

ID Zebras You Learned About in Med School, but Never Thought You'd See

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COI

- Nothing to declare

Learning Objectives

- To refresh your memory about some uncommon infections
- To discuss why some of these are becoming more prevalent
- To make providers aware of signs & symptoms to look for when presented with a patient whose diagnosis seems unclear

Outline

- Ebola
- Mumps & Measles
- Malaria in the USA
- Polio
- Monkey Pox
- Zika
- Worldwide Pandemic
- Hepatitis Outbreaks
- Cholera
- Syphilis
- Trench Fever (*B. quintana*)
- Scarlet Fever
- Rabies

Why?

- Changes in disease reservoirs (soil, animals)
- Modes of Transmission (contact, droplet, vector)
- Host defense mechanisms (barrier, innate, immunity)
- Vaccination
- Population shifts
- Safety/regulation shortfalls
- Public health shortfalls
- Treatment shortfalls (MDRO's)

Ebola

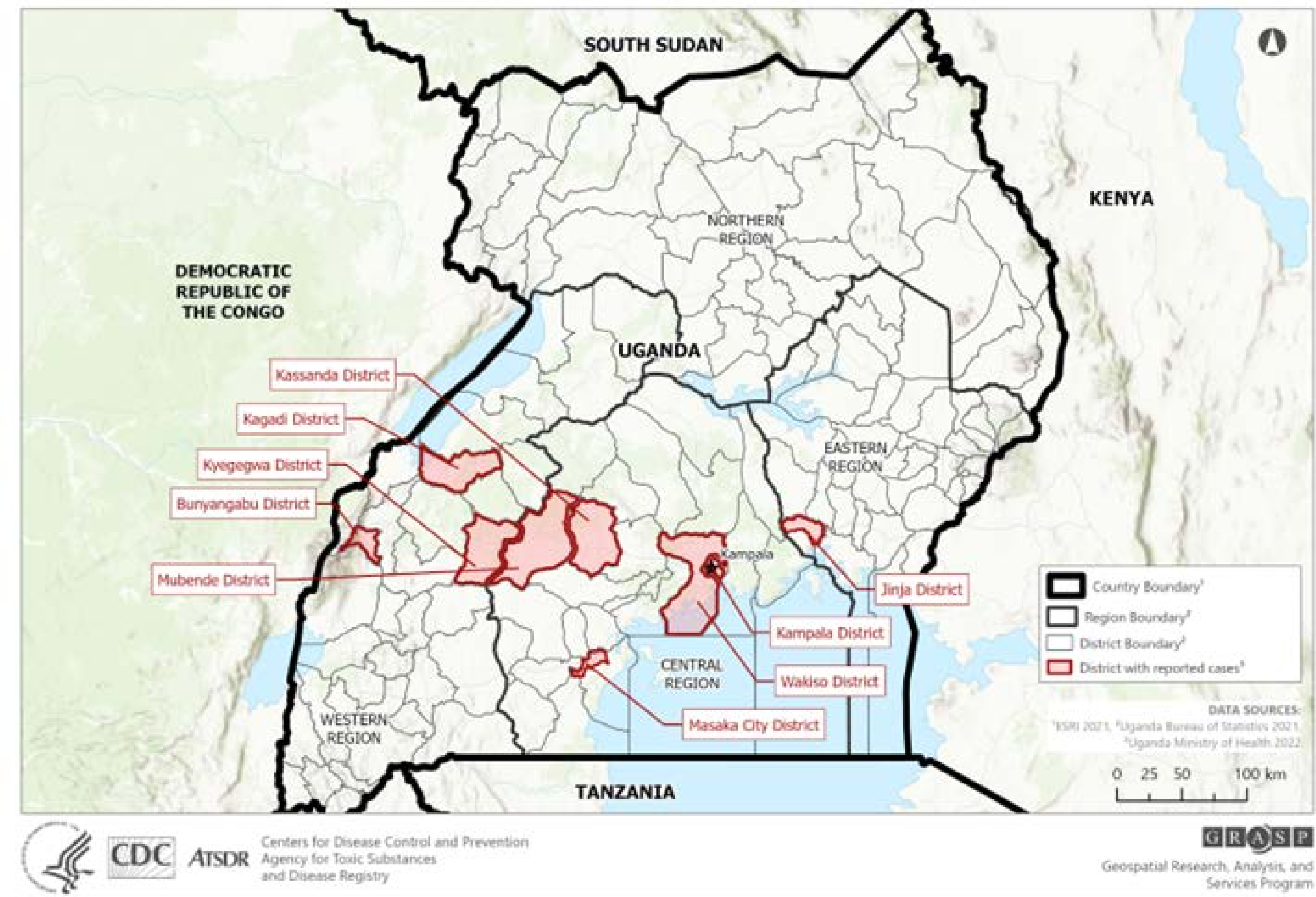
- Ebola virus disease is a severe illness that was first discovered in humans in 1976 in South Sudan and the Democratic Republic of Congo, formerly Zaire. Since then, a number of outbreaks have occurred in central and western Africa.
- Ebola is highly contagious, but it is transmitted only through direct contact with bodily fluids. It is not spread through the air or casual contact. The incubation period for Ebola is 2 to 21 days.
- People with Ebola are not contagious until they begin having symptoms. People who have died from Ebola remain contagious.



Ebola

- The latest Outbreak of Ebola (Sudan virus) started on 9/20/22 in Mubende District, in western Uganda. The announcement came after a patient with a suspected viral hemorrhagic fever (VHF) was identified and isolated at Mubende Regional Referral Hospital. A sample from the patient was sent to the VHF laboratory at the Uganda Virus Research Institute, where Ebola (Sudan strain) was confirmed.
- This marked the sixth Ebola outbreak in Uganda. Five of the six were caused by the species Sudan Ebola virus.
- The outbreak spread to nine districts in Uganda (Mubende, Kyegegwa, Kassanda, Kagadi, Bunyangabu, Kampala, Wakiso, Masaka City, Jinja). Rapid Response Teams were deployed to support outbreak response activities, including investigation of unexplained deaths and contact tracing. CDC provided support in surveillance, epidemiology, laboratory, communication, and ecological investigations.
- The outbreak was declared over on January 11, 2023.

Uganda: Ebola Virus Disease Outbreak 2022

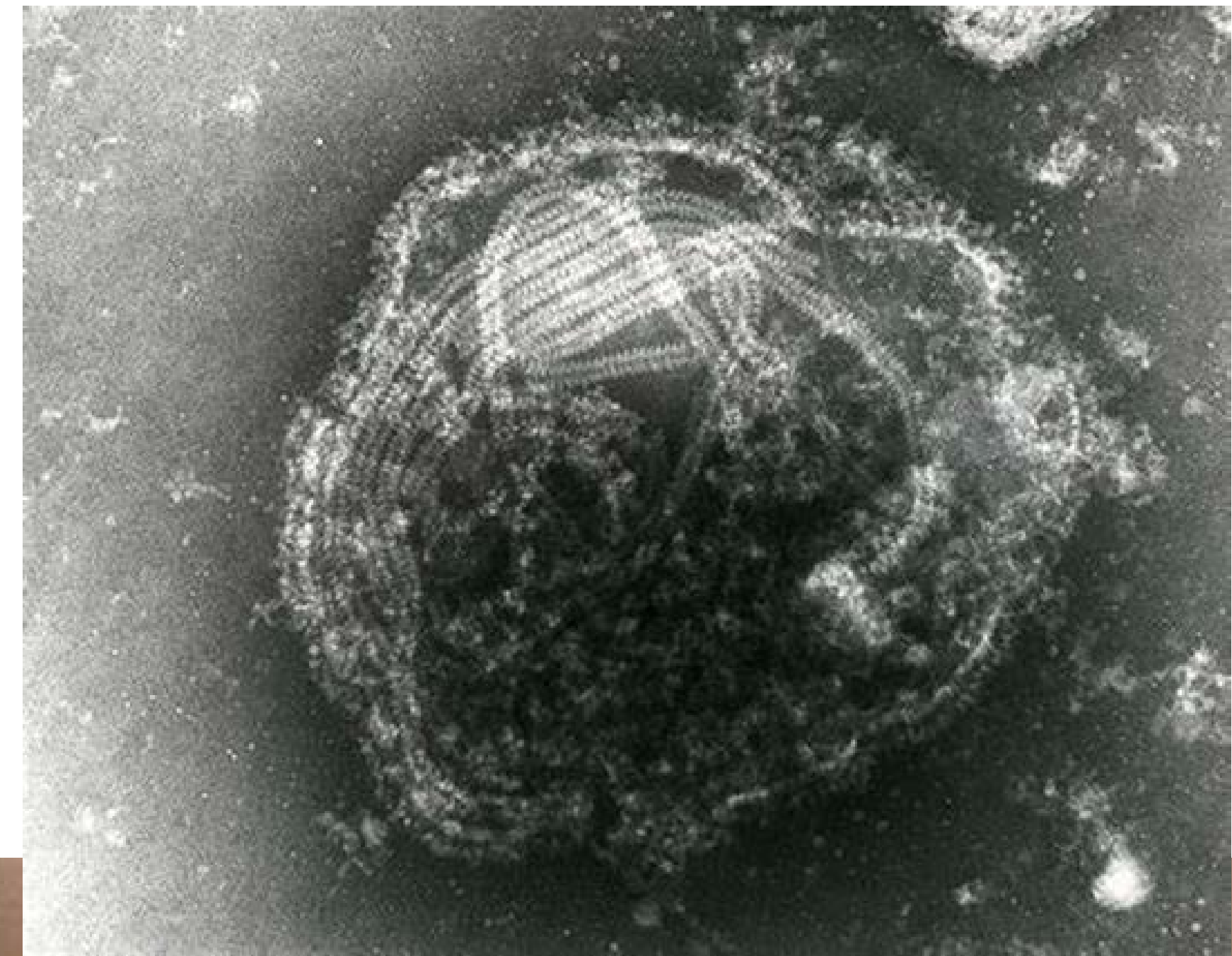


Ebola Outbreak Challenges

- Importation of Ebola disease to the United States by an infected traveler from an outbreak area is a recognized risk with the potential for spread to other people. During the 2014–2016 Ebola disease outbreak in West Africa, 11 people were treated for EVD in the U.S., and two of them died. Nine of these cases were imported into the U.S. Two were domestic healthcare workers who were infected while caring for the first travel-associated Ebola disease case diagnosed in the U.S. Both healthcare workers recovered.
- The Vaccine (ERVEBO®) is for the Zaire virus & it does not provide cross-protection against Sudan virus because the 2 viruses are antigenically different (a vaccine is in development & has had success in animal trials)
 - The duration of protection conferred by an initial dose of ERVEBO is unknown.
 - The correlate of protection, or the specific immune response to the ERVEBO vaccine that closely relates to protection against infection with EBOV, is unknown and still being studied.
 - It is also not known whether it is effective when administered concurrently with antiviral medication, immune globulin, and/or blood or plasma transfusion
 - A booster dose for people who have been previously vaccinated may extend the duration of protection for ERVEBO.

Mumps

- Mumps is a viral illness caused by a paramyxovirus, a member of the Rubulavirus family. The average incubation period for mumps is 16 to 18 days, with a range of 12 to 25 days.
- It replicates in the upper respiratory tract and is transmitted person to person through direct contact with saliva or respiratory droplets of a person infected with mumps.
- The risk of spreading the virus increases the longer and the closer the contact a person has with someone who has mumps.
- The infectious period is considered from 2 days before to 5 days after parotitis onset, although virus has been isolated from saliva as early as 7 days prior to and up to 9 days after parotitis onset.
- Mumps virus has also been isolated up to 14 days in urine and semen.

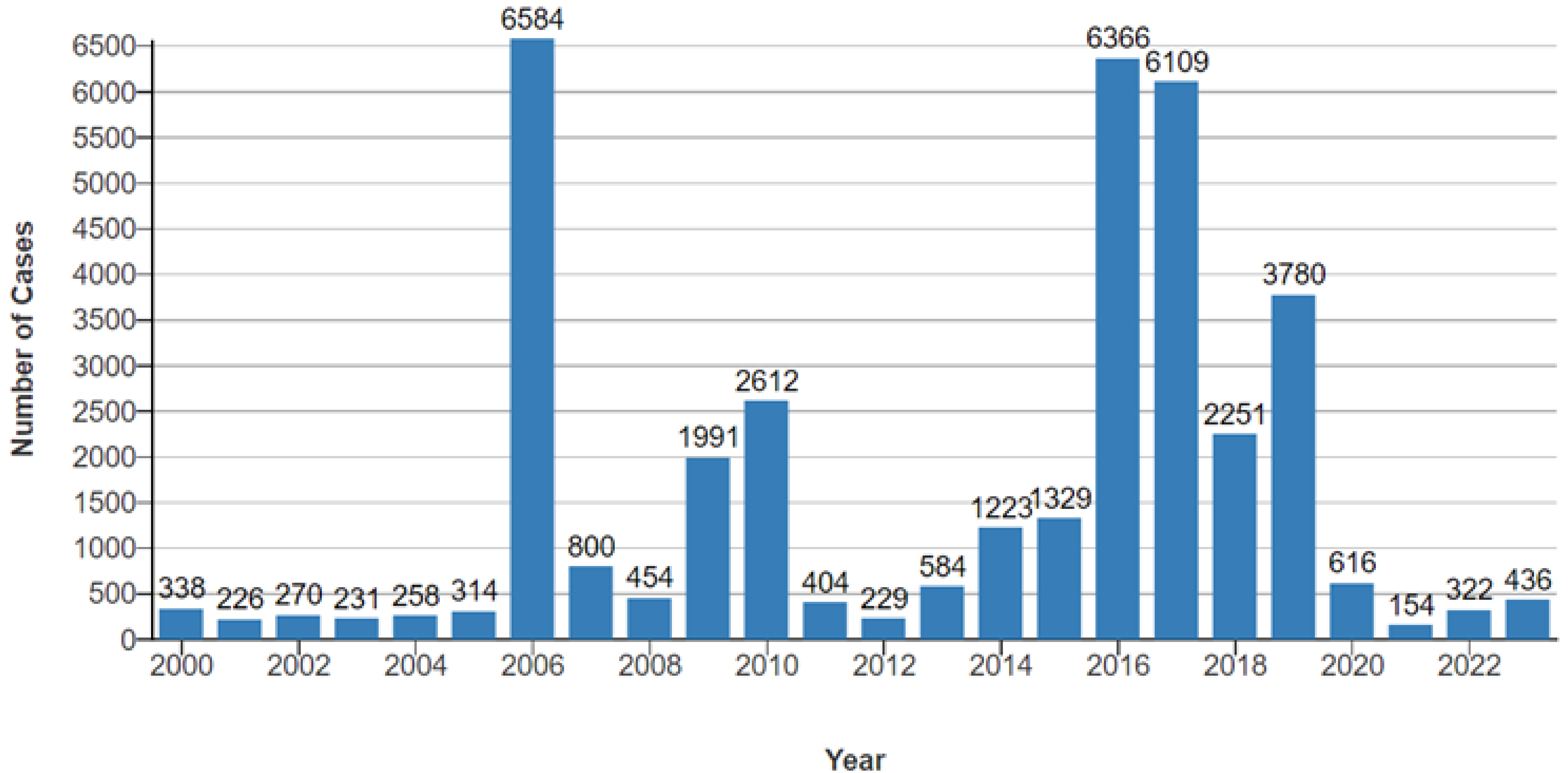


Mumps Clinically

- It typically starts with a few days of fever, headache, muscle aches, tiredness, and loss of appetite.
- Then most people will have swelling of their salivary glands (often referred to as parotitis when the parotid gland, located in front and below the ear, swells). This is what causes the puffy cheeks and a tender, swollen jaw.
- Orchitis occurs in approximately 30% of unvaccinated and 6% of vaccinated post-pubertal male mumps patients. In 60% to 83% of males with mumps orchitis, only one testis is affected. Mumps orchitis has not been linked to infertility, but may result in testicular atrophy and hypofertility.
- Among adolescent and adult female mumps patients in the United States in the post-vaccine era, rates of oophoritis and mastitis have been $\leq 1\%$. However, these complications may be more difficult to recognize and are likely underreported.
- Pancreatitis, deafness, meningitis, and encephalitis have been reported in less than 1% of cases in recent U.S. outbreaks.

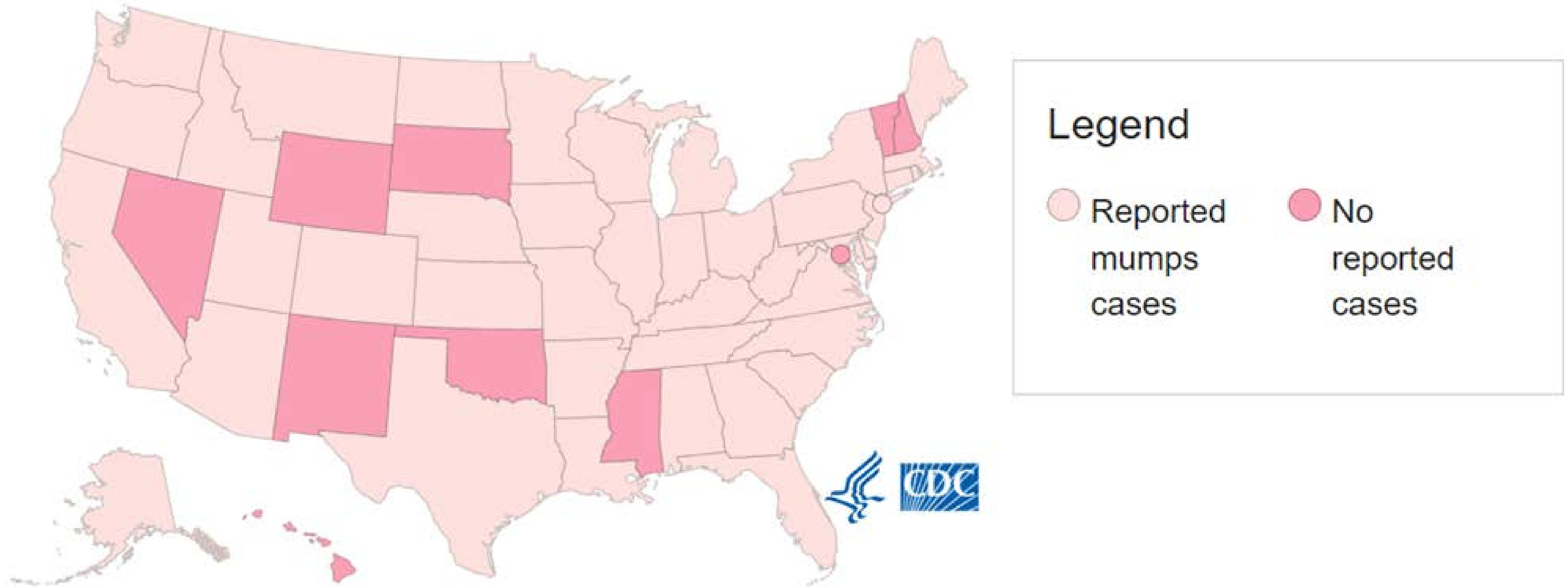


Reported Mumps Cases by Year — United States, 2000-2023**



Reported US Mumps Cases by Jurisdiction and Year*

Reported Mumps Cases-2023



Measles

- Measles is caused by a single-stranded, enveloped RNA virus with 1 serotype. It is classified as a member of the genus Morbillivirus in the Paramyxoviridae family. Humans are the only natural hosts of measles virus.
- In the decade before the live measles vaccine was licensed in 1963, an average of 549,000 measles cases and 495 measles deaths were reported annually in the United States. However, it is likely that, on average, 3 to 4 million people were infected with measles annually; most cases were not reported.
- Of the reported cases, approximately 48,000 people were hospitalized from measles and 1,000 people developed chronic disability from acute encephalitis caused by measles annually.
- In 2000, measles was declared eliminated from the United States.
- Since 2000, when measles was declared eliminated from the U.S., the annual number of cases has ranged from a low of 37 in 2004 to a high of 1,282 in 2019. The majority of cases in the United States have been among people who are not vaccinated against measles.

Measles Clinically

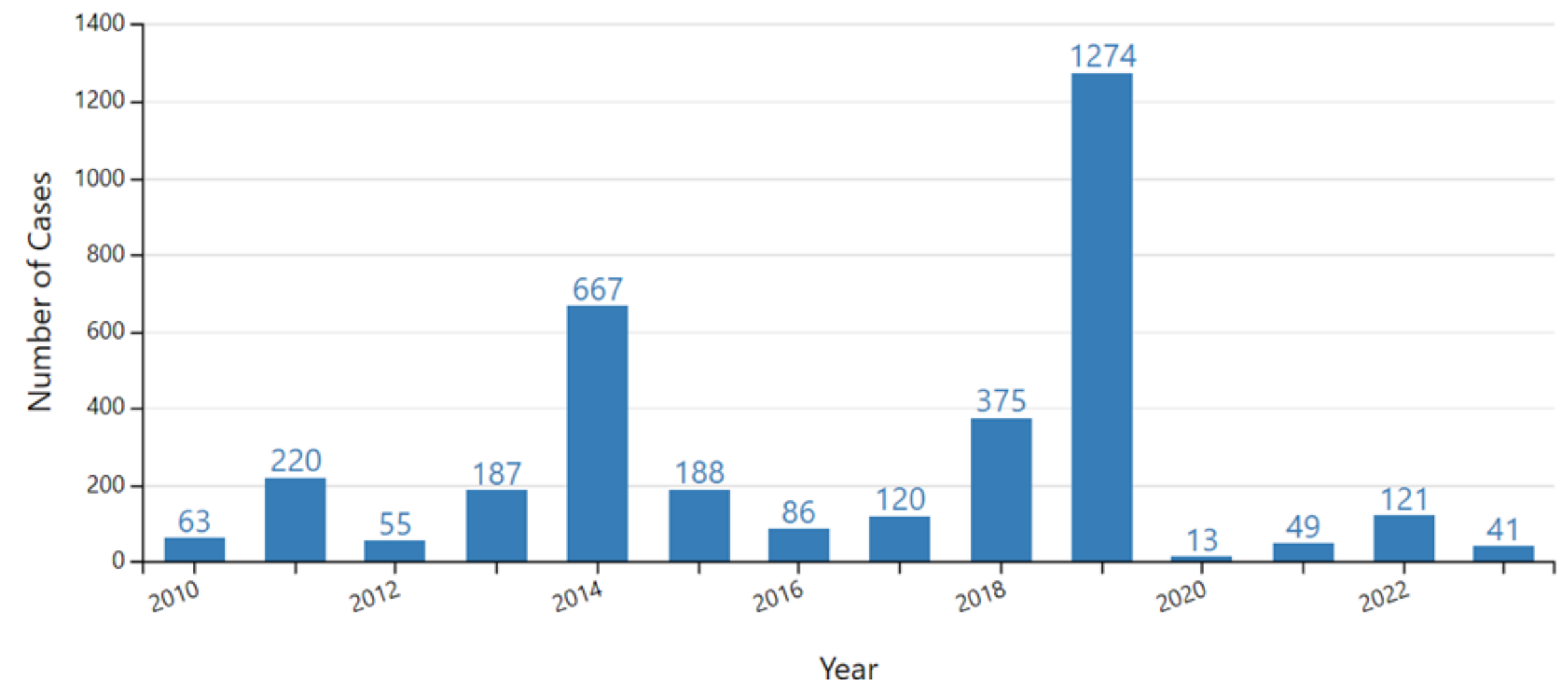


Measles Outbreaks

- Measles cases in 2024
 - As of February 29, 2024, a total of 41 measles cases were reported by 16 jurisdictions: Arizona, California, Florida, Georgia, Indiana, Louisiana, Maryland, Michigan, Minnesota, Missouri, New Jersey, New York City, Ohio, Pennsylvania, Virginia, and Washington.
- Measles cases in 2023
 - During January 1-December 31, 2023, a total of 58 measles cases were reported by 20 jurisdictions: California, Colorado, District of Columbia, Florida, Hawaii, Idaho, Illinois, Kentucky, Maryland, Missouri, New Jersey, New York City, Ohio, Oregon, Pennsylvania, Texas, Utah, Virginia, Washington, and Wisconsin.
- Measles cases in 2022
 - From January 1 to December 31, 2022, a total of 121 measles cases were reported by 6 jurisdictions. *

Number of measles cases reported by year

2010-2023* (as of November 2, 2023)





WFLA Tampa (+)

Measles spreads to Polk County amid growing outbreak in South Florida

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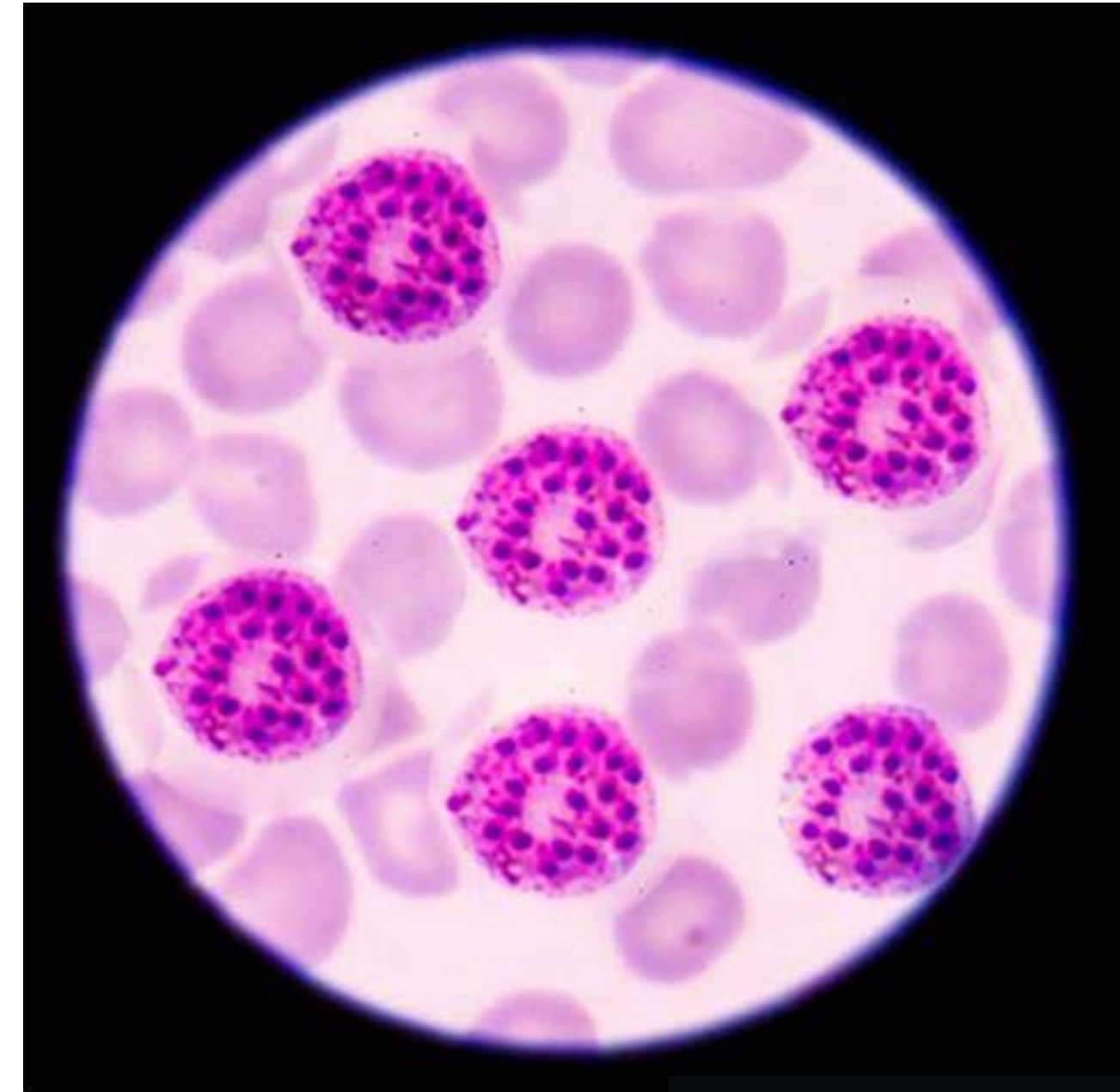
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Measles Outbreak Concerns

- Current Outbreak - Measles cases in 2024
 - Florida has been hit particularly hard & are not responding in a typical manner
 - 10 residents and at least 4 non-residents have been diagnosed with measles in the past month or so. 3 counties are involved with at least one school district having 7 of the 10 cases
 - Calls for improved vaccination (at the lowest point in a decade) & staying out of school have not been announced
 - Contact tracing has not been initiated
- In the UK, a measles outbreak continues to widen: As of January 18, there have been 216 confirmed cases and 103 probable cases reported since October. The UK Health Security Agency has declared a national incident to signal the growing public health risk.
- It is very contagious & about 90% of susceptible people who are exposed will come down with signs and symptoms of the disease
- Prevention with the vaccine is the single best treatment

Malaria

- Malaria is very common worldwide. It is one of the most common infections on the planet — about half of the world's population live in places where they are at risk of contracting malaria.
- Through one of our nation's greatest public health successes in history, malaria was eliminated from the U.S. by about 1950.
- There are still malaria cases in the U.S. every year, but these are contracted in places where malaria normally occurs and then are brought into the U.S. through travel.



Malaria in the USA

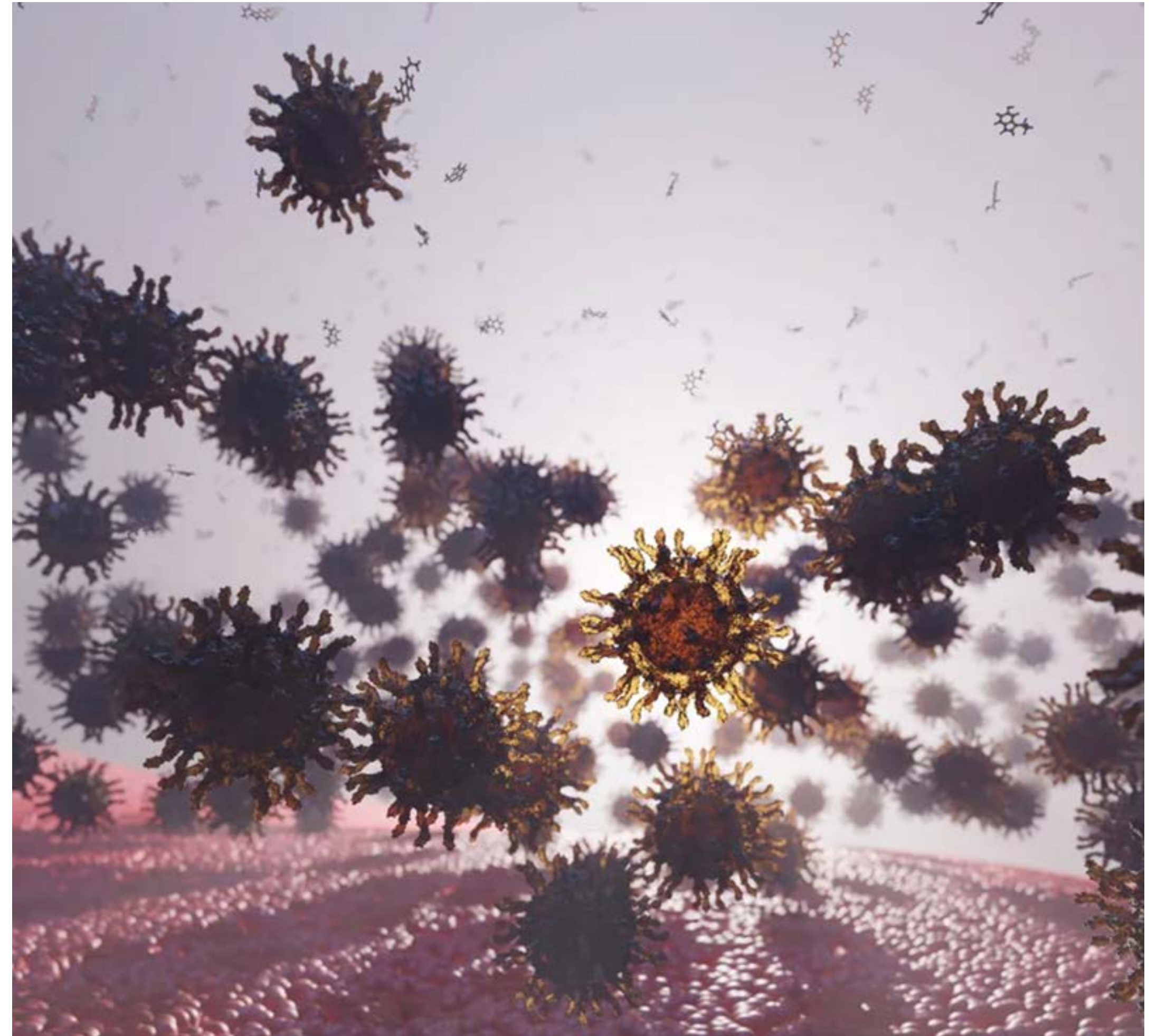
- In July of 2023, the Centers for Disease Control and Prevention issued an advisory concerning several malaria cases detected in the southern United States over the past two months.
 - The five diagnoses — one in Texas and four in Florida — quickly made headlines, with CDC officials reporting that these are the first cases of malaria to originate inside the U.S. (rather than from travel) since 2003.
- Infections with the specific species of malaria parasite identified in these cases can take weeks to produce symptoms, sometimes up to a year or more later.
- The public health response in these areas had been quick and seems to have interrupted further spread

Malaria Risk Factors

- The single greatest risk factor for malaria in the U.S. is still travel.
 - Anyone visiting or living in a region where malaria is endemic is at risk of contracting the parasite and taking it with them when they travel.
- According to the CDC, about 2,000 such cases are detected in the U.S. every year.
- Fortunately, there are effective treatments for malaria.
 - Treatment is important if infected, especially for children and for pregnant women.
- It is pretty unusual in the U.S. for travel-associated cases to seed outbreaks like what we are experiencing, but it does sometimes happen.
- Much of the southern U.S. is home to the *Anopheles* mosquito that carries the malaria parasite, and mosquito abundance in these areas can be a driver of outbreak risk.

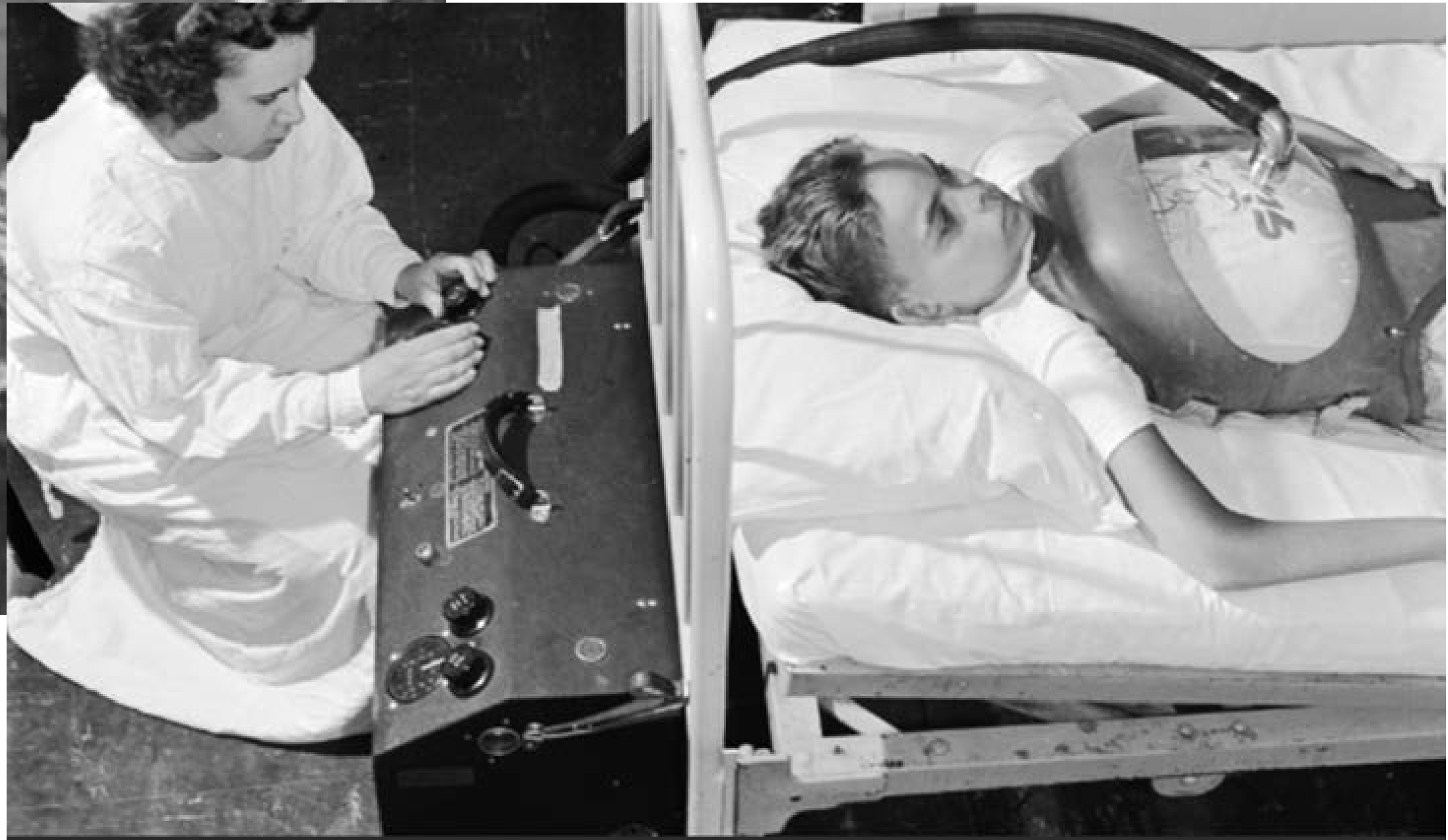
Polio Virus

- Poliovirus is a serotype of the species Enterovirus C, in the family of Picornaviridae. There are three poliovirus serotypes: types 1, 2, and 3.
- Poliovirus is composed of an RNA genome and a protein capsid. The genome is a single-stranded positive-sense RNA (+ssRNA) genome that is about 7500 nucleotides long.
- The viral particle is about 30 nm in diameter with icosahedral symmetry. Because of its short genome and its simple composition—only RNA and a nonenveloped icosahedral protein coat that encapsulates it—poliovirus is widely regarded as the simplest significant virus.
- Poliovirus was first isolated in 1909 by Karl Landsteiner and Erwin Popper.
- The structure of the virus was first elucidated in 1958 using X-ray diffraction by a team at Birkbeck College led by Rosalind Franklin, showing the polio virus to have icosahedral symmetry.



Polio History

- The disease has caused paralysis and death for much of human history.
- Over millennia, polio survived quietly as an endemic pathogen until the 1900s when major epidemics began to occur in Europe.
 - Soon after, widespread epidemics appeared in the rest of the world & by 1910, frequent epidemics became regular events throughout the developed world primarily in cities during the summer months.
 - At its peak in the 1940s and 1950s, polio would paralyze or kill over half a million people worldwide every year
- In 1952, the United States experienced its largest outbreak of polio with about 58,000 cases
- The availability of the inactivated poliovirus vaccine (IPV) in 1955 eradicated the disease in the U.S.
 - By 1957, following mass immunizations promoted by the March of Dimes, the annual number of polio cases in the United States was reduced by 1-log down to ~5,600 cases.
 - Following the development of oral polio vaccine, a second wave of mass immunizations led to a further decline in the number of cases & by 1961, only 161 cases were recorded in the United States.
 - The last cases of paralytic poliomyelitis caused by endemic transmission of poliovirus in the United States were in 1979, when an outbreak occurred among the Amish in several Midwestern states.
- Polio was mostly eradicated worldwide after the massive vaccination programs
- Recently was only circulating in Pakistan & Afghanistan
 - HCW & security guards in those 2 countries still risk their lives & are routinely gunned down traveling to remote areas & battling anti-vaccine conspiracy theories trying to deliver oral Polio vaccines to children



Polio Epidemiology

- Prior to 2022, there were a few sporadic cases, due to the weakened virus that led to polio infection (but not poliomyelitis) in vaccine recipients.
 - From 1980 to 1992, 109 cases of this vaccine-related polio occurred with the administration of 262 million doses of the oral vaccine in the U.S., for an average of about 8.4 cases annually.
 - In response, and because of wild polio's eradication from the country, in 2000 the U.S. switched to an injectable vaccine that uses a killed virus and does not carry this risk, since the killed-virus vaccine protects against polio itself but not against viral transmission.
- In July 2022, the New York State Department of Health alerted community members that a person in Rockland County tested positive for polio.
 - On August 12, health officials also reported finding evidence of poliovirus in New York City's wastewater samples
 - By September 9, the Governor of the State of New York declared a State disaster emergency regarding poliovirus.
 - Finding the virus in the wastewater indicated that other people in the region may have been infected, too.
 - In three of the affected counties, polio vaccination rates hover around 60 percent, leaving unvaccinated residents vulnerable since many people infected with the virus never develop symptoms but can still pass the virus to others.

Polio Concerns

- The treatment of polio is supportive.
 - Treatment specially addresses symptoms and signs of polio, like fever, & also physical therapy for weakness or paralysis
 - Treatment today would not be very different than that used during the polio epidemics of the 1940s and 1950s, except respiratory problems caused by polio would be treated with our newer ventilators and not an 'iron lung'
 - There are no FDA/internationally-approved antivirals against polio at this time.
- A primary concern is that today's physicians may not recognize and accurately diagnose polio.
 - the man in New York was diagnosed with acute flaccid myelitis until the results of the viral studies done on a stool specimen came back positive for vaccine-derived poliovirus type 2.
- The virus is actually quite good at finding those who are unvaccinated
- Polio will continue to spread until it is eliminated worldwide (like smallpox)

Monkeypox

- Monkeypox was first identified as a distinct illness in 1958 among laboratory monkeys in Copenhagen, Denmark.
- The first documented cases in humans was in 1970, in six unvaccinated children during the smallpox eradication efforts; the first being a 9-month-old boy in the Democratic Republic of the Congo (DRC).
- From 1981 to 1986, over 300 cases of human monkeypox were reported in the DRC, the majority being due to contact with animals.
- The virus has been detected in Gambian pouched rats, dormice and African squirrels, which are often used as food.
- Many more monkeypox cases have been reported in Central and West Africa, and in the Democratic Republic of Congo in particular: 2000 cases per year are known between 2011 and 2014. The collected data is often incomplete and unconfirmed, which hinders realistic estimations of the number of cases of monkeypox over time.
- Since then, the frequency and severity of outbreaks has significantly increased, possibly as a result of waning immunity since the cessation of routine smallpox vaccination

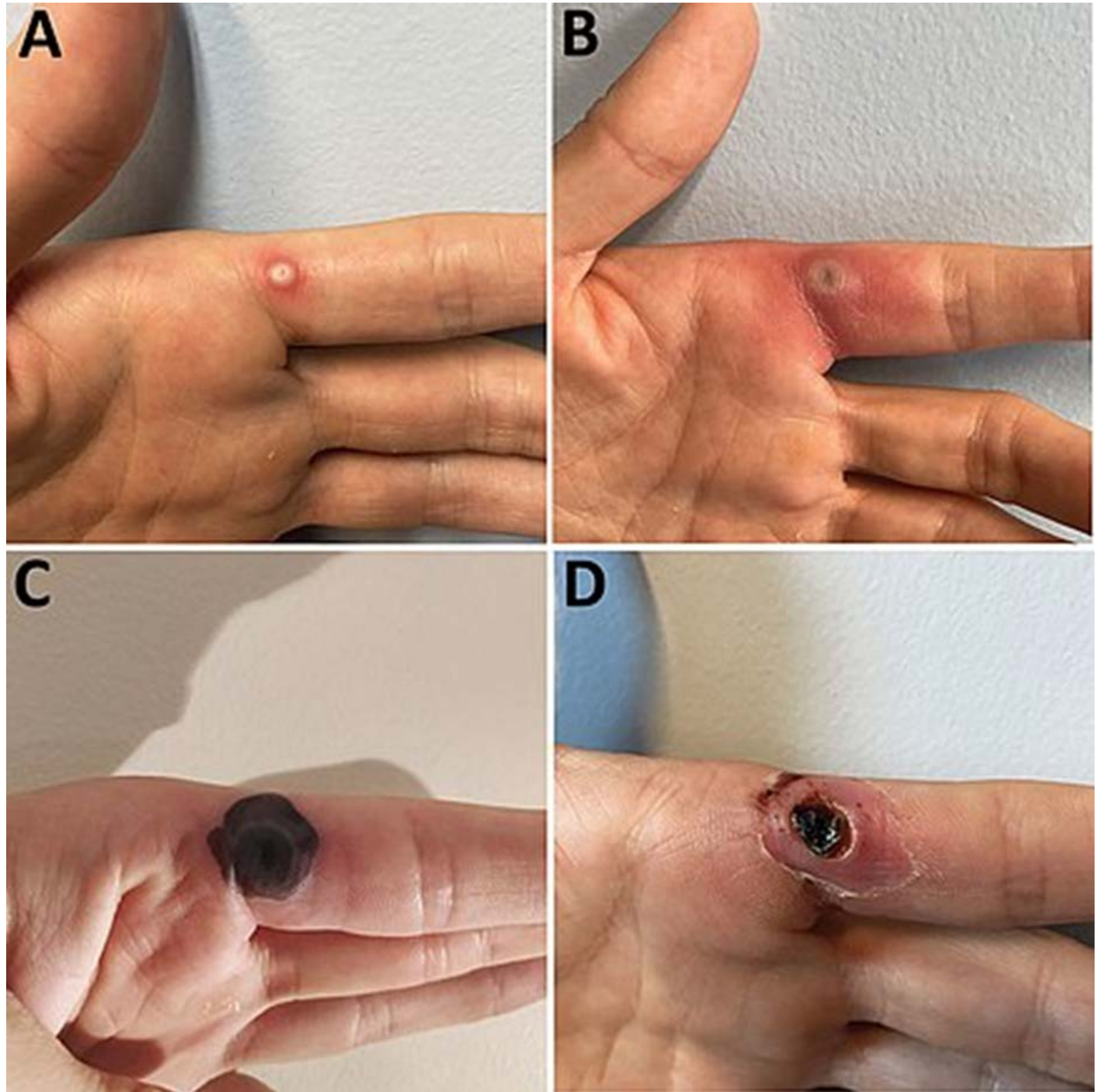


Monkeypox rash on arm and leg of a four-year-old girl in 1971

Mpox (Monkeypox)

- The disease is caused by the monkeypox virus, a zoonotic virus in the genus Orthopoxvirus.
- The variola virus, the causative agent of the disease smallpox, is also in this genus.
- Human-to-human transmission can occur through direct contact with infected skin or body fluids, including sexual contact.
- People remain infectious from the onset of symptoms until all the lesions have scabbed and healed.
- It may spread from infected animals by handling infected meat or via bites or scratches.
- Diagnosis can be confirmed by PCR testing a lesion for the virus' DNA.

Progression of mpox after needle-stick injury from a pustule



Mpox Outbreak 2022

U.S. Cases

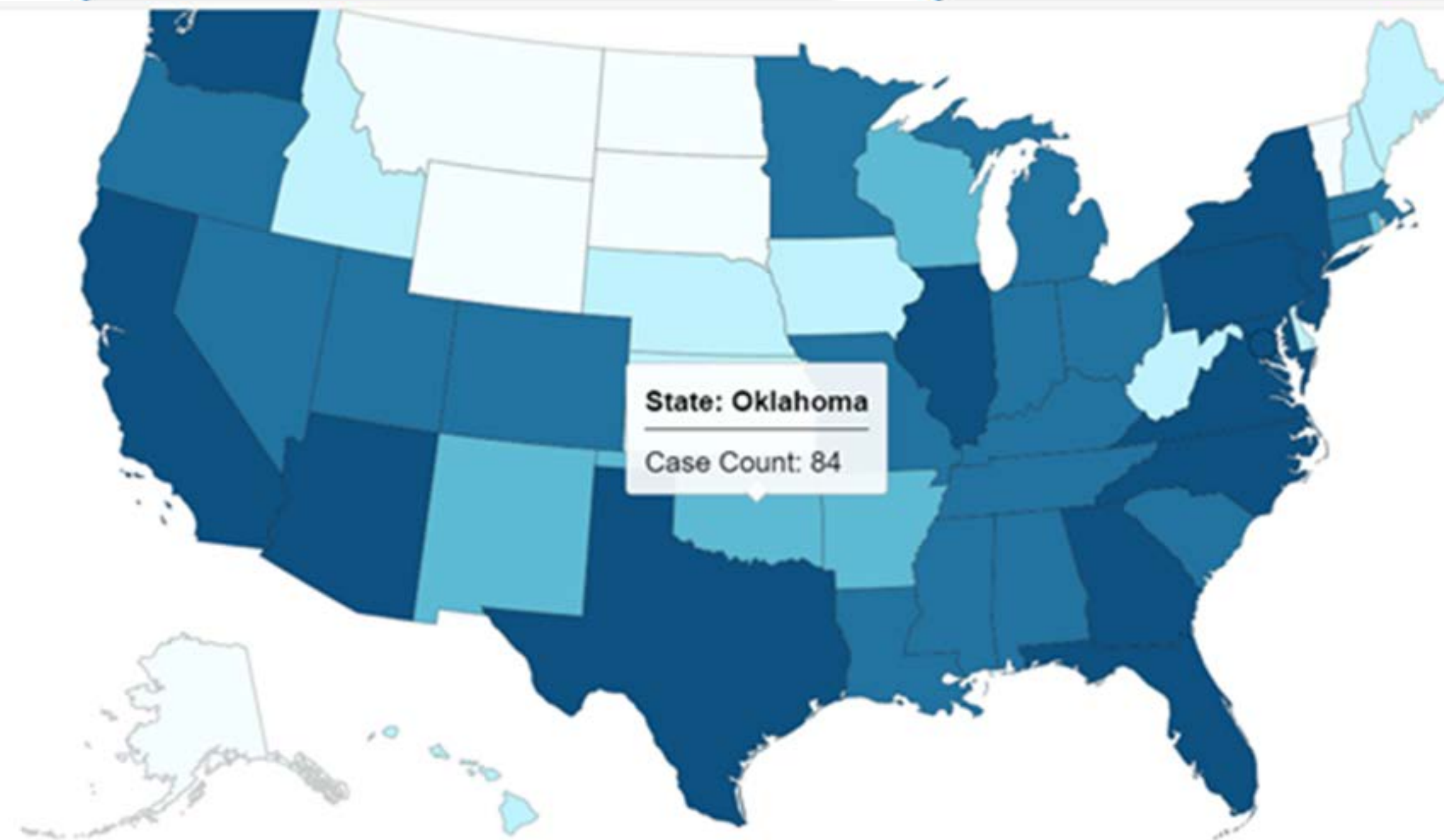
Total Cases
31,689

U.S. Deaths

Total Cases
56

Global Cases

Total Cases
93,497



Territories **PR**



- The 2022–2023 mpox outbreak represents the first incidence of widespread community transmission outside of Africa.
- This was initially identified in the United Kingdom in May 2022, with subsequent cases confirmed in 111 countries as of May 2023.
- The World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern (PHEIC) between 23 July 2022 and 10 May 2023.

Mpox

CDC > Poxvirus > Mpox

 Mpox

Your Health +

Outbreaks +

Ongoing 2022 Global
Outbreak Cases and Data +

**Healthcare
Professionals** -

Case Definition

Clinical Guidance +

Special Population
Considerations +

Information For Healthcare Professionals

Updated November 30, 2023

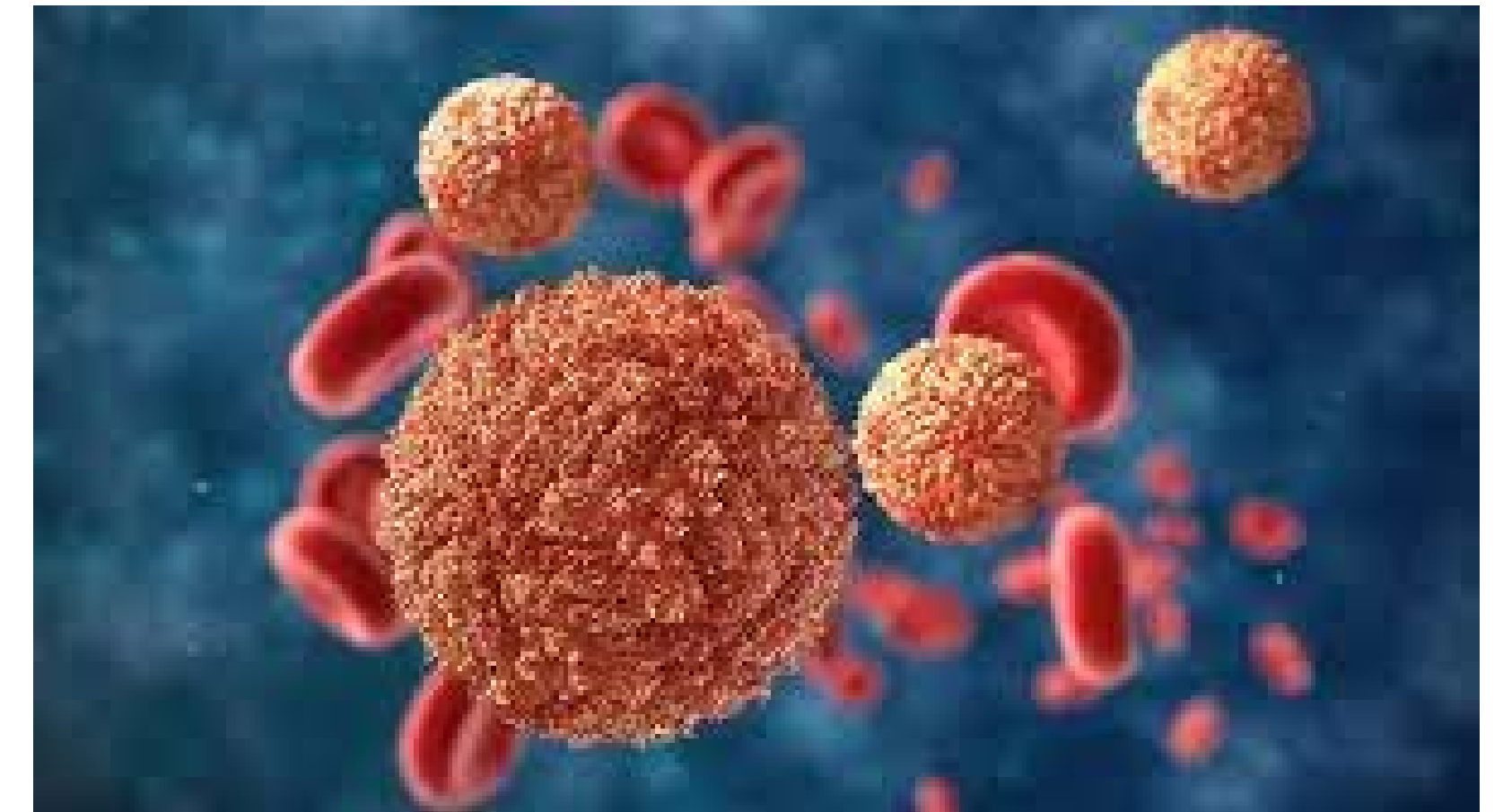
[Print](#)

Notice: Mpox illness, including severe infections, continue to occur across the United States. CDC urges clinicians to consider mpox when lesions consistent with mpox are observed in a patient, even if an alternate etiology (e.g., herpes simplex virus, syphilis) is considered more likely. Consult public health authorities for access to mpox therapeutics when appropriate. Treatment with tecovirimat can be considered via the NIH sponsored STOMP trial. Tecovirimat use under the expanded access Investigational New Drug protocol must be for patients who meet eligibility criteria and per the recommended dosing.

For persons with sexual risk factors for mpox who have not been diagnosed with mpox during the ongoing outbreak or have not already received 2 doses of the vaccine, CDC asks that clinicians encourage vaccination. Administration of additional vaccine doses is currently not recommended for any population and may not be legally covered if administered.

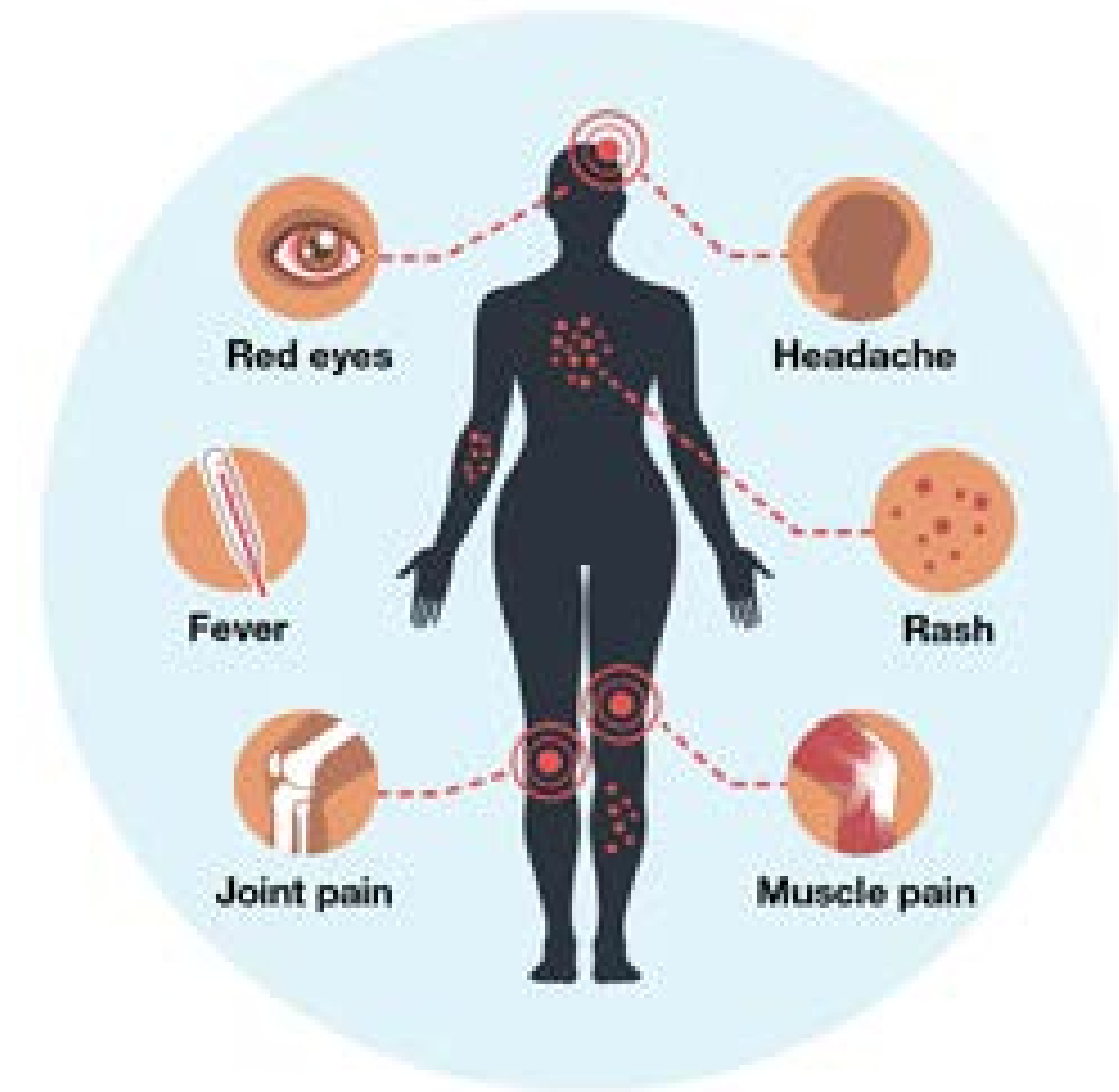
Zika

- First identified in Uganda in 1947 in monkeys, Zika was later identified in humans in 1952. The first large outbreak of disease caused by Zika infection was reported from the Island of Yap in 2007.
- Zika virus is a single-stranded RNA virus of the Flaviviridae family, genus Flavivirus.
- Zika virus is transmitted to humans primarily through the bite of an infected *Aedes* species mosquito; the mosquito vectors typically breed in domestic water-holding containers; they are aggressive daytime biters and feed both indoors and outdoors near dwellings.
- Nonhuman and human primates are likely the main reservoirs of the virus, and **anthroponotic (human-to-vector-to-human) transmission occurs during outbreaks.**
- Perinatal, in utero, and possible sexual and transfusion transmission events have also been reported. Zika virus RNA has been identified in asymptomatic blood donors during an ongoing outbreak.



Zika Clinically

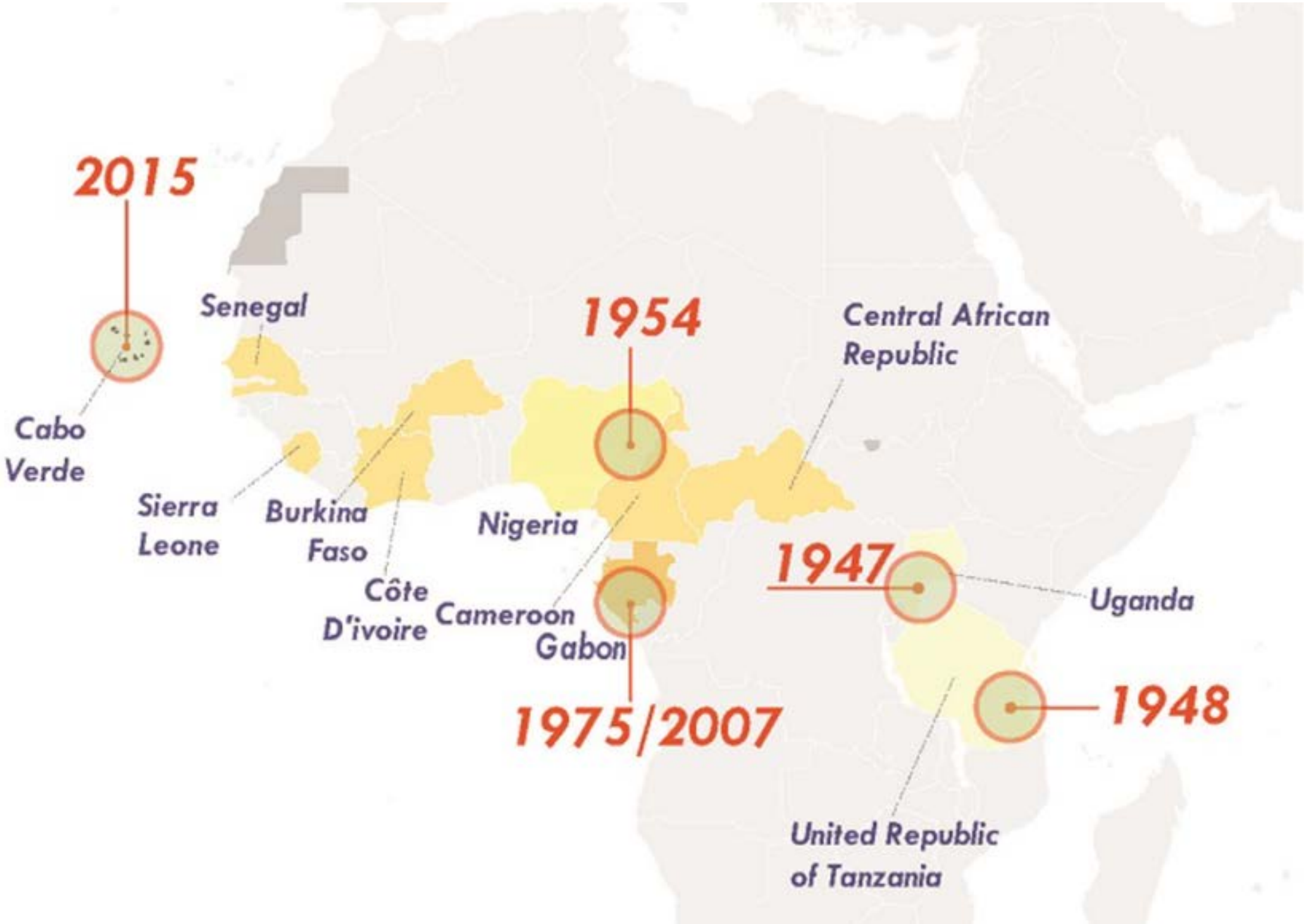
- Many people infected with Zika virus are asymptomatic.
- Characteristic clinical findings are acute onset of fever with maculopapular rash, arthralgia, or conjunctivitis.
- Other commonly reported symptoms include myalgia and headache.
- Clinical illness is usually mild with symptoms lasting for several days to a week.
- Severe disease requiring hospitalization is uncommon and case fatality is low. However, there have been cases of Guillain-Barré syndrome reported in patients following suspected Zika virus infection.
- Recently, CDC concluded that Zika virus infection during pregnancy is a cause of microcephaly and other severe fetal brain defects.
- Due to concerns of microcephaly caused by maternal Zika virus infection, fetuses and infants of women infected with Zika virus during pregnancy should be evaluated for possible congenital infection and neurologic abnormalities.



Zika - Reporting & Treatment

- Zika virus is a nationally notifiable condition. Healthcare providers are encouraged to report suspected cases to their state or local health departments to facilitate diagnosis and mitigate the risk of local transmission. State or local health departments are encouraged to report laboratory-confirmed cases to CDC through ArboNET, the national surveillance system for arboviral disease.
- No specific antiviral treatment is available for Zika virus disease.
- Treatment is generally supportive and can include rest, fluids, and use of analgesics and antipyretics.
- Because of similar geographic distribution and symptoms, patients with suspected Zika virus infections also should be evaluated and managed for possible dengue or chikungunya virus infection.
- **Aspirin and other non-steroidal anti-inflammatory drugs (NSAIDs) should be avoided until dengue can be ruled out to reduce the risk of hemorrhage.**
- People infected with Zika, chikungunya, or dengue virus should be protected from further mosquito exposure during the first few days of illness to prevent other mosquitoes from becoming infected and reduce the risk of local transmission.

Zika Outbreaks



Zika 2016 C/S American Outbreak



COVID-19

'Nuff said

Time traveler: What year is it?

Me: 2020

Time traveler:



PropertyOnion.com

Hepatitis Outbreaks

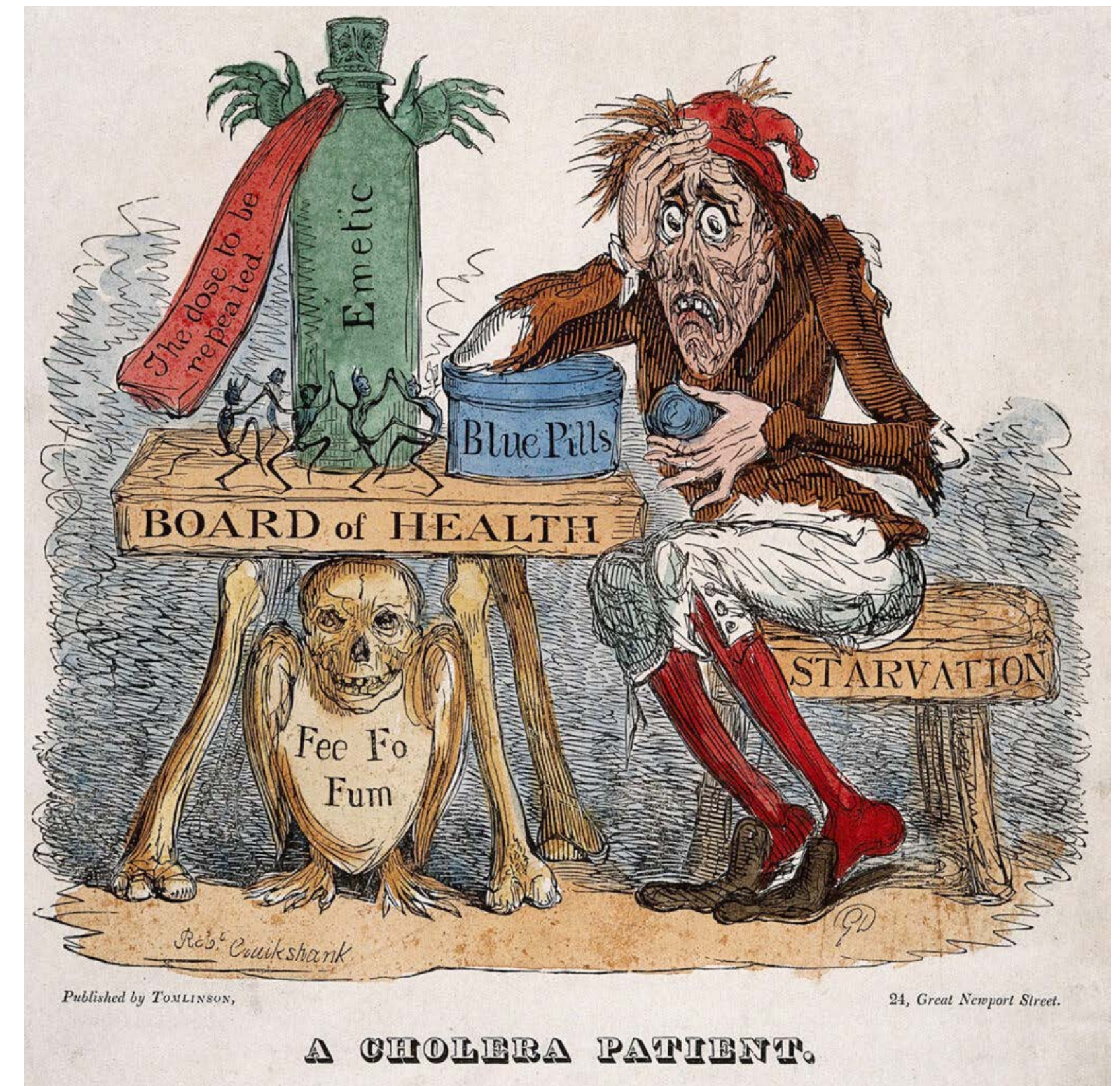
- 2015 – IN HCV/HIV outbreak among IVDA/PEH, state of emergency, clean needle exchange by Jerome Adams
- During 2016–2018, California experienced a large hepatitis A outbreak among PEH that was concentrated in San Diego County.
 - This outbreak was the largest hepatitis A outbreak in California since the introduction of hepatitis A vaccination.
 - Statewide, a total of 708 outbreak-related hepatitis A cases were reported, with 465 hospitalizations (66%) and 21 deaths (3%).
 - More than half of cases (52.6%, n = 372) were in PEH.
 - The outbreak did not involve the general population and predominantly affected PEH and/or who were using drugs.
 - Of the PEH who developed hepatitis A, more than two-thirds (71.6%, n = 263) also reported drug use.
 - This outbreak was notable for the high rate of hospitalization and death (For comparison, a multistate outbreak of hepatitis A tied to consumption of frozen strawberries in 2016 was linked to 143 cases, 56 hospitalizations (39%) and no deaths)

Hepatitis Outbreaks, cont...

- Several factors drove the California outbreak of hepatitis A among PEH, including underlying risk factors, environmental sanitation, and vaccine acceptability and access.
- PEH were at risk for developing hepatitis A due to exposure to unsanitary conditions and concomitant drug use.
- PEH were at increased risk of severe disease due to underlying alcohol use disorder and chronic HCV infection.
- Of people with outbreak-associated hepatitis A, 17% were positive for either HCV antibody (anti-HCV) indicating past or current infection, or HCV RNA indicating current infection.
- Similarly, the prevalence was high in three other states that experienced hepatitis A outbreaks that affected PEH and people who use drugs in 2017: 49% (29/59) in Kentucky, 26% (165/632) in Michigan and 21% (31/148) in Utah

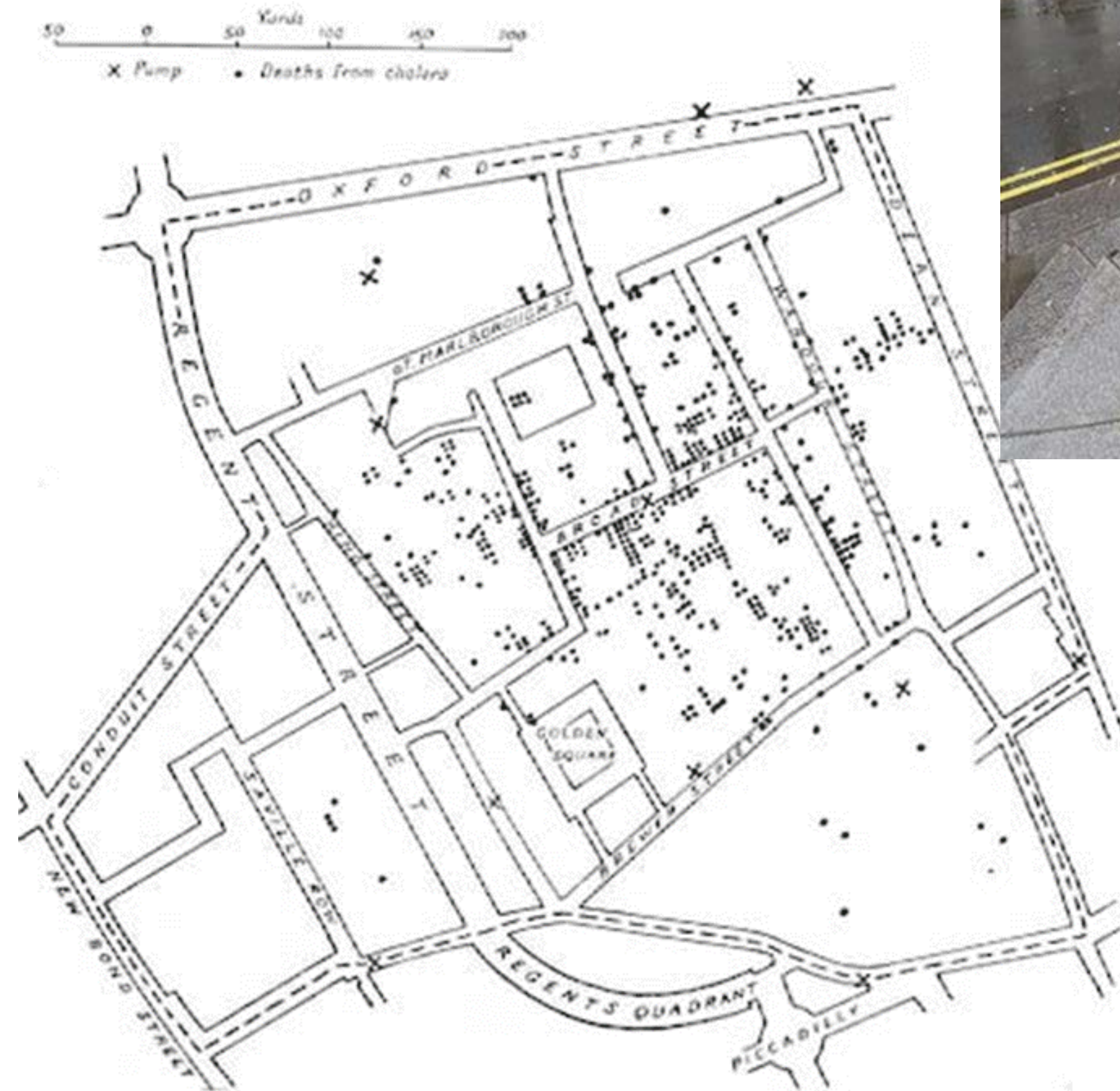
Cholera

- Cholera is a deadly, diarrheal disease that has been recognized for millennia.
- It is caused by a gram-negative, toxigenic organism, *Vibrio cholerae*, which is found in aquatic environments.
- The disease is characterized by watery diarrhea that is so voluminous that daily fluid losses in adults are measured in liters (more on this in a bit)
 - Without interventions, this disease can result in profound dehydration, hypovolemic shock and death.
 - Death is most commonly seen in infants and young children, especially those who are malnourished, because of the rapidity with which dehydration and shock can occur.



Cholera History

- the genesis of the field of epidemiology is a result of Dr. John Snow's observation during a cholera outbreak in 1854 London.
- Snow mapped each cholera death in the Soho region of London in late summer of 1854. He noticed that the cases were primarily found in areas surrounding the Broad Street pump marked by an "X" on this map.
- When he removed its pump handle, thereby preventing people from drinking the *V. cholerae* contaminated water, the number of cases declined.
- These observations resulted in infrastructure improvements in potable water treatment and human sewage disposal throughout the industrialized world.



Cholera Pathology

- The bacterial pathogen colonizes host intestines and produces an enterotoxin (called cholera toxin).
- That toxin enters enterocytes, where it activates adenylate cyclase, leading to an increased level of cyclic AMP.
- A major impact of increased cyclic AMP levels is activation of protein kinase A, resulting in an efflux of chloride and bicarbonate ions and water into the lumen of the small intestine.
- An additional impact of cholera toxin is the blockage of sodium and potassium ion uptake, which reduces water reabsorption in the small intestine and colon.
- The efflux of electrolytes and water is responsible for the high volume, watery stools that occur, and the higher the stool volume in relation to body mass, the more severe the clinical disease of cholera becomes.

Cholera Pandemics in the Past

- The [first cholera pandemic](#) occurred in the Bengal region of India, near [Calcutta](#) (now Kolkata), starting in 1817 through 1824. The disease dispersed from India to Southeast Asia, the Middle East, Europe, and Eastern Africa through trade routes.
- The [second pandemic](#) lasted from 1826 to 1837 and particularly affected North America and Europe, due to the result of advancements in transportation and global trade, and increased human migration, including soldiers.
- The [third pandemic](#) erupted in 1846, persisted until 1860, extended to North Africa, and reached South America, for the first time specifically affecting Brazil.
- The [fourth pandemic](#) lasted from 1863 to 1875, and spread from India to Naples and [Spain](#), and to the United States in 1873.
- The [fifth](#) pandemic was from 1881 to 1896 and started in India and spread to Europe, Asia, and South America.
- The [sixth pandemic](#) started in India and lasted from 1899 to 1923.
 - The 5th & 6th epidemics were less fatal due to a greater understanding of the cholera bacteria (due to John Snow's work in London)
 - Egypt, the Arabian peninsula, Persia, India, and the Philippines were hit hardest during these epidemics, while other areas, such as Germany in 1892 and Naples from 1910 to 1911, also suffered severe outbreaks.
- The [seventh pandemic](#) originated in 1961 in Indonesia and is marked by the emergence of a new strain, nicknamed El Tor, which still persists (as of 2019^l) in developing countries.^l
- Cholera did not occur in the [Americas](#) for most of the 20th century after the early 1900s in New York City.
- It reappeared in the Caribbean toward the end of that century and seems likely to persist.

Modern Cholera Outbreaks

- August 2005, after one of the worst hurricanes in U.S. history, which devastated the Gulf Coast of Mississippi, Louisiana and parts of Texas, only 2 cases of cholera were reported, even though *V. cholerae* is found throughout the Gulf Coast estuary.
- Notably, the number of countries with cholera outbreaks increased from 23 in 2021, to 29 in 2022. This is particularly disheartening since the World Health Organization (WHO) has a 2030 goal to reduce the number of cases of cholera globally by 90%. The outbreaks predominately occur in lower and lower-middle income countries, where large portions of the population have limited or no access to clean water and sewage disposal. The spread of this disease has been exacerbated by flooding due to tropical storms (Malawi and Mozambique), monsoon rains (Pakistan and Bangladesh) and political violence (9 countries primarily in Africa and the Middle East).
- The 2022 Haitian cholera outbreak is a prime example of what happens when this organism is introduced into the world of disorder. Because of widespread political violence, the poorest portion of the population does not have access to clean water, sanitation hygiene or medical care. As a result, Haiti is in the midst of another deadly cholera outbreak, only months after Haiti was declared cholera-free since the last outbreak that started in 2010.

Haiti Outbreak

- Molecular studies showed that the strain responsible for the current outbreak was genetically highly related to the strain responsible for the 2010-2019 epidemic.
- The event that triggered this resurgence was the assassination of the Haitian President, Jovenel Moïse, in July 2021. Since then, the capital, Port-au-Prince has been wracked with violence centered around the large town of Citi Soleil, where 200,000-400,000 individuals live in extreme poverty without clean water or sanitation. Furthermore, political unrest and violence resulted in blockage of the major fuel depot in Port-au-Prince for several weeks during the onset of the epidemic. Since public hospitals in Port-au-Prince depended on electricity provided by generators, fuel shortages shuttered hospitals, limiting access to care.
- Ongoing violence makes it impossible to access health care at night, or to establish local cholera treatment centers because health care workers fear being killed or kidnapped. As a result, the most vulnerable do not have access to care that is taken for granted in much of the world where cholera is endemic.
- As of January 2023, there have been an estimated 26,000 cases and over 500 cholera-associated deaths, resulting in a mortality rate of 2%, which is twice the rate that is expected in a cholera outbreak globally. Those numbers are likely much higher, but getting accurate data is next to impossible due to the ongoing violence.



American nurse and her child reportedly kidnapped in Haiti | WNT

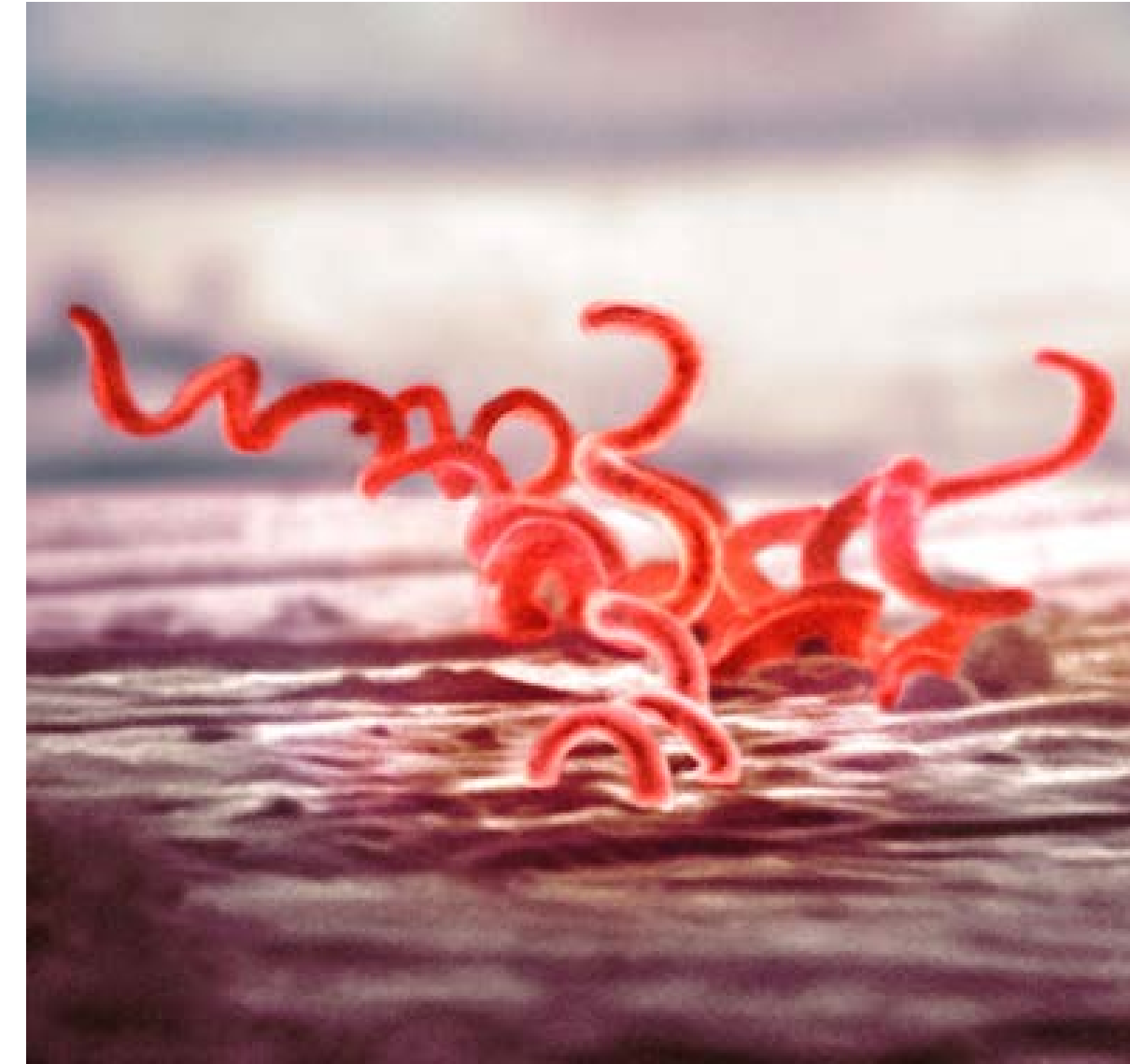
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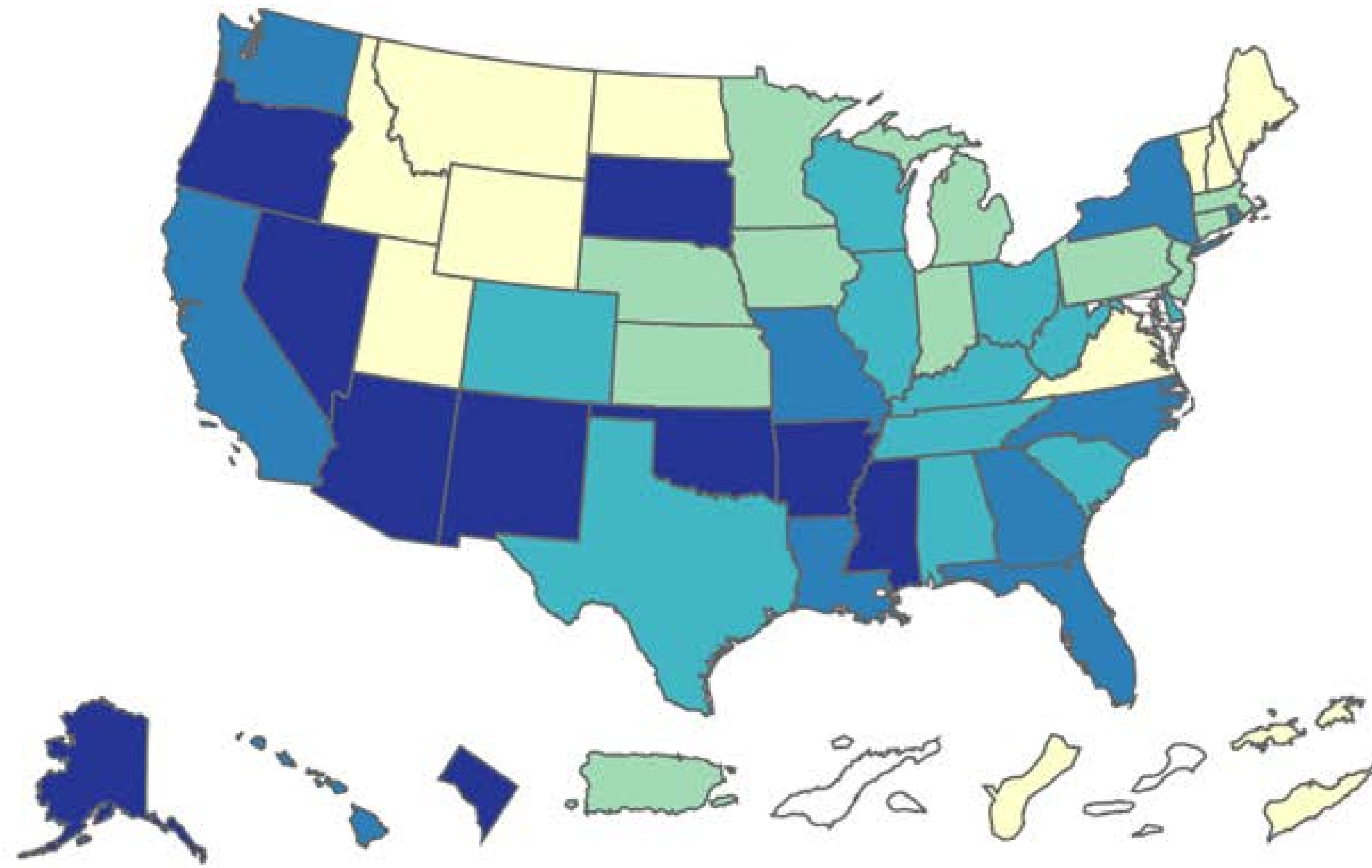
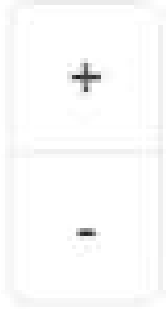
While the bulk of such cases are local, targeting the rich and poor alike, foreigners have been taken in several high-profile kidnappings. In 2021, 17 missionaries from the United States and Canada were seized by a local gang while traveling on the road north of the capital and held for more than a month. And authorities registered 1,014 kidnappings in Haiti from January to June this year – 256 women, 13 girls and 24 boys – according to a United Nations report on Haiti.

The same day, the US State Department ordered the departure of nonemergency government personnel from Haiti as the security situation in the country deteriorates. The order followed a travel advisory from the US Embassy in Haiti advising US nationals to leave immediately due to recent armed clashes between criminal groups and police in Port-au-Prince.

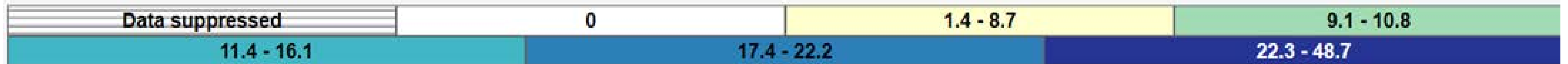
Syphilis

- According to a Centers for Disease Control and Prevention (CDC) CDC report published today, 207,255 total syphilis cases were reported in the United States in 2022, representing an 80% increase since 2018 and continuing a decades-long upward trend. Cases in nearly every demographic group and region increased, as did disparities in the burden of disease among certain racial and ethnic populations.
- According to the report, more than 3,700 cases of congenital syphilis were documented among newborns in 2022—more than 10 times the number diagnosed in 2012.





Rate per 100,000 among selected population
Legend classified using quantile based on 2021 data



Trench Fever

- In 1915, a British medical officer on the Western Front reported on a soldier with relapsing fever, headache, dizziness, lumbago, and shin pain.
- Within months, additional cases were described, mostly in frontline troops, and the new disease was called trench fever.
- More than 1 million troops were infected with trench fever during World War 1, with each affected soldier unfit for duty for more than 60 days.
- Diagnosis was challenging, because there were no pathognomonic signs and symptoms and the causative organism could not be cultured.



Trench Fever Epidemiology

- For 3 years, the transmission and cause of trench fever were hotly debated.
- In 1918, two commissions identified that the disease was louse-borne.
 - The bacterium they named *Rickettsia quintana* was consistently found in the gut and feces of lice that had fed on patients with trench fever and its causative role was accepted in the 1920s.
- The organism was finally cultured in the 1960s and reclassified as *Bartonella quintana*; it was also found to cause endocarditis, peliosis hepatis, and bacillary angiomatosis.
 - Subsequently, *B. quintana* infection has been identified in new populations in the Andes, in homeless people in urban areas, and in individuals with HIV.
 - *B. quintana* is carried by the human body louse, *P. humanus corporis*, which lives in clothes and bedding.
 - The bacterium lives in the intestine of the louse and spreads through the louse feces to infect people with wounds or open sores on their skin.
- The story of trench fever shows how war can lead to the recrudescence of an infectious disease and how medicine approached an emerging infection a century ago.

Trench Fever Clinically

- The disease is classically a five-day fever of the relapsing type, rarely exhibiting a continuous course.
 - The fever begins two to three weeks after infection and lasts up to three days.
 - The fever recurs every four to six days with each succeeding attack less severe.
 - Some infections can last up to eight years, and some can also develop a potentially fatal endocarditis or affect heart valves and require surgeryThe incubation period is relatively long, at about two weeks.
- The onset of symptoms is usually sudden, with high fever, severe headache, pain on moving the eyeballs, soreness of the muscles of the legs and back, loss of appetite, and frequent hyperaesthesia of the shins (the most consistent complaint)
- Recovery takes a month or more.

Current Trench Fever Outbreaks

- In the Summer of 2020, amid the COVID-19 pandemic, Colorado state public health officials investigated an outbreak of a rare disease found among PEH in Denver. 4 people tested positive for trench fever.
- A case of a 48-year-old man in Winnipeg, Manitoba, who was diagnosed with trench fever, which is caused by *Bartonella quintana* bacteria that's transmitted by body lice. The man in this case study visited an emergency department with chest pain and shortness of breath. In the previous 18 months, he'd sought treatment for chest pain and body lice infestation.

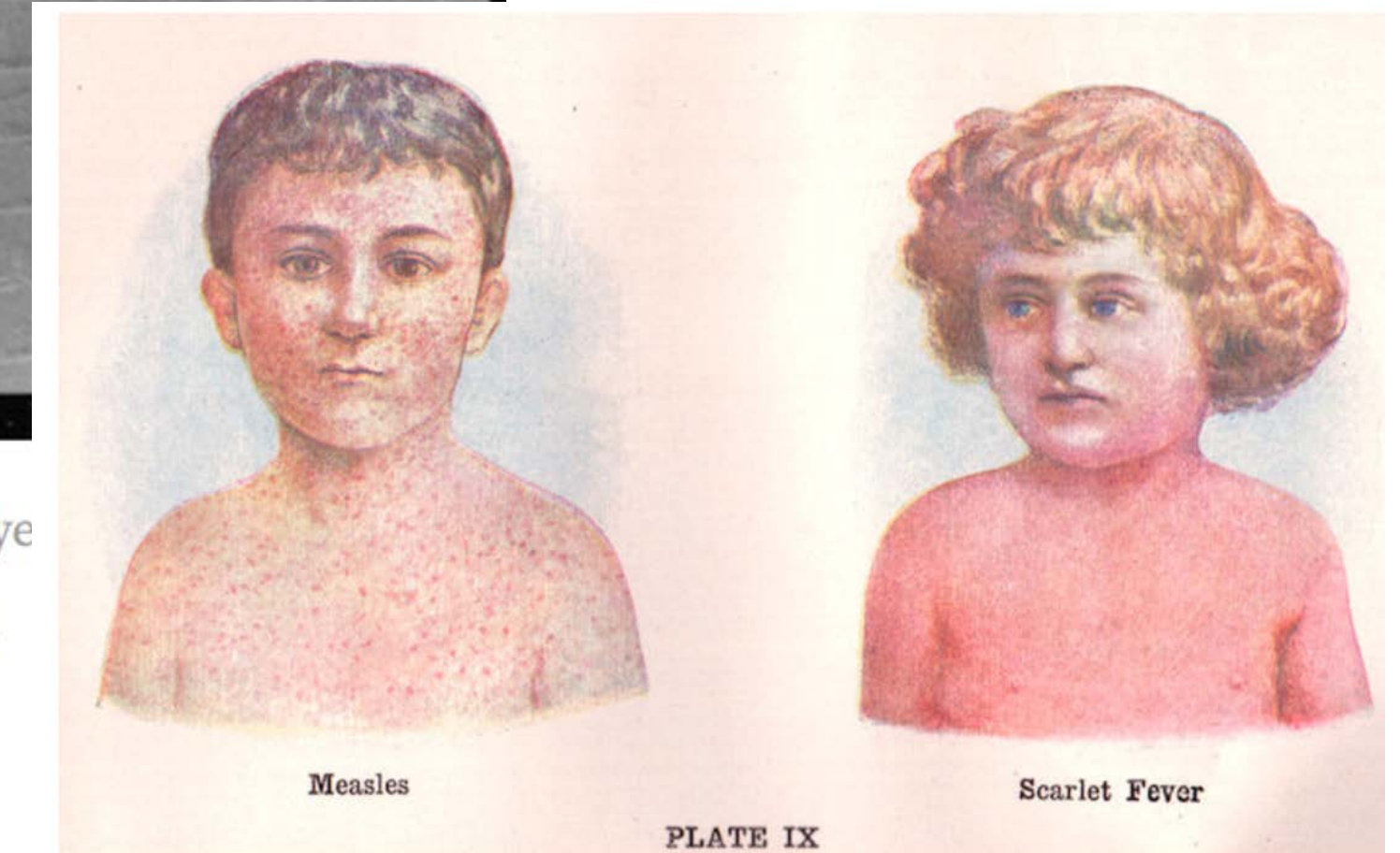


Scarlet Fever

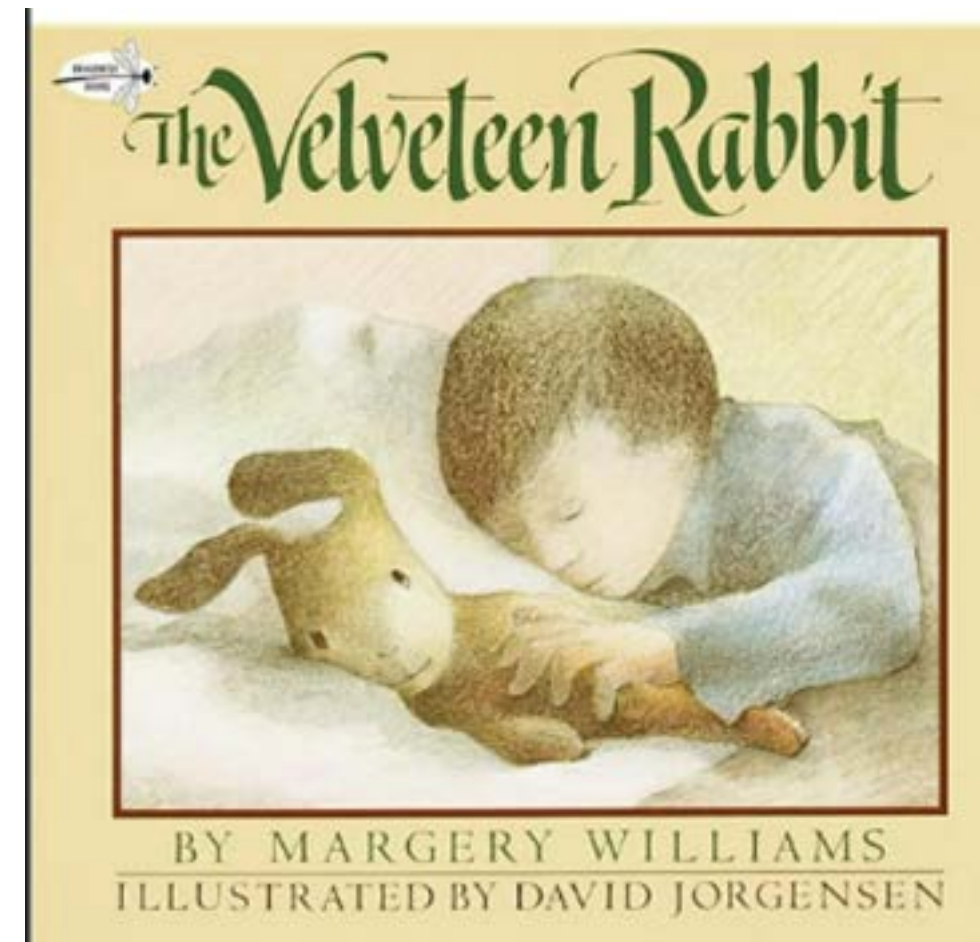
- Scarlet fever is a disease that has significantly evolved in definition and management over the last several hundred years.
- The disease, which is caused by a toxin produced by the bacteria *Streptococcus pyogenes*, was once enormously prevalent amongst the global population and associated with high mortality rates.
- It eventually became effectively managed and relatively easy to treat via antibiotic administration.
- Recent outbreaks demonstrate the need to keep the disease front-of-mind to successfully identify and track the pathogen, treat patients and prevent poor outcomes.



A scarlet fever quarantine sign is displayed at the home of an infected patient in 1940.



Illustrations from 1908 demonstrating the difference between the rashes of measles and scarlet fever.



Scarlet Fever History

- The first notable description of what might have been scarlet fever was documented by the Sicilian physician Giovanni Filippo Ingrassia in 1553. Ingrassia, who was well-known for his anatomical studies and contributions to public health, called the disease “rossalia” and described the patient as having “numerous spots, large and small, fiery and red, of universal distribution so that the whole body appeared to be on fire.”
- Throughout the remainder of the 1500s and most of the 1600s, various scientists and physicians around the world added elements to the definition of the disease, further distinguishing it from other rash-causing illnesses like measles. For example, German physicians described an outbreak of a similar disease to “rossalia” in 1564. They termed it “scarlatina anginosa,” noting that it was particularly fatal to infants and that patients presented with a sore throat, violent fever, vomiting and swelling of the parotid glands, in addition to a rash.
- While epidemics of scarlet fever raged through Europe and North America through the 17th and 18th centuries, it was not until the 1920s that the significance of the patient’s sore throat would be fully realized. In 1924, American bacteriologists Gladys and George Dick demonstrated that the cause of scarlet fever was the beta-hemolytic organism *Streptococcus pyogenes* (*S. pyogenes*, also called group A *streptococci*) and that a toxin produced by the organism could cause this severe downstream disease, or even progress to the development of rheumatic fever later in life.

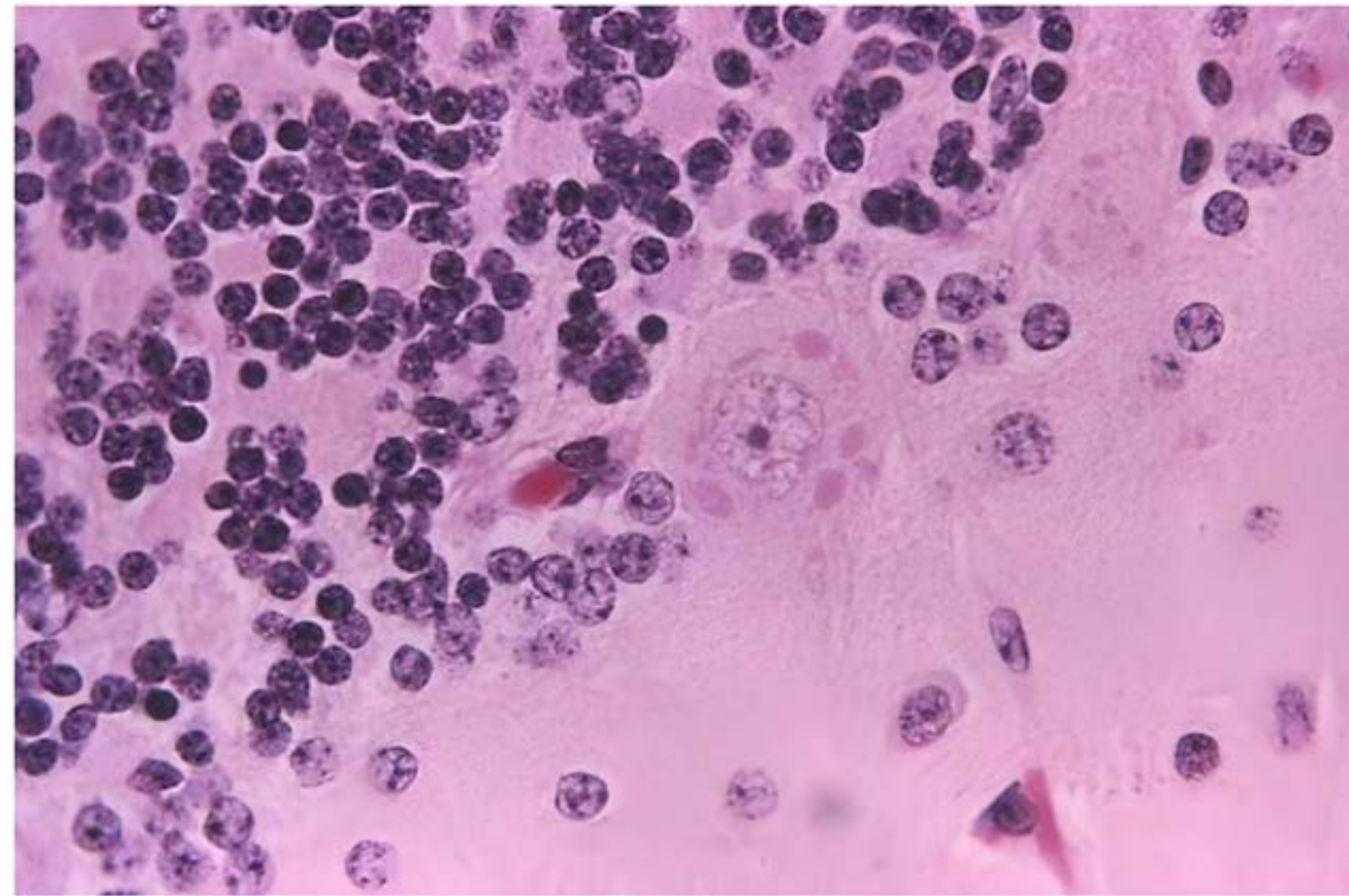


Current Scarlet Fever Outbreak

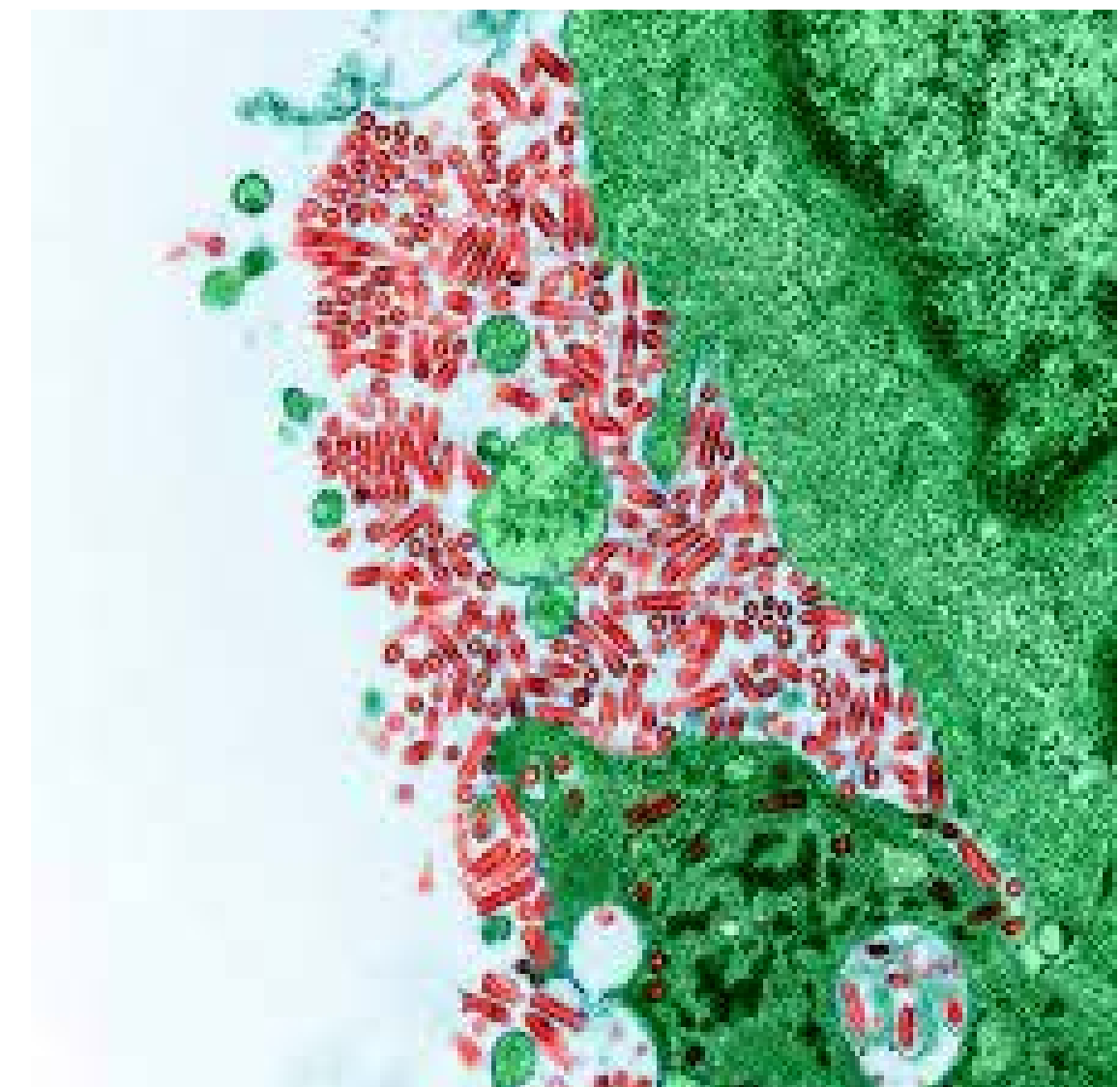
- Since September 2022, there has been a significant outbreak of scarlet fever in children in Europe, and more recently, there have been documented increases in cases in the U.S. This outbreak has been unique in that it first appeared out of sync with typical seasonality and has come with higher mortality rates than normal. For example, the outbreak began in late summer and has killed 13 children under 15 in England since September. Between September and November 2022, public health agencies in England reported 4,622 cases of scarlet fever, a value significantly higher than the previous 5-year average of 1,294.
- While the reasons for the increase in scarlet fever are unclear, hypotheses include macrolide resistance, weakened herd immunity, environmental factors and the absence of a vaccine for the bacteria that cause the disease
- Additionally, rates of scarlet fever increase with the start of the school year and as winter approaches. This may be attributed to the absence of immunity or the greater risk of crowding indoors during colder months.

Rabies

- The pathogens that cause rabies belong to a genus of viruses called Lyssavirus that target warm-blooded vertebrates.
- Although researchers believe that all mammals are susceptible to infection, only certain animals are reservoirs: environments, habitats or populations where a pathogen can live, multiply and transmit.
- In the U.S., the highest-risk animal reservoirs for rabies are skunks, bats, foxes, coyotes and raccoons.



Negri bodies (purple) are proteins that collect in neurons containing ra...



Rabies Cases

- Rabies is usually transmitted through the saliva of an infected animal through a bite.
- It has one of the highest mortality rates of any disease, but death is preventable: Vaccines taken before symptoms appear are nearly 100 percent effective.
- Still, rabies causes about 59,000 deaths around the world each year.
- Most of the deaths occur in countries where public health resources are inadequate.
- In the early 1900s, more than 100 people in the United States died of rabies every year.
- That number fell to one or two per year since 1960 as pet vaccination, animal control programs and public health surveillance improved, and the rabies vaccine became more available.
- In 2018, three people died from rabies, the second highest number in the past few years. In 2011, six people died from rabies.
- In 2019 and 2020, there were no reported cases or deaths.

Most Recent Rabies Cases in the USA

- In 2022, the CDC reported that five people in the United States died from rabies last year, the highest number in a decade
 - Three of those deaths, including that of a 7-year-old child, involved direct contact with bats and occurred over a five-week period starting in late September.
 - The deaths occurred in Idaho, Illinois and Texas, and all three people experienced symptoms three to seven weeks after contact with bats.
 - They died two to three weeks after symptoms began
- In one case, a man in Illinois who had a bat roost in his home awoke in August to find a bat on his neck, according to a statement from the Illinois Department of Public Health. The bat was captured and tested positive for rabies, but the man declined to take a vaccine because of a longstanding fear of vaccines. About a month after contact with the rabid bat, the man started experiencing neck pain, headaches, difficulty controlling his arms, finger numbness and difficulty speaking, before dying.
- In another case, a child in Texas picked up a bat with his bare hands and then released it.
- A third person died in New York after he was bitten by a dog in the Philippines. He started developing symptoms after he returned to the United States. The C.D.C. said it was not able to determine why the man did not receive a vaccine.
- A fourth person from Minnesota who died from rabies received the vaccine but his weakened

How one rabid kitten triggered intensive effort to contain deadly virus



By [Lena H. Sun](#)

November 26, 2023 at 6:00 a.m. EST

- A feral kitten in Omaha, Nebraska, tested positive for rabies in November 2023. It died of the raccoon variant of the virus, which is typically found only in the Appalachian Mountains. Detecting this variant hundreds of miles away in the Midwest raised concerns about a potential outbreak and launched a public health task force to vaccinate all raccoons in the area.
- Prior attempts to control rabies include animal culling and vaccination: Culling animal populations did not lead to reduced infection. Rather, it raised significant economic, ecological and ethical concerns. Besides killing likely healthy animals, culling also isn't cost-effective. Animal vaccination, on the other hand, can protect both animals and humans with minimal risk and reduced costs. Oral rabies vaccination of wildlife began during the 1970s with the distribution of vaccine-laden baits in the local environment. Officials saw success in rabies control among coyote, fox and raccoon populations in Europe and North America.

Sooooooooo Many More Topics!

- Dengue
- XDR TB
- The end of the ABX era
- Plague
- Leprosy
- Chagas
- Hookworms
- Diphtheria

Questions?

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