PLAGUE & PANDEMICS

A WORLD HISTORY



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MAJOR TOPICS

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 - 2. Bubonic
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 - 4. Spanish Flue
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DEFINITIONS

Infectious Diseases: are caused by pathogenic microorganisms such as bacteria, viruses, parasites and fungi that can be spread directly or indirectly from one person to another. The seasonal influenza (flu), which is highly contagious viral infection of the upper respiratory tract, is considered a infectious disease.

Plague: An infectious disease process caused by the bacterium Yersinia pests such as the bubonic (Black Death), septicemic and pneumonic plagues. Generally, the term also supposes the disease process encompasses large geographical regions of the world.

Pandemic: A epidemic of disease that has spread across a large geographical region of the world including multiple continents affecting a large number of individuals.

Epidemics: A widespread epidemic such as seasonal influenza that affects a stable number of people.

MAJOR PLAGUES & PANDEMICS

Bubonic Plague

Justinian.	Europe, Asia, N. Africa.		Italy. London.		France.	China					
541.	1331.		1629.	1665.	1720.	1855					
Smallpox											
Roman Empire	e. Japan.	Mexico.	N. America	Canada.	N. Amer	rica. N. /	America.	. Pittsburgh	N. America.	Australia	Canada
165.	735	1520.	1634.	1702.	1721.	. 1	738.	1755-63.	1780.	1828-37-57	1885
Cholera											
Europe/Asia	Europe/A	Asia/N.Amer	. Russia/Eur	rope M.E	ast/Egypt	India/Ger	rmany	Europe/Asia/A	frica Egypt	Worldwide.	S.Amer
					1863-78						
1816-26.	1829-51		1852-54	1852-54		1	1881 1889		1902	1961-75.	1990

MAJOR PANDEMICS

Measles

	N. England N.		. England/Canada		Ν	I. America.	N. America	a. N. An	N. America		
	1657.	1687		1740-47.	1759		1772.	1788		1875	
Other I Salmo	nfectious Disease nella Y. Fever	es Influenza	Polio	Spa Flue	Polio	Asian Flue	AIDS	Swine Flu	Ebola	Zika	Covid-19
1545	1793/1803/20/	50. 1889	1916.	1918	1949	1957-58	1981	2009	2014	2015	2020

Major US Epidemics

Epidemics raged throughout US history. Early on, an infectious disease outbreak might be confined to a city or two, with ports particularly susceptible due to passengers on arriving ships. Many areas saw the same disease return year after year. But as Americans moved westward and became more mobile, epidemics were more widespread. Indian tribes, lacking the immunity some Europeans had, died in great numbers. These are major US epidemics and their geographic areas of concentration; you'll find full lists at BJ's Genealogy Site and on Wikipedia.

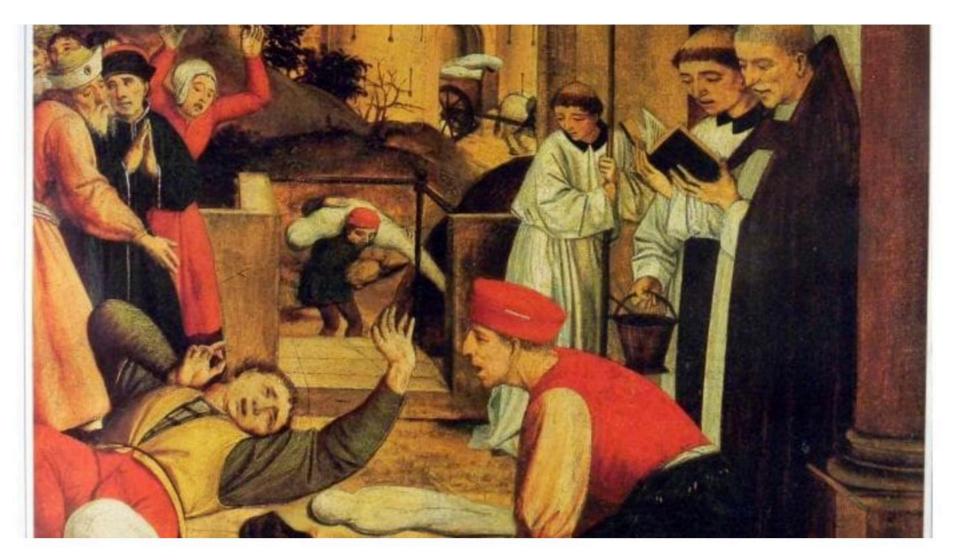
1721 smallpox (New England) 1770s smallpox (Pacific Northwest) measles (North America) **1793 to 1798** yellow fever (recurs in Philadelphia) cholera (New York City, New Orleans and other major cities) smallpox (Great Plains) yellow fever (Southern states) cholera (New York City) cholera (New Orleans, St. Louis and other cities along the Mississippi River) influenza (nationwide) 1851 cholera (Great Plains) yellow fever (nationwide, especially New Orleans) yellow fever (New Orleans) yellow fever (nationwide) smallpox (Pacific Northwest) 1865 to 1873 typhoid, yellow fever, scarlet fever recur (nationwide) yellow fever (New Orleans) yellow fever (lower Mississippi River valley) polio (nationwide) Spanish influenza (nationwide) 1949 polio (nationwide) polio (nationwide) 2020 COVID-19

Devastating Pandemics

1. The Plague of Justinian 541 A.D. 25-100 Million Deaths

Plagues were first described in the Old Testament as a "pestilence" striking the Philistines. Genomic traces of Y. Pestis have been traced back to the teeth of Swedish neolithic inhabitants from around 4,900 years ago using DNA analysis. The Byzantine capital of Constantinople suffered the impact on what is believed to be the bubonic plague (bacterium Yersinia pests) from infected rats arriving on merchants ships from Africa. The city was believed to have lost approximately 10,000 lives per day according to accounts by the ancient historian Procopius. The plague continued to re-appear for many centuries later throughout Europe, Asia and Africa.

1. The Plague of Justinian



Painting showing the plague in Constantinople. (Credit: Walters Art Museum)

Devastating Pandemics

2. The Black Death 1331-1353 75-200 Million Deaths

The bubonic plague return to Europe with a devastating mortality that is believed to killed 60 percent of the population. Historians believe the plague was re-introduced by Italian sailors returning home from the Eastern city of Crimea. The mortality rate would have probably been even higher if it hadn't been for the first recognized use of quarantine methods introduced by the Italians in Venice and Florence. Later in the 17th century, infected individuals were contained in "Pest-houses". The plague would re-occur later in Italy (1629-31) and London (1650-66) as well as in Marseille, France (1720-22) and in the Chinese providence of Yunnan (1855). The plague eventually subsided by the 1950s after claiming some 15 million lives throughout Asia and Africa. In 1894, the Japanese physician Shiba Saburo Kitasato and a Swiss medical student Alexander Yersin discovered the bacillus Yersinia pestis present in the tissue of rats and deceased human remains. It was subsequently in 1895 that the French physician Paul Lewis Sigmond discovered the relationship between black rats (Rattus rattus) and the flea Xenopsylla cheeps which turned out to be the principle vector for the bubonic plague: the flea picks up the bacillus from the rat and transmits it to its human host. Prior to these medical discoveries society believed the plague was spread by contaminated air referred to as "miasma" or as a "affliction of the soul" which was associated with mental depression or melancholia. Current treatment for the bacterium Y. Pests involves antibiotics such as streptomycin or gentamyicin.

Black Rat (Rattus rattus)



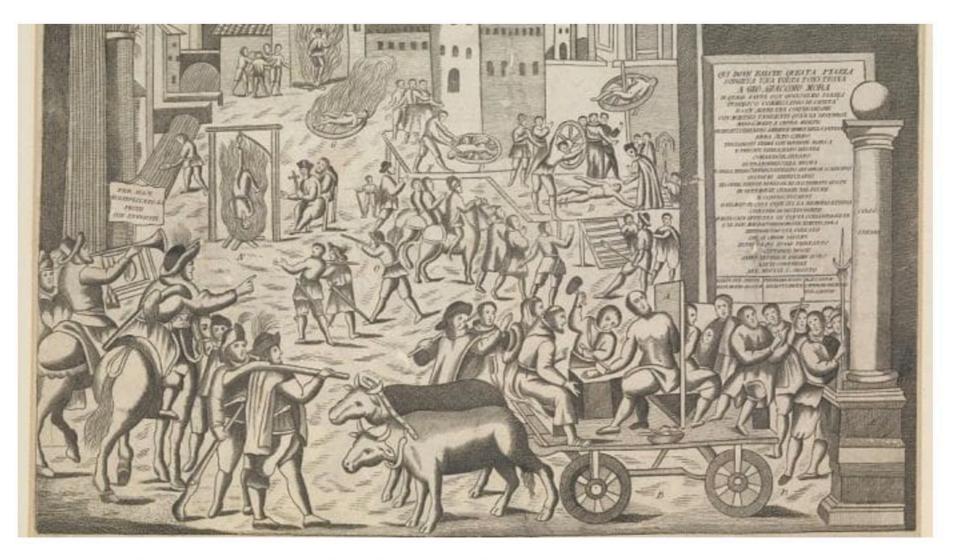
Black rats that live near grain reserves next to fleas were responsible for transferring the bacillus Yersinia pestis to ships leaving ports in Egypt.

Wikimedia

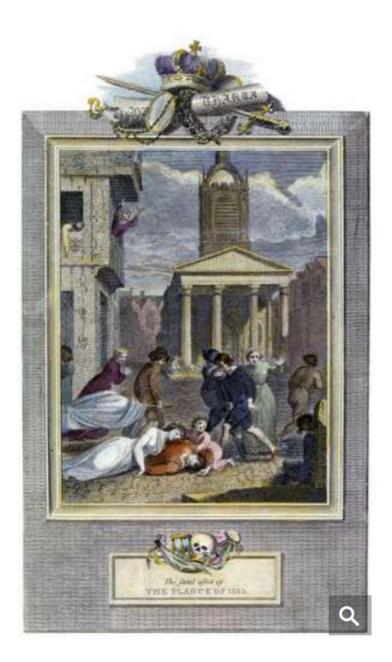


These woodcuts are from the *Decameron*, a collection of novellas in which young people fleeing plague-ridden Florence tell stories that often provide accounts of life during the pandemic. CHARLES WALKER COLLECTION / ALAMY

3. The Italian Plague of 1629-31



Drawing of the Great Plague in Milan. (Credit: Fine Art Images/Heritage Images/Getty Images)



A scene of death and despair in a London street during the plague outbreak of 1664–66, which killed more than 70,000 people.

Britannica

DANSE MACABAE The Dance of Death



The Dance of Death was a visual representation of life's fragility at different stages, due to the plague during the middle ages. A mural was painted 1424-25 on the South wall of Holy Innocents Cemetery in Paris that was later torn down in 1660. People would enact plays in costumes as corpses in small villages throughout Europe as a coping mechanism.

Dance of Death by Michael Wolgemut, 1493: Nuremburg Chronicle of Hartmann Schedule

Pneumonic Plague

Pneumonic plague was a alternate form bubonic that results in a secondary infection of the lungs which can be spread among individuals in close contact by exhaled droplets of blood: Most of the early European fatalities resulted from this deadly combination.

Plague Doctor



Paul Furst, Der Doctor Schnabel von Rom

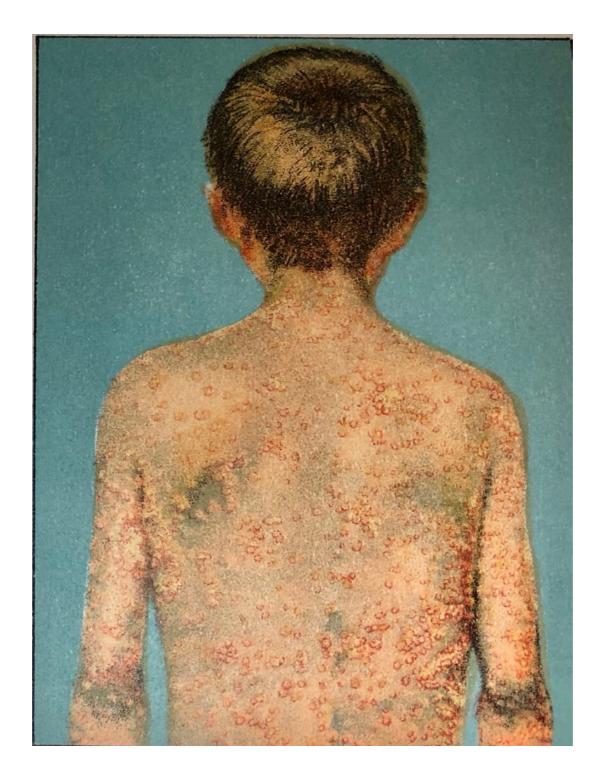
Plague Doctor

The European Plague Doctor's Garb was created by Charles de Lorme, a chief physician to several French kings around 1690. The garb was designed to keep health care workers at a safe distance from the diseased individual. A thick black overcoat was worn along with gloves, circular glasses to seal the eyes behind a mask and a wand to examine the patient. The long bird-like beak was stuffed with scented spices and herbs to mask the ferocious odors emitted by the infectious disease.

Devastating Pandemics

3. Smallpox 735-1977 510 Million Deaths

Many Europeans, with their natural immunity to smallpox, did not witness its symptoms in native Americans until the Spanish arrived to the New World in 1520. Prior to this, Japan had a epidemic of smallpox between 746-747 AD killing two million of its inhabitants. Eventually, Pilgrims arriving at Plymouth, introduced the disease to native North Americans. Later in 1650, smallpox spread to the Dutch colony of New Amsterdam (New York). Most of the smallpox epidemics in the New World left the white communities intact while killing off the native populations. During the American Revolutionary War, General Washington recognized the British troops immunity against smallpox and utilized variolation (transferring pus from an infected person to a healthy individual) to inoculate his troops. Between 1877 and 1977, smallpox had killed over 500 million people throughout the world. In 1796, doctor Edward Jenner adopted the currently employed medical process of vaccination to prevent the smallpox virus Variola major and Variola minor from reoccurring.

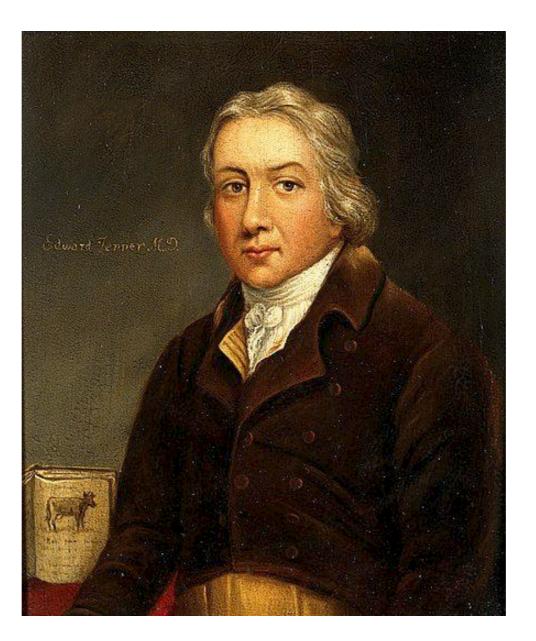


Smallpox

Symptoms include fever, vomiting, mouth sores and fluid filled blisters that scab over for up to 4 weeks.

Edward Jenner

Edward Jenner (1749-1823) was an English physician who contributed to the development of a smallpox vaccine.



Wikipedia

Edward Jenner



Inoculating Child

From the Parke, Davis & Co. A History of Medicine in Pictures by George A. Bender: Painting by Robert A. Thom.

Devastating Pandemics

4. Measles (Rubeola) 1100-2020

Emergence of measles first documented by Persian physician Muhammad Ibn Zakariya al-Razi in the 10th century in his text "The Book of Smallpox and Measles". **Todays measles virus mutated from Rinderpest (cattle** plague) sometime between AD1100 and AD 1200. Measles is a endemic viral disease aways present in a community with most individuals developing a resistance. Children younger than age three are the most susceptible to this virus that has twenty-three identifiable strains. John Enders, a American biomedical scientist, developed the first vaccine for measles in 1963 that was later improved upon in 1968 by Maurice Hilleman, a American microbiologist. Currently, the measles vaccine is usually combined with mumps, rubella and varicella (MMRV).



Measles

Symptoms include fever, cough, runny nose, inflamed eyes and rash that lasts from 7 to 10 days.

Devastating Pandemics 4. Cholera 1816-1923 Over 2 Million Deaths

The bacterium Vibrio cholera is responsible for the cholera intestinal disease caused by contaminated food and water. The first. **Documented cholera pandemic occurred in Europe and Asia** between 1816 and 1826 killing over an estimated 100,000 individuals. There were six cholera pandemics with a total of over two million people killed world-wide between 1816 and 1923. During the third cholera pandemic between 1846 and 1860 that spread to North America from Europe aboard ships carrying immigrants, the disease also spread across the West to California with gold rush argonauts aboard land schooners from the East and with settlers aboard steamers arriving from Panama and Nicaragua. Dr. Thomas M. Logan, a Sacramento physician and pioneer epidemiologist who collected medical statistics, estimated that between 800 to 1000 inhabitants and a third of the cities' physicians died from the cholera disease. It is believed that raw sewage containing the bacterium found its way into the drinking water supply. In 1854, a British scientist and early epidemiologist named John Snow tracked the cause of the cholera outbreak in London to the Broad street water supply pump. Later, in 1884, Robert Koch, a Prussian bacteriologist, discovered the causal agent of cholera comma bacillus in a Calcutta water supply. Following WWII, intravenous and oral hydration along with antibiotics such as doxycycline and azithromycin are used to successfully treat cholera outbreaks around the world.

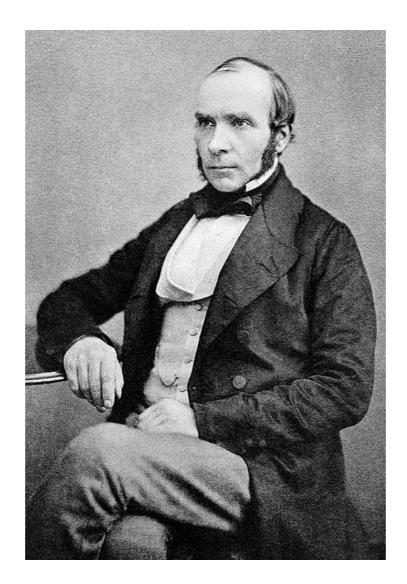
Thomas M. Logan (1813-1876)

Dr. Logan was a Sacramento physician and pioneer epidemiologist during the cholera epidemic of 1850. He was the founder of California's State Board of Public Health and one of the founders of the California Medical Association.



John Snow

John Snow was an English physician who was responsible for tracing the cholera outbreak in London in 1854. He finally had the handle removed from the pump to stop the cholera outbreak.



Wikimedia

EARLY PUBLIC HEALTH MEASURES



Attempts to disinfect and remove garbage on walks and streets in 1864 New York City to prevent the spread of cholera.

Wikimedia

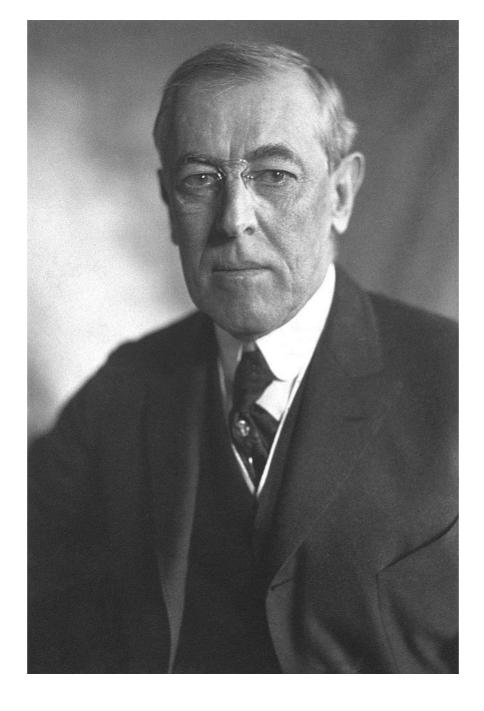
Devastating Pandemics

5. The Spanish Flu 1918-1919 50-100 Million Deaths

The Spanish flu or Great Influenza (Europeans referred to it as "LaGrippe"), is a viral infection that attacks the respiratory system that can eventually led to pneumonia. This H1N1 swine influenza A virus is believed to have infected over 500 million people around the world with the highest (23-71 percent) fatality rate among pregnant women: The overall, world-wide mortality rate was estimated to be two percent. Spain was the first country to report cases of the disease with King Alfonso XIII contracting the flu, hence the misnomer "Spanish Flu". Some epidemiologists theorize the origin to be in Haskell county Kansas at the Army's Camp Funston used to train WWI doughboys. The infection rate rapidly spread to the front lines in France killing more soldiers in the trenches than the German offensive. A second, more veracious wave of the infection, arrived around the world in September of 1918 and a third, weaker strain, in the spring of 1919 that eventually took the life of President Woodrow Wilson in 1924. The majority of fatalities were associated with the development of secondary bacterial pneumonia. Some of the antiviral drugs used to treat seasonal flue also have been successfully employed to treat the H1N1 swine flue.

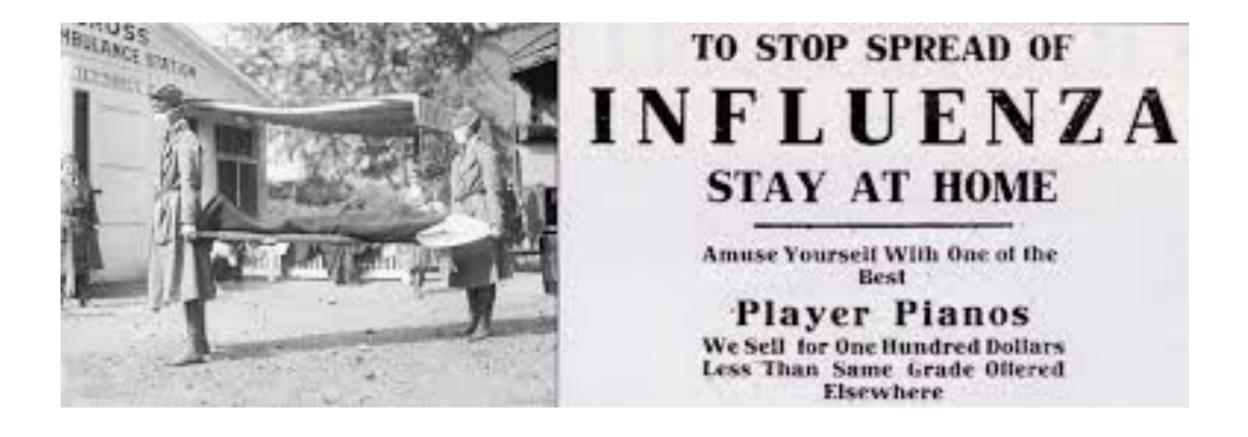
Wikimedia

Camp Funston Kansas 1918



Woodrow Wilson the 28 President of the US Suffered a Stroke in 1919 Following a Episode of the Spanish Flue and remained Incapacitated Until His Death in 1924 at Age 67.

Wikipedia



Wikimedia

Devastating Epidemics

6. Poliomyelitis (Polio)

Poliomyelitis derives from the Greek meaning "grey", referring to the marrow grey matter of the spinal cord becoming inflamed. Prehistory Egyptian paintings depict individuals with withered limbs walking with canes. Poor sanitation practices in the developing world exposed most inhabitants to this RNA virus enabling a natural immunity. With improved sanitation practices in the developing world, individuals lost this resistance. Polio is a viral infection spread by coming into contact with infected fecal matter. The symptoms of this virus were first recognized as a medical condition in 1789 by English physician Michael Underwood with the viral nature being identified by Austrian immunologist Karl Landsteiner. Major outbreaks among children occurred in he United States during the 20th century. The first polio vaccine wasn't developed until the 1950s by American virologists Jonas Salk and Albert Sabin.

The spinal polio virus invasion results weakness of the cervical, thoracic, or lumbar muscles and tendons. A smaller percentage of patients can also be affected by the bulbospinal version that produces paralysis of the diaphragm requiring artificial ventilation to assist breathing.



1936 Emerson Negative Pressure Respirator Known as the "Iron Lung"

Jonas Salk (1914-1995)



Jonas Salk (1914-1995) was an American physician and epidemiologist specializing in virology who developed the first successful polio vaccine.

Wikipedia

Devastating Pandemics

7. AIDS/HIV

Human immunodeficiency virus (HIV) believed to have migrated from the consumption of non-human primate bush meat in the Belgian Congo during the late 19th and early 20th century. The virus was further spread through prostitution, homosexual activity and drug use throughout the African continent. WW1 troops in Europe were eventually exposed to this virus with ties to French Equatorial Africa. HIV-1 spread from Haiti to the homeless population in New York City in 1971 and then to San Francisco around 1976. The global spread of HIV is difficult to trace because the Acquired Immune Deficiency Syndrome (AIDS) has a long incubation time of up to a decade or longer to emerge.

The AIDS epidemic was first documented in the US during 1981 among gay men in Southern California and referred to as "gay-related immune deficiency". One of the principle symptoms was Pneumocystis pneumonia (PCP). The HIV virus was later isolated in 1983 by Jay Levy, a physician at the University of California, San Francisco. The current treatment for AIDS is a antiretroviral cocktail involving three or more drugs. There is no cure for removing this virus from the body.

Devastating Epidemics

8. EBOLA

EBOLA, named after the Ebola river in the Democratic Republic of Congo, is a viral, hemorrhagic disease. Symptoms of fever, vomiting and rash accompany the virus resulting in decreased liver and kidney function between two days to three weeks from direct exposure to infected body fluids or bush meat. The EBOLA virus has a 25 to 90 percent fatality rate within six to 16 days. Fruit bats have been the attributed vector for passing the virus to non-human primate bush meat.

The disease was first identified in the Congo in 1976 with the majority of the epidemic outbreak being confined to the South-West African continent. Two, non-approved treatments involving monoclonal antibodies REGN-EB3 and mAb1114 have been employed to manage symptoms. The administration of oral rehydration and intravenous fluids are also employed as supporting measures to improve outcomes. Community containment and contact tracing help in preventing further spread.

WORLD-WIDE MORTALITY'S

PANDEMIC	TIME PERIOD	MORTALITY
Plague of Justinan	541-542	30-50M
Black Death	1347-1351	200M
Smallpox	1520	56M
Cholera	1817-1923	1M
Spanish Flue	1918-1919	40-50M
HIV/AIDS	1981-Present	25-35M
Ebola	2014-2016	11.3K
COVID-19	2019-Present	1M+

CONTAINMENT

Quarantine "cordons sanitaires"

Early containment of infectious diseases, such as the bubonic plague was first instituted in the 14th century by Italian city state magistrates in Venice and Florence. The islands of Lazzaretto Vecchio and Lazzaretto Nuovo were some of the first quarantine sites to protect Venice inhabitants from the Black Death. Infected individuals of Florence were required to remain sheltered in squalid cottages provided by the city. Many people in European cities during this time and later, fled to the countryside to escape the ravages of the plague. Later, in the 17th century, infected individuals were relegated to be quarantined in pest houses also known as "fever sheds" along with the insane and criminals manned by barber-surgeons.

CONTAINMENT

Personal Protective Equipment

Personal protective equipment (PPE) such as face masks were first used in 1905 by Chicago physicians to prevent becoming contaminated by the streptococci bacteria from scarlet fever patients. Subsequently, the medical profession gradually began to adopt the use of masks during surgical procedures. All medical personnel routinely wore cotton fabric masks during the 1918 Spanish flu epidemic.

1918 Spanish Flue Pandemic UK



The Times UK 1918



A 1918 Office Flue Mask

BBC 1918

CONTAINMENT

Social Distancing

Social distancing or physical distancing is a form of social isolation that has been around for hundreds of years to prevent the spread of contagious diseases. It goes back to biblical times to prevent coming into contact with individuals that suffered from Hansen's disease (leprosy). During the 1918 Spanish flu epidemic, authorities mandated the closing of schools and bars as well as banning public gatherings to prevent disease transmission. Later, in the 1950s, public pools and theaters were closed down to prevent the spread of polio.

Contact Tracing

Contact tracing is a public health process of identifying individuals who may have come into contact with a infected person. The contact can then be tested and isolated for tracing their contacts to prevent the disease spread. Diseases such as smallpox, TB, measles, HIV and Ebola have been the object of contact tracing to interrupt their transmission since the mid-19th century.

The earliest evidence of tracing disease spread occurred during the reoccurrence of the bubonic plague in Italy during the 16th century. Andrea Gratiolo, a village physician in Desenzano, employed contact tracing as we know it today to disprove the disease was not transmitted by sexual contact. Around the same time period, another Italian physician, Gabriel Falloppio, was tracing the outbreak of syphilis among soldiers and their female contacts. Contact tracing become popular with the development of epidemiology in the mid-19th century by French physicians in preventing the spread of Yellow Fever. Smallpox was not eradicated by universal immunization, but rather by extensive contact tracing. Later, in the 20th century at the height of HIV infections, contact tracing became known as "partner notification" and was a crucial method of curtailing the disease spread among intravenous drugusing partners.

IMMUNIZATION

Immunity

Immunity is a state of protection offered by the body's immune system against infectious diseases confirmed either through an immune response generated my immunization or a previous infection. There are two types of immunity. Active immunity or natural or acquired immunity, refers exposing the body to an antigen to generate an adaptive immune response taking days to weeks to develop. Passive immunity refers to providing Immunoglobin G (IgG) antibodies to protect against an infection to provide short-lived protection from weeks to months. Physicians who specialize in the branch of medicine that deals with treating the immune system and infectious disease are immunologists.

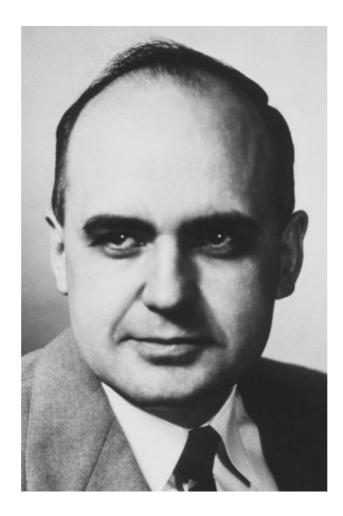
During the 18th century, European milk-maids were acknowledged to possess a natural immunity to smallpox that could be passed on to others by a process of variolation whereby pus from uninfected individual was transferred to a healthy person. This early form of inoculation which would later in 1796 be recognized as vaccination by English physician Edward Jenner to prevent becoming infected and the further spread go smallpox. Inoculation subsequently became a successful means to prevent the spread of viral diseases once a vaccine was made available to the medical community.

IMMUNIZATION

Vaccine

Vaccines are biological preparations that provide active acquired immunity to a specific infectious disease that usually contain a weekend agent of the microbe. These agents stimulate the body immune system to attack any future exposure to the same microbe. There are four vaccine types which include live attenuated, killed/inactive, subunit and toxoid.

Maurice Hilleman (1919-2005)



Maurice Ralph Hilleman was an American microbiologist specializing in vaccinology who developed over 40 vaccines including measles, mumps, hepatitis, chickenpox, meningitis, pneumonia and Haemophilus influenza. The record time development for the mumps vaccine in 1967 was accomplished by Dr. Hilleman within three years.

Wikipedia

HERD IMMUNITY

Also referred to as "community or population immunity"

Herd immunity is protection from a infectious disease being communicated between individuals in a population where a sufficient percentage have either experienced the disease or have been vaccinated. Those individuals who are susceptible because they are unable to receive a vaccine are protected by the herd effect: the herd effect stops or slows down any further transmission of a infectious disease.

VIRAL DISEASE TESTING

Polymerase Chain Reaction (PCR)

PCR is a reliable molecular biology test that permits the identification of small amounts of DNA sequences to identify infectious agents.

Enzyme-Linked immunosorbent assay (ELISA)

ELISA is used to detect the antigen or antiviral antibody.

Rapid Antigen Test (RAT)

These are rapid diagnostic test to detect the presence of antigens that includes tests for rapid strep (streptococcal antigens), rapid influenza virus antigens and malaria detection (Plasmodium antigens)

Unlike serum test for bacterial disease or stool cultures such as for cholera, these viral tests require a oral or nasal swap that is sent to a laboratory for analysis. There are a number of home tests for COVID-19 with mail-in analysis that provide the results online.

Virus Treatments

Vaccines are the most effective method to prevent viral infections.

Antiviral Medications:

1. Tamiflu (oseltamivir) Used to treat the symptoms of flue virus (influenza A and B)

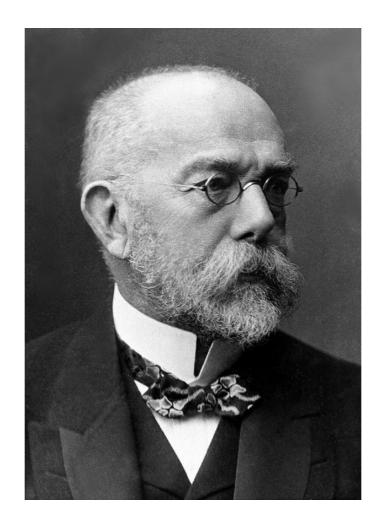
2. Acetaminophen and Ibuprofen can be used to treat viral fevers.

3. acylovir, famciclovir and valacyclovir can be used treat herpesvirus.

Convalescent Plasma Treatment:

This treatment involves giving infected patients plasma or serum from patients who have recovered from the disease and have developed antibodies that is believed to give the recipient's immune system an added boost. CPT was first used as a treatment for diphtheria in 1892 and later as a treatment for scarlet fever in 1920. It was also used in the 1918 Spanish flue pandemic with mixed outcomes.

Robert Koch (1843-1910)



German physician and microbiologist who conducted research into infective diseases such as tuberculosis, cholera and anthrax that improved public health.

Wikipedia

EPIDEMIOLOGY

Epidemiology is the study and analysis of infectious disease distribution in defined populations. The statistics collected by epidemiologists help shape public health policy decisions. Epidemiological studies include the causes of diseases and their transmission as well as comparing treatments.

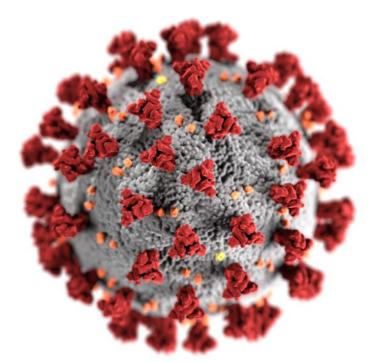
WORLD HEALTH ORGANIZATION (WHO)



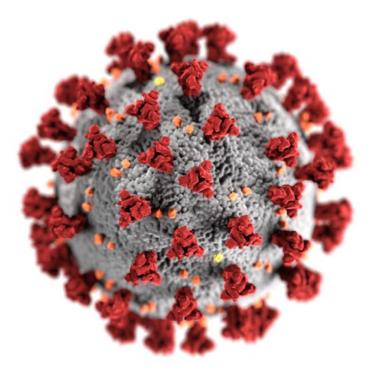
The World Health Organization (WHO) was established in 1948 to set guidelines for international public health standards to curb communicable diseases such as HIV/ AIDS, ebola, malaria and tuberculosis. The Who has employed epidemiological methods to successfully eradicate smallpox, polio and to promote the development of an Ebola vaccine. The Who's headquarters is currently located in Geneva, Switzerland and is one of the United Nation's specialized agencies.

Coronavirus Disease 2019

Covid-19 as a virus is a submicroscopic agent or microbe that causes an infectious disease process that primarily affects the lungs. This virus was believed to have originated from a "wet market" in Wuhan, China where butchered meat and wild animals were sold in 2019. This infectious virus causes severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID-19 is another example of a zoonotic virus that has been responsible for major pandemics throughout man's history. Rodents, primates bats and birds have been primarily responsible for transmitting many of these infectious diseases to humans.



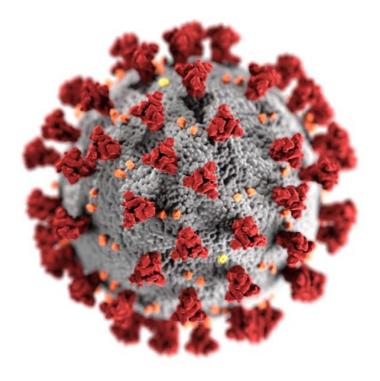
Coronavirus Disease 2019



COVID-19 Mutant Swarm

Covid-19 is Unlike bacteria: viruses do not require oxygen to survive, I.e., non-metabolic. A virus reproduces by invading a cell's deoxyribonucleic acid (DNA) and encoding the cell's ribonucleic acid (RNA) to make its own proteins to modify bodily functions. The host cells die following this process creating numerous disease processes. The virus's genome is believed to have mutated back in January of 2020 to a more virulent strain that easily infects the human lung tissue making it highly contagious.

Coronavirus Disease 2019



Treatments

- 1. Dexamethasone Treatment used for treatment with patients requiring oxygen support.
- 2. FDA approved Vekhury (Remdesivir) for use with hospitalized patients.
- 3. Emergency use monoclonal antibody treatment using bamlanivaimad a laboratorymade protein that blocks the virus attachment to the spike protein of SARS-COV-2 for use with patients exhibiting mild-to-moderate symptoms.

RESOURCES

Barry, John M. The Great Influenza

Watts, Sheldon. Epidemics and History

Markel, Howard. Six Major Epidemics that have Invaded America and the Fears they Have Unleased.

Markel, Howard. Quarantine: East-European Jewish Immigrants and the New York City Epidemics of 1892.

Note: Howard Markel, M.D., Ph.D. is the director of the Center for the History of Medicine at the University of Michigan.