of these three modes of transmission is unclear, and they may all contribute to the spread of the virus.

In the airborne route, the droplets that are small enough for people to inhale are 0.5 to 5 μm in diameter and inhaling just one droplet might be enough to cause an infection. Although a single sneeze releases up to 40,000 droplets, most of these droplets are quite large and will quickly settle out of the air.

How long influenza survives in airborne droplets seems to be influenced by the levels of humidity and UV radiation, with low humidity and a lack of sunlight in winter aiding its survival; ideal conditions can allow it to live for an hour in the atmosphere.

So by understanding the devil we know (the common Flu,) we can get a better understanding of the devil that is here now to kill us. They are both viruses with many similarities, like symptoms, transmissibility, and the ability to spread secretly by people without symptoms (latency.) However, one significant difference is in the lethality or mortality rate.

Mortality Rate

To determine a crude mortality rate of a virus, epidemiologists divide the number of deaths confirmed by the number of reported illnesses. For instance, if 100,000 caught a particular virus and

10,000 people died from that virus, that would equate to a mortality rate of 10%.

At least 29 million people in the U.S. have experienced flu illnesses this season, **the CDC estimates.** About 280,000 people have been hospitalized so far, and an estimated 16,000 have died, including 105 children.

As of February 27, there were 82,549 confirmed cases of coronavirus worldwide and at least 2,810 deaths, according to **the latest figures from health officials.**

Time for some arithmetic. With the numbers reported from this year's Flu outbreak, unfortunately, we have 16,000 deaths divided by 29 million people infected. That comes to a mortality rate of 0.0006. That's 6/100th of 1 percent.

Now with the coronavirus, the confirmed deaths of 2,810 people divided by 82,549 confirmed cases equate to 0.034. That means a mortality rate of 3.4% in just a little of 3 months.

Comparing the two mortality rates they are not even close to being equal. By dividing 0.034 by 0.0006 you get 56.67. At this time according to these numbers this novel coronavirus (COVID19) is more than 56 times more lethal than the seasonal Flu.

If you just look at the aggregate or the total number of people who've perished this season from the Flu (16,000) and compare that to the total number of COVID19 fatalities (2,810,) the Flu is by far more deadly, right? No, because the Flu infected over 29 million people resulting in 16,000 deaths.

If the coronavirus infected 29 million people, based on its 3.4% death rate, there would 986,000 people dead. Now that would be a catastrophic disaster. That's why the world is freaking out. The coronavirus is not the flu. It's a danger to our way of life.

"Community Spread"

U.S. public health officials reported on February 26 that a 50-year-old California woman had become infected with the novel coronavirus that has been spreading around the world since late December. This case marks a troubling new phase of the outbreak in the United States, experts say. The reason: No one knows yet where or how she picked up the virus.

Until now, all U.S. cases were due to people who had been in China, where the viral infection first emerged, or who had been in contact with others known to be infected.

The woman had not traveled to China or had not been exposed to someone known to be carrying the virus. As such, she appears to be the first case in the United States of what's known as "community spread." That means she picked up her illness from some unknown infected person with whom she had come into contact.

“It probably means there's an unknown number of other cases” in Northern California, Gordon says. “It's probably not a super large number,” she adds. There is the worry, however, that “there may be a large number of people who are infected but haven't started to show symptoms.”

The new coronavirus may be spreading in parts of the Pacific Northwest, with California, Oregon, and Washington State reporting February 28 that they have diagnosed cases with no travel history or known contact with another case.

Health officials in Santa Clara County reported a case of so-called community spread late afternoon on February 28 — the second in the northern part of the state in the past few days.

Later on that day, health officials in Oregon reported diagnosing a case of Covid-19 in a person from Washington County who had neither a history of travel to a country where the virus was circulating nor close contact with a confirmed case.

And a teenager from Snohomish County, north of Seattle, was diagnosed with the disease, Washington State health authorities announced late February 28. This individual had not traveled outside the country nor had contact with a known Covid-19 case, they said.

What Are Clusters?

Clusters are chains in a link of infections of a virus. Health officials try to map out clusters to determine contact history to help them set up isolation and containment measures. The problem we are faced with today is they are having trouble identify the "index case" or ground zero of these clusters which are popping up around the world.

In South Korea, Singapore and Iran, clusters of infections are leading to a jump in cases of the new viral illness outside China. But it’s not the numbers that are worrying experts: It’s that increasingly they can’t trace where the clusters started.

WHO officials said China’s crackdown on parts of the country bought time for the rest of the world to prepare for the new virus. But as hot spots emerge around the globe, trouble finding each source — the first patient who sparks every new cluster — might signal the disease has begun spreading too widely for tried-and-true public health steps to stamp it out.

But health authorities have not yet found the “index case,” the person among the church’s 9,000 followers who set off the chain of infections.

“If we still hospitalize and isolate every suspect case, our hospitals will be overwhelmed,” he said. So far, the city-state has identified five clusters of transmission, including two churches. But there remain eight locally transmitted cases with no links to earlier cases, or to China.

Viruses vary in how they infect. The new coronavirus — unlike its cousins SARS, or severe acute respiratory syndrome, and MERS, or Middle East respiratory syndrome — spread as easily as a common cold.

And it’s almost certainly being spread by people who show such mild symptoms that no one can tell, **said Dr. Amesh Adalja** of the Johns Hopkins Center for Health Security.

“If that’s the case, all of these containment methods are not going to work,” Adalja said. “It’s likely mixed in the cold and flu season all over the place, in multiple countries” and go unnoticed until someone gets severely ill.

These milder symptoms are good news “in terms of not as many people dying," said Mackay, of Australia. "But it's really bad news if you are trying to stop a pandemic," he added. There's no way to predict if the recent clusters will burn out or trigger widespread transmission.

In The United States

Federal health officials starkly warned on February 25, that the new coronavirus will almost certainly spread in the United States, and that hospitals, businesses, and schools should begin making preparations.

"It's not so much of a question of if this will happen anymore but rather more of a question of exactly when this will happen," Dr. Nancy Messonnier, director of the National Center for Immunization and Respiratory Diseases, said in a news briefing.

She said that cities and towns should plan for "social distancing measures," like dividing school classes into smaller groups of students or closing schools altogether. Meetings and conferences may have to be canceled, she said. Businesses should arrange for employees to work from home.

Medical experts may not be able to identify, isolate and contain this current outbreak, but they do have a way of predicting how wide and far it will spread.

The "R Naught"

R0 is pronounced “R naught.” It's a mathematical term that indicates how contagious an infectious disease is. It's also referred to as the reproduction number. As the infection spreads to new people, it reproduces itself. The R naught specifically applies to a population of people who were previously free of infection and haven't been vaccinated.

In epidemiology, the basic reproduction number of an infection can be thought of as the expected number of cases directly generated by one case in a population where all individuals are susceptible to infection. The definition describes the state where no other individuals are infected or immunized.

To do that, they use a number called an "R naught," or R0. ... If people exposed to the virus aren't vaccinated, measles' R0 can be as high as 18. Ebola is more deadly but much less efficient: Its R0 is typically just 2, in part, because many infected individuals pass away before they can pass the virus to someone else.

A disease's contagiousness, on the other hand, doesn't count individual microorganisms, but rather describes how quickly it spreads. Say you share a funny cat picture on Facebook and it's so good that ten friends post it on their walls. Ten of each of their friends post it, and ten of theirs, and so on; that picture will eventually be all over the internet. But if you share a funny picture of your lunch instead, and most people who see it (are "exposed" in epidemiology speak) don't bother to pass it on, that meme will soon fizzle out.

In epidemiological terms, our funny cat picture has an R naught or R0 of 10. Our lunch picture, somewhere near zero. An infectious disease needs at least an R0 of 1 to spread; that would mean each person spreads it to one other person. Ebola's R0 is somewhere around 2; think of the Dallas patient that spread the disease to two health care workers. That's a typical case.

Measles clearly gets the gold in this contest, with an R0 of up to 18. That means that, in many outbreaks, each sick kid was infecting an average of 18 friends. Here's a ranking from Wikipedia, taken from published data on each entry:

Customary values of R_0 of well-known infectious diseases

Disease	Transmission	R_0
Measles	Airborne	12–18
Diphtheria	Saliva	6–7
Smallpox	Airborne droplet	5–7
Polio	Fecal–oral route	5–7
Rubella	Airborne droplet	5–7
Mumps	Airborne droplet	4–7
Pertussis	Airborne droplet	5.5
HIV/AIDS	Sexual contact	2–5
SARS	Airborne droplet	2–5
COVID-19	Airborne droplet	1.4–3.8
Influenza (1918 pandemic strain)	Airborne droplet	2–3
Ebola (2014 Ebola outbreak)	Body fluids	1.5–2.5
MERS	Airborne droplet	0.3-0.8

According to Laurie Garrett, Pulitzer Prize-Winning Science Writer an Epidemics Expert says this coronavirus' R naught can be as high as 4.5 based on reports from China.

The Spanish Flu

The 1918 influenza pandemic (January 1918 – December 1920; colloquially known as Spanish flu) was unusually deadly, the first of the two pandemics involving H1N1 influenza virus, with the second being the swine flu in 2009.

It infected 500 million people around the world, or about 27% of the then world population of between 1.8 and 1.9 billion, including people on isolated Pacific islands and in the Arctic. The death toll is estimated to have been 40 million to 50 million, and possibly as high as 100 million, making it one of the deadliest epidemics in human history.

Scientists offer several possible explanations for the high mortality rate of the 1918 influenza pandemic. Some analyses have shown the virus to be particularly deadly because it triggers a cytokine storm, which ravages the stronger immune system of young adults. In contrast, a 2007 analysis of medical journals from the period of the pandemic found that the viral infection was no more aggressive than previous influenza strains.

The Spanish Flu "circumnavigated the globe 3 times in 18 months without commercial air travel" according to **Laurie Garrett, Epidemic Expert.** It has also been claimed that, by late 1917, there had already been a first wave of the epidemic in at least 14 US military camps.

The WHO estimates that 2–3% of those who were infected died. It is estimated that approximately 30 million were killed by the flu, or about 1.7% of the world population died. Other estimates range from 17 to 55 million fatalities. This flu killed more people in 24 weeks than HIV/AIDS killed in 24 years.

The unusually severe disease killed up to 2.5% of those infected, as opposed to the usual flu epidemic mortality rate of 0.1%. This huge death toll resulted from an extremely high infection rate of up to 50% and the extreme severity of the symptoms, suspected to be caused by cytokine storms.

Modern analysis has shown the virus to be particularly deadly because it triggers a cytokine storm (overreaction of the body's immune system), which ravages the stronger immune system of young adults.

The pandemic mostly killed young adults. In 1918–1919, 99% of pandemic influenza deaths in the U.S. occurred in people under 65, and nearly half in young adults 20 to 40 years old.

Another oddity was that the outbreak was widespread in the summer and autumn (in the Northern Hemisphere); influenza is usually worse in winter

In fast-progressing cases, mortality was primarily from pneumonia, by virus-induced lung consolidation. Slower-progressing cases featured secondary bacterial pneumonia, and possibly neural involvement that led to mental disorders in some cases. Some deaths resulted from malnourishment.

There Were 3 Waves of the 1918 Influenza Pandemic

The Spanish Flu circumnavigated the world 3 times in 18 months without commercial air travel. **The second wave of the 1918 pandemic was much deadlier than the first.** The first wave had resembled typical flu epidemics; those most at risk were the sick and elderly, while younger, healthier people recovered easily.

In civilian life, natural selection favors a mild strain. Those who get very ill stay home, and those mildly ill continue with their lives, preferentially spreading the mild strain. In the trenches, natural selection was reversed. Soldiers with a mild strain stayed where they were, while the severely ill were sent on crowded trains to crowded field hospitals, spreading the deadlier virus. The second wave began, and the flu quickly spread around the world again.

Another study by He et al. (2013) used a simple epidemic model incorporating three factors to infer the cause of the three waves of the 1918 influenza pandemic. These factors were school opening and closing, temperature changes throughout the outbreak, and human behavioral changes in response to the outbreak. Their modeling results showed that all three factors are important, but human behavioral responses showed the most significant effects.

How Bad Can This Coronavirus Get?

Harvard scientist: coronavirus pandemic likely will infect 40-70% of the world this year.

Harvard epidemiologist Marc Lipsitch told The Wall Street Journal that "it's likely we'll see a global pandemic" of coronavirus, with 40 to 70 percent of the world's population likely to be infected this year.

"What proportion of those will be symptomatic, I can't give a good number," added Lipsitch, who is the Director of the Center for Communicable Disease Dynamics at the Harvard T.H. Chan School of Public Health.

Two other experts have recently given similar estimates.

Ira Longini, a biostatistician, and adviser to the World Health Organization (WHO), has predicted that two-thirds of the global population may eventually contract COVID-19.

Prof Gabriel Leung, the chair of public health medicine at Hong Kong University, says if the transmission estimate of 2.5 additional people for each infected rate is accurate, that would result in an "attack rate" that would affect 60 to 80 percent of the world's population.

"**One death could mean there are 100 confirmed cases in the region** – and maybe you haven't recorded as many cases just because you haven't tested enough people," he said.

"This bug is particularly wily, particularly bad. And particularly intelligent," he said. Covid-19 coronavirus "is more infectious than the 2009 pandemic flu. So, we're dealing with a very clever bug."

Also according to **Professor Gabriel Leung,** Epidemiologist and Dean of Medicine at Hong Kong University, "it's plausible that 60% of the world's population can become infected by this novel coronavirus with a 1% mortality rate."

So, based on the 2019 Worldwide population estimate of 7.7 Billion people, with a 60 percent infection rate and a 1% mortality rate that could mean that there could be a substantial loss of lives. Here's the math: 60% of 7.7 billion is 4.62 billion. 1% of 4.62 billion is 46.2 million deaths worldwide. Just like in the Spanish Flu, it won't happen all in the first wave.

The Dangers Of The Duality Of COVID19

The coronavirus (COVID 19) has a duality, or twin if you like. They are almost identical. Except for 2 distinct characteristics: lethality and latency. The first COVID, I will call COVID-S. The twin COVID, I will call COVID-M.

COVID-S is a secret sleeper super-spreading virus with little to no symptoms. It is not much more dangerous than the common cold or the first 4 coronaviruses. However, while you go on about your everyday life, you will unknowingly spread this virus to family and friends unless you are carefully aware. This virus is super-contagious. This is probably the aerosolized airborne version of COVID19.

COVID-M is a maniac. A lethal killer. It invades, infects, attacks, and starts wreaking havoc on the respiratory system almost immediately upon infection. The latency (time before symptoms show) is short. As this maniac virus initiates its immediate violent attack on the host body, it triggers the alarm system. The alarm system (T cells) calls the authorities (the B cells and Killer T cells) and the battle begins.

This battle is devastating on the body because it causes what is known as a "cytokine storm." This is an overreaction by the immune system that sends so many white blood cells to the lungs, it reduces the lungs' capacity to function. In other words, the body, in an attempt to fight the vicious invading vicious, starts to kill itself with a massive buildup of fluid-causing pneumonia.

COVID-S, on the other hand, is a smooth operator. It invades the host and goes to sleep. The latency period is long. Somewhere between 14 and 24 days according to reports from China. There was one reported case of a woman showing symptoms 44 days after leaving Wuhan. Therefore, people who are not tested and not quarantine continue to spread the sleeper form of the coronavirus.

Another way to look at this is this way: COVID19 has two versions, the mild and the spicy. The mild will bearly affect you. The spicy will almost definitely kill you unless your immune system is strong enough to fight it off without causing a cytokine storm which is self-defeating.

The Tandem Killing Team

I have learned that the COVID-S and the COVID-M were not released to the public at the same time. They were exposed about a month apart. COVID-S was released in November 2019. COVID-M was released in December 2020.

This means that as this deadly duo tours the world on its FIRST wave, there is a lag time. COVID-S hits first and spreads widely without notice or fanfare until it's detected by the health authorities.

It seems as though it is posing as Influenza deceiving people by making them believe all they have is a mild case of the flu. This is part of its Intelligent design. So, most people are not suspicious enough to pay to investigate the cold symptoms and go on spreading the virus.

COVID-S is soon followed by its deadly maniacal twin, COVID-M. If you catch COVID-M on the first wave, you will have a fierce battle on your hands. However, if you survive, your heart and immune system cannot prevail in a second attack.

Whether that attack comes on the second wave, or whether you are released from hospital care and get reinfected. There are many reports from China of people dropping dead with fatal heart attacks after being re-infected. And in Iran, there are many videos of people collapsing from an initial COVID attack.

I believe that these two viruses are a tandem killing duo. COVID-S spreads quickly and quietly, but it marks people for death. It's like a special-ops soldier. He infiltrates behind enemy lines, covertly, and marks a target with lasers for termination by drones.

COVID-M is the executioner or killer drone. If a person is infected with COVID-S, catches COVID-M, then death is almost guaranteed and swift within 2 days of infection, just like in 1918 with the Spanish Flu. According to John M. Barry's book, "The Great Influenza," there were many reports on people dropping dead in less than 2 days of getting infected on the second wave. They were walking around healthy one day and then collapsed 2 days later.

I surmise these people were marked or survived the first wave, but could not survive twice. So, with all of the experts' predictions and epidemiological models, it stands to reason that the first wave will not be that deadly.

This will give us time to prepare for the second wave. Estimates are, it will take 12-18 months to create, test, and manufacture a vaccine. Hopefully, we can get it done before the second wave. The Spanish Flu went around the world 3 times in 18 months without commercial air travel. We must be diligent, determined, and successful in building up our defenses before the 2nd wave.