Maine CDC Clinician Update: Monkeypox Vaccines and Therapeutics

Isaac Benowitz, MD

State Epidemiologist

Maine Center for Disease Control and Prevention

STATE OF MAINE
Department of
Health and Human Services

August 9, 2022

Next webinar: Tuesday, September 13, at 12pm

Maine CDC Clinician Update: COVID-19 and Monkeypox
Please join us to learn more about COVID-19 in Maine and current vaccines and therapies
(2nd Tuesday of the month from 12–1pm)

https://mainestate.zoom.us/j/83384535429
Meeting ID: 833 8453 5429

One tap mobile
- +13017158592,,83384535429# US (Washington DC)
- +13126266799,,83384535429# US (Chicago)

Dial by your location
- +1 301 715 8592 US (Washington DC)
- +1 312 626 6799 US (Chicago)
- +1 646 876 9923 US (New York)
- +1 669 900 6833 US (San Jose)
- +1 253 215 8782 US (Tacoma)
- +1 346 248 7799 US (Houston)
- +1 408 638 0968 US (San Jose)
- Meeting ID: 833 8453 5429

Find your local number: https://mainestate.zoom.us/u/keev9ZGoew

MONKEYPOX

Monkeypox virus

- **Monkeypox is a rare disease caused by infection with monkeypox virus**
- ***Monkeypox virus* belongs to the *Orthopoxvirus* genus**
  - *Orthopoxviridae* genus includes *Variola virus* (which causes smallpox), *Vaccinia virus* (used in the smallpox vaccine), and *Cowpox virus*
- **First discovered in 1958 following two outbreaks of a pox-like disease in colonies of monkeys kept for research (hence the name 'monkeypox')**
- **Specific animal reservoir unknown, but likely small African mammals**

MONKEYPOX

Clinical Illness: '2022'

- Pattern: **scattered or localized** to a body site rather than diffuse
- **Rash often starts in mucosal areas** (e.g., genital, perianal, oral mucosa) and may not develop simultaneously in all body areas
  - **Proctitis**: anorectal pain, tenesmus, and rectal bleeding; associated with visible perianal vesicular, pustular, or ulcerative skin lesions and proctitis
  - **Oropharyngitis**: complicated by tonsillar swelling, abscess, dysphagia
- "Prodromal" symptoms can be absent or follow rash onset

MONKEYPOX

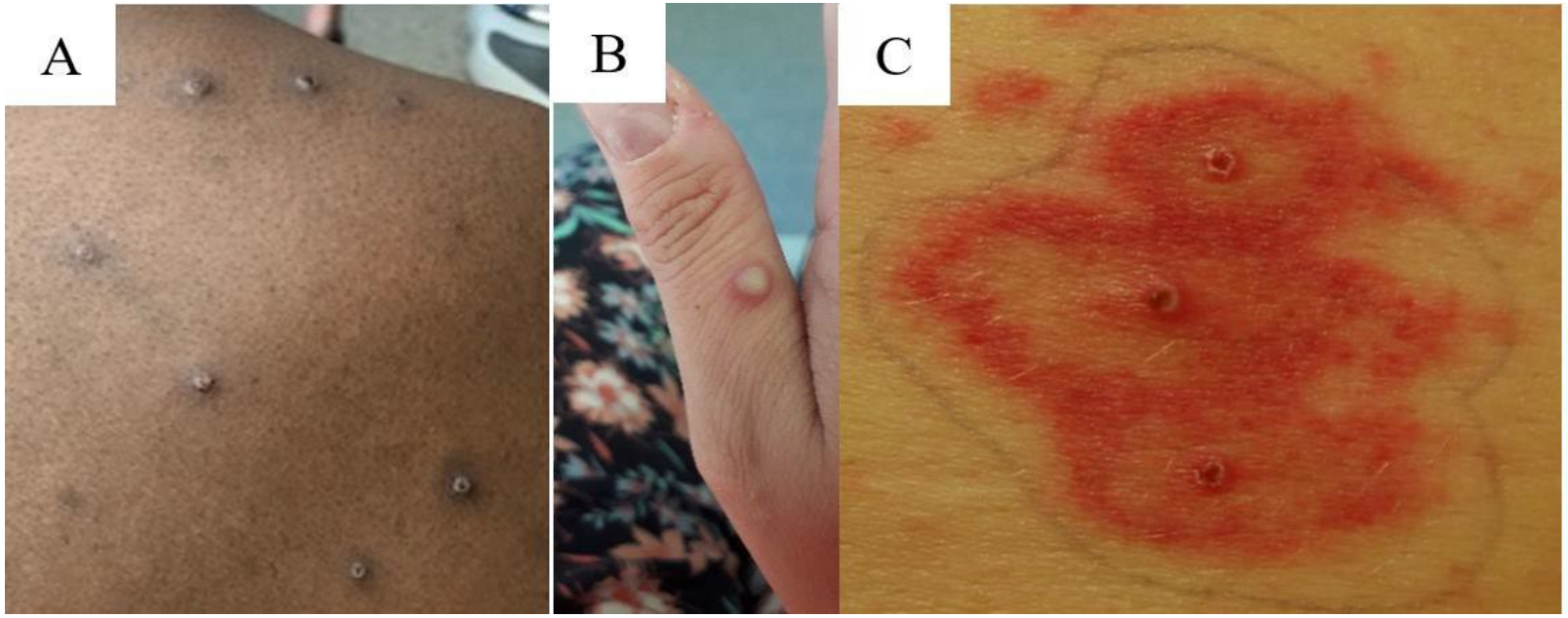
Clinical Illness: '2022' Lesions

Characteristic	(N = 528)
No. of skin lesions — no. (%)	
<5	207 (39)
5–10	131 (25)
11–20	112 (21)
>20	56 (11)
No lesions or missing data	22 (4)
Mucosal lesions present — no. (%)	217 (41)
Site of mucosal lesions — no./total no. (%)	
Anogenital only	148/217 (68)
Oropharyngeal only	50/217 (23)
Anogenital and oral	16/217 (7)
Nasal and eye	3/217 (1)

Source: Thornhill 2022, N Engl J Med

Lesions observed during May and June 2022*

- Firm, deep-seated, well-circumscribed, painful, itchy, sometimes umbilicated
- Small lesions; often not distributed diffusely
- May rapidly progress through stages (papules, vesicles, pustules, and scabs)
- Papulovesicular and pustular lesions may be seen on same body site

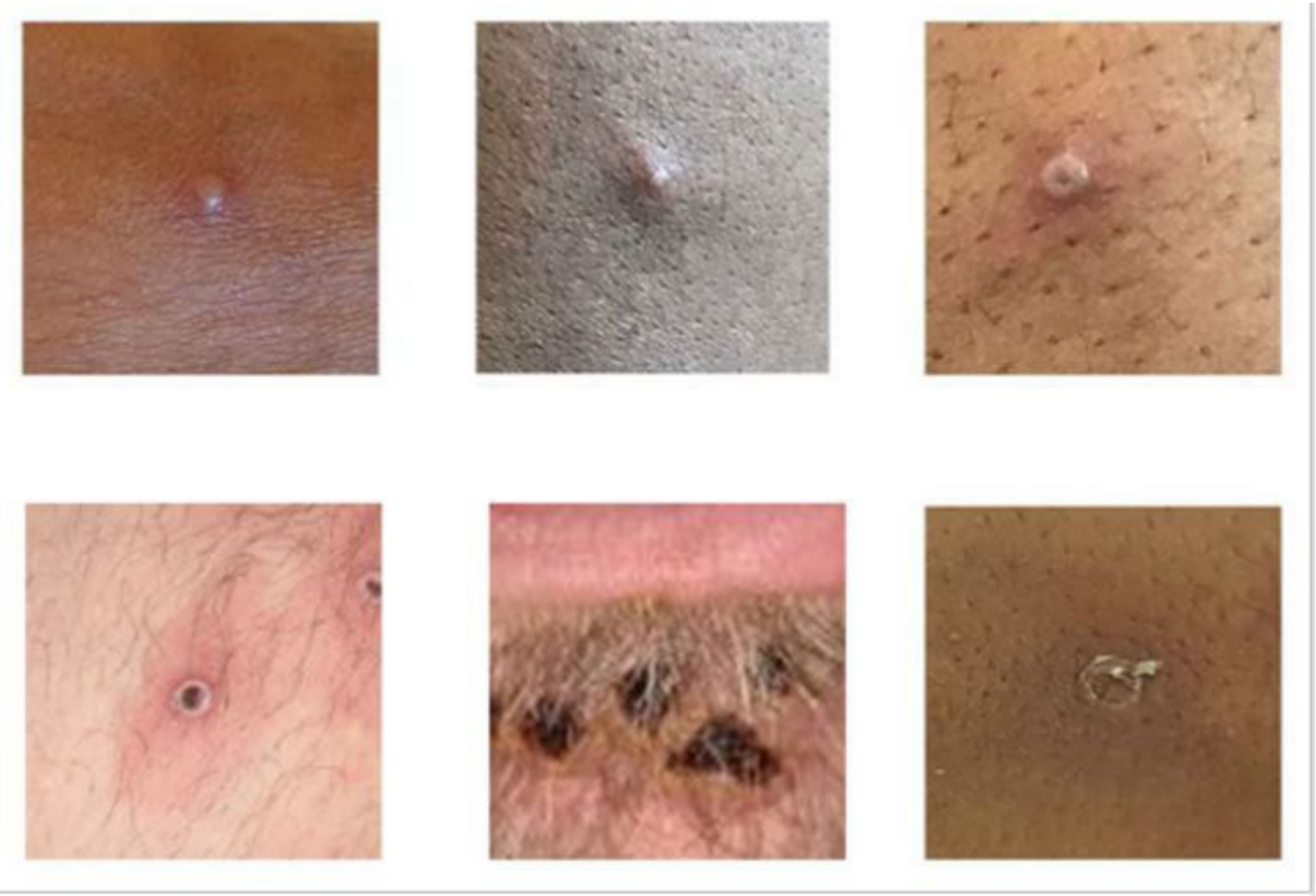


Photos A and B from NHS England High Consequence Infectious Diseases Network; photo C from Reed KD, Melski JW, Graham MB et al. The detection of monkeypox in humans in the Western Hemisphere. Page 346. Copyright © 2004. Massachusetts Medical Society. Reprinted with permission

For additional images:

1) Ogoina D et al. Clinical course and outcome of human monkeypox in Nigeria. Clin Infect Dis. 2020; 71(8): 210-214
2) Antinori A et al. Epidemiological, clinical, and virological characteristics of four cases of monkeypox support transmission through sexual contact, Italy, May 2022. Euro Surveill. 2022 June; 27 (22).

*As data continues to be collected, what is known about the clinical presentation may change



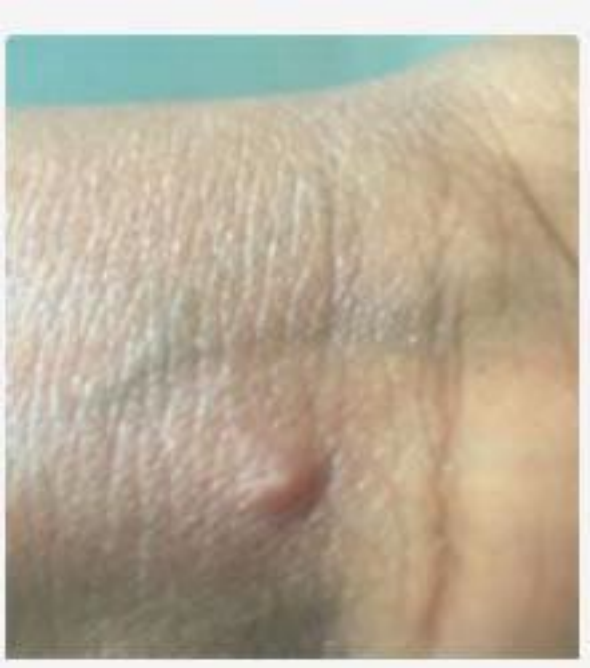
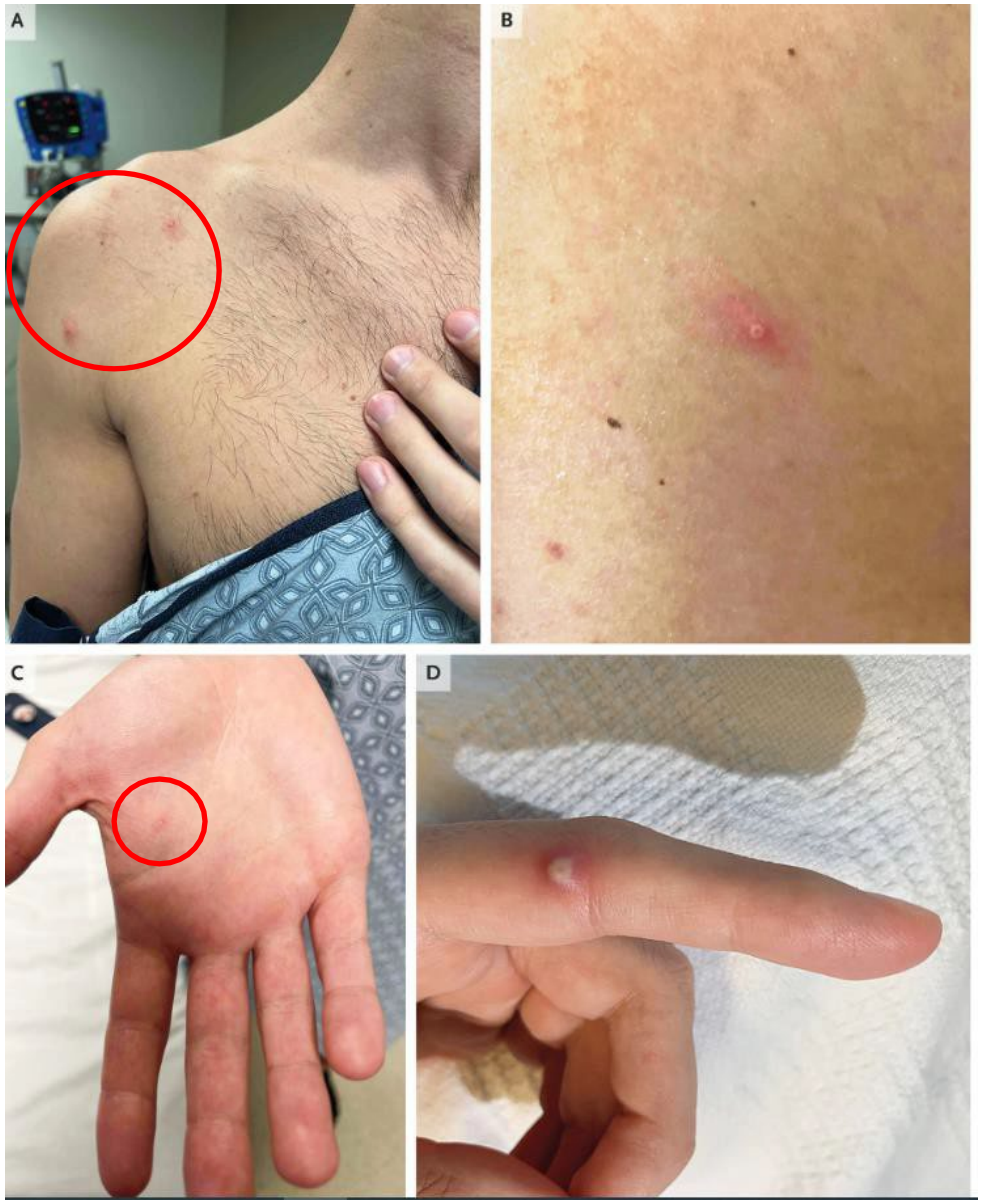


Photo Credit: NHS England High Consequence Infectious Disease Network

Monkeypox lesions, United States 2022



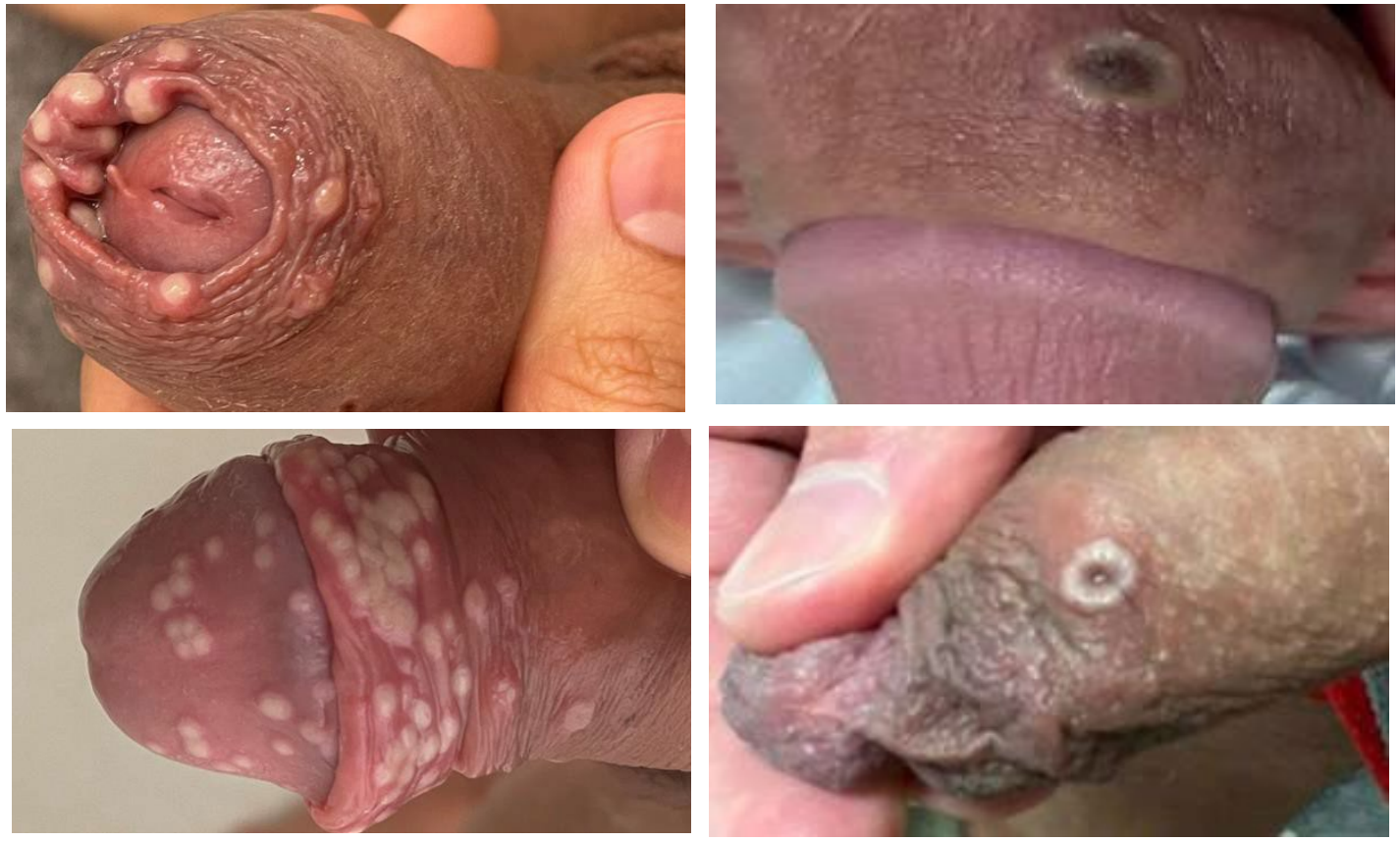
From Basgoz N, Brown CM, Smole SC, et al. Case 24-2022: A 31-Year-Old Man with Perianal and Penile Ulcers, Rectal Pain, and Rash. Epub ahead of print. *Copyright* © Jun 15 2022. Massachusetts Medical Society. Reprinted with permission from Massachusetts Medical Society

Shared with permission from patients, CDC 2022

MONKEYPOX

Clinical Illness: '2022' Lesions

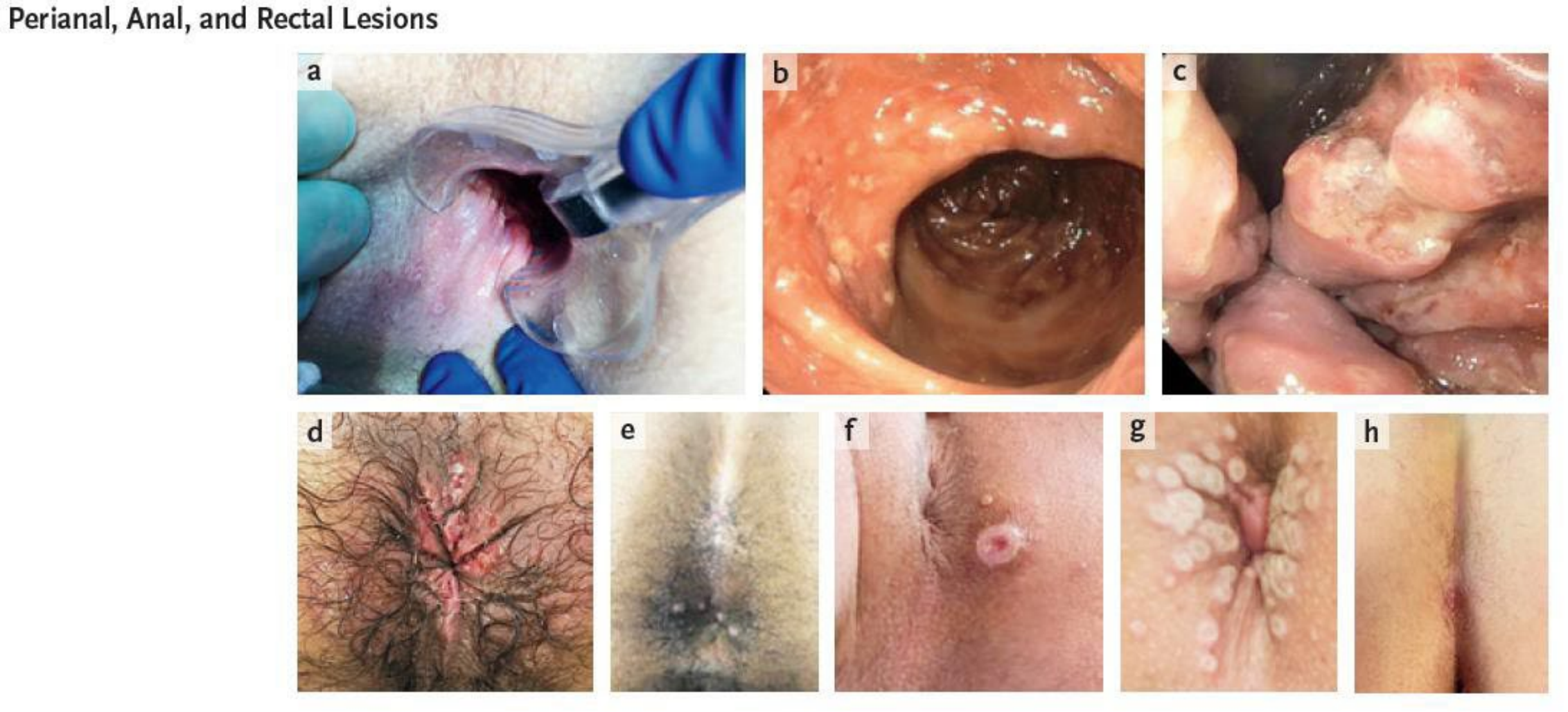
Penile Lesions



Sources: Basgoz 2022, N Engl J Med; Jang 2020, J Korean Med Sci. Others courtesy of BW Furness with patient consent.

MONKEYPOX

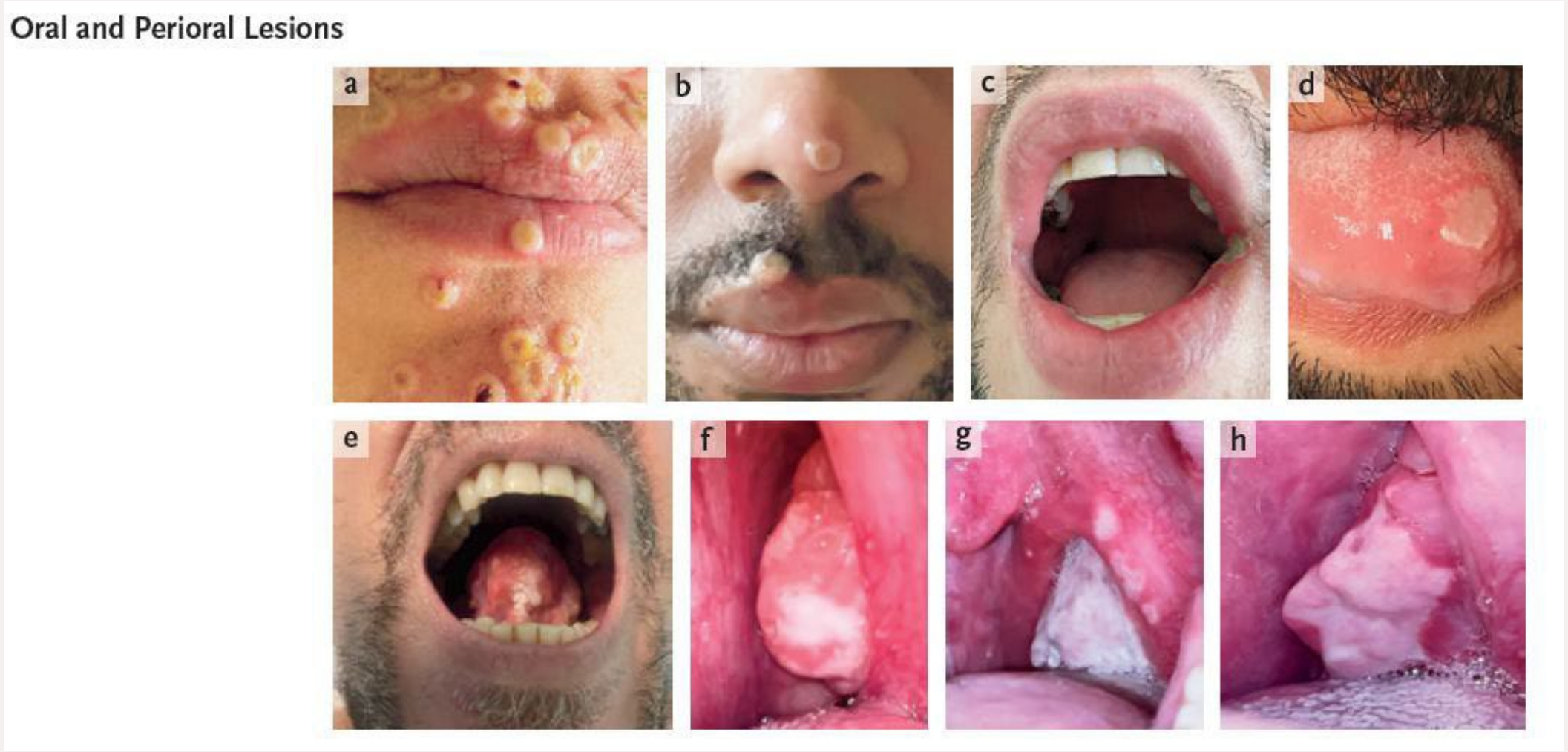
Clinical Illness: '2022' Lesions



Source: Thornhill 2022, N Engl J Med

MONKEYPOX

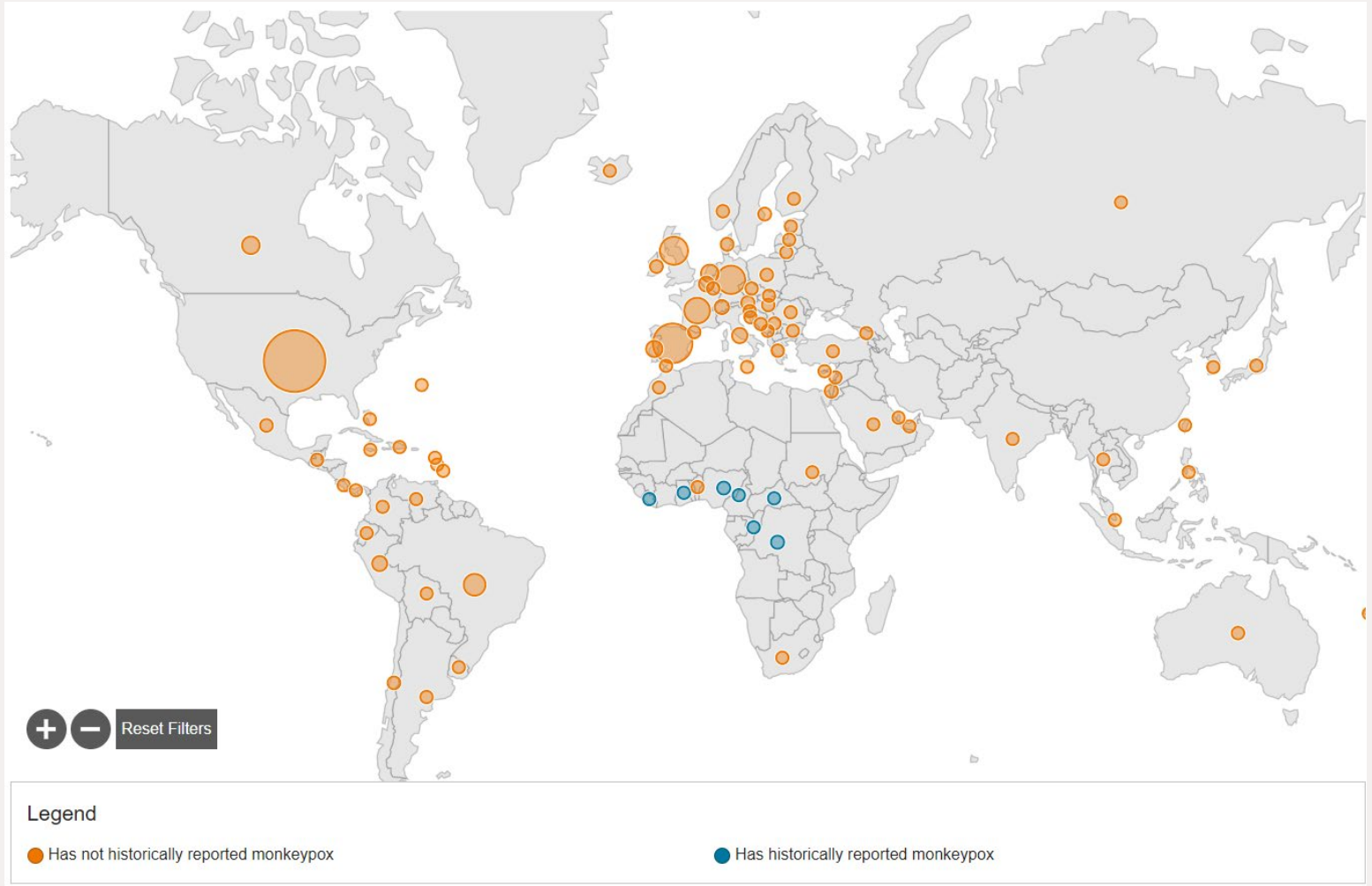
Clinical Illness: '2022' Lesions



Source: Thornhill 2022, N Engl J Med

MONKEYPOX

Case Count: 30,189 (August 8, 2022)

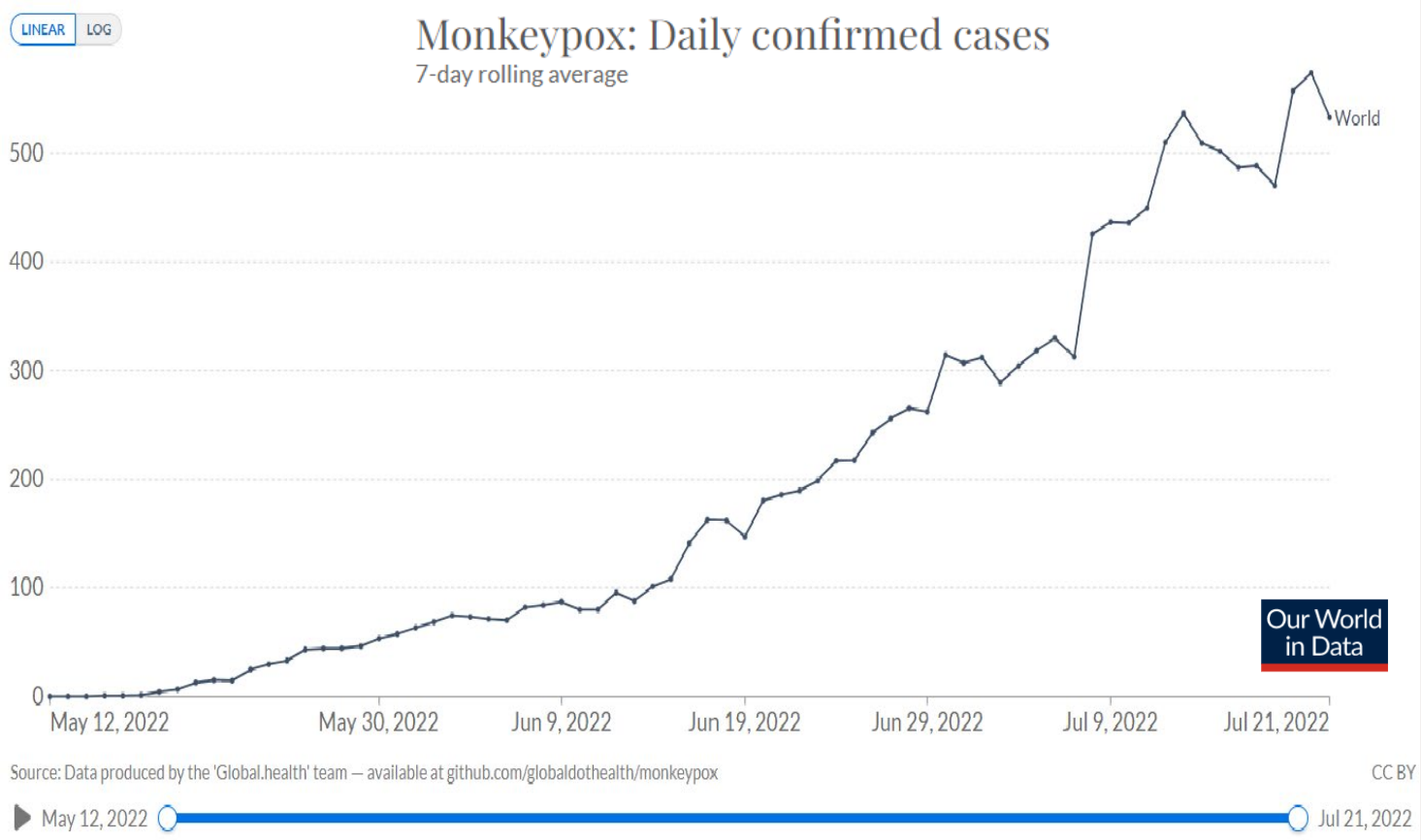


Country	Cases
United States	8,933
Spain	4,942
Germany	2,916
United Kingdom	2,859
France	2,423
Brazil	1,721

Source: [2022 Monkeypox Outbreak Global Map | Monkeypox | Poxvirus | CDC]

MONKEYPOX

Worldwide Trend in Cases



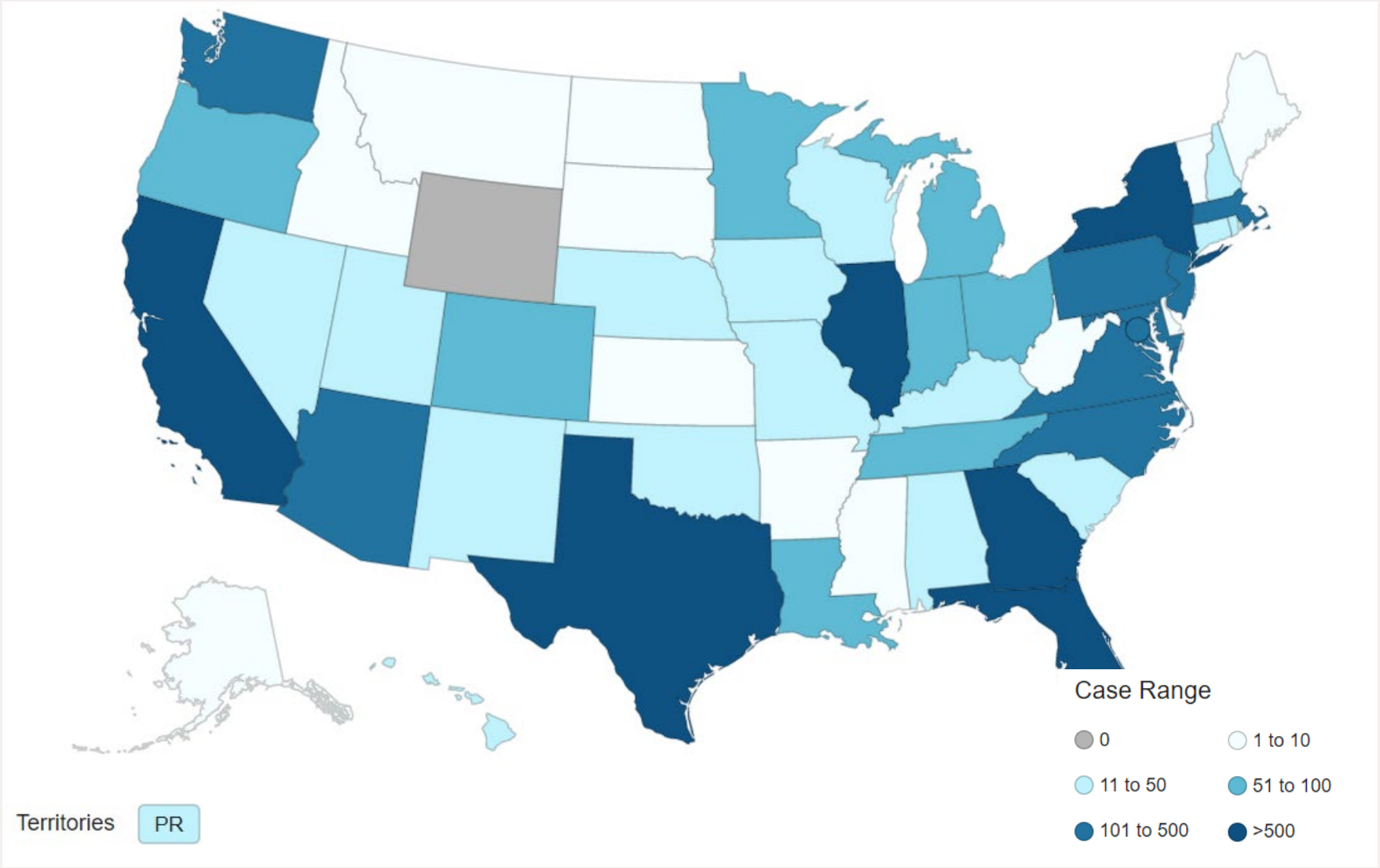
Selected epidemiological metrics from enhanced surveillance questionnaires in confirmed monkeypox cases in England as of 6 July 2022 (N=445)

Metric	N (%)
Gay, bisexual, or men who have sex with men	427 (96.2%)
Travel abroad prior to symptom onset (21 days)	136 (30.6%)
Age under 30 years	86 (21.5%)
History of STI in the last year	233 (53.7%)
One or no sexual partners in last 3 months	67 (15.7%)
10+ sexual partners in last 3 months	134 (31.3%)
Living with HIV	123 (29.5%)

Source: Monkeypox - Our World in Data and Investigation into monkeypox outbreak in England: technical briefing 3 - GOV.UK (www.gov.uk)

MONKEYPOX

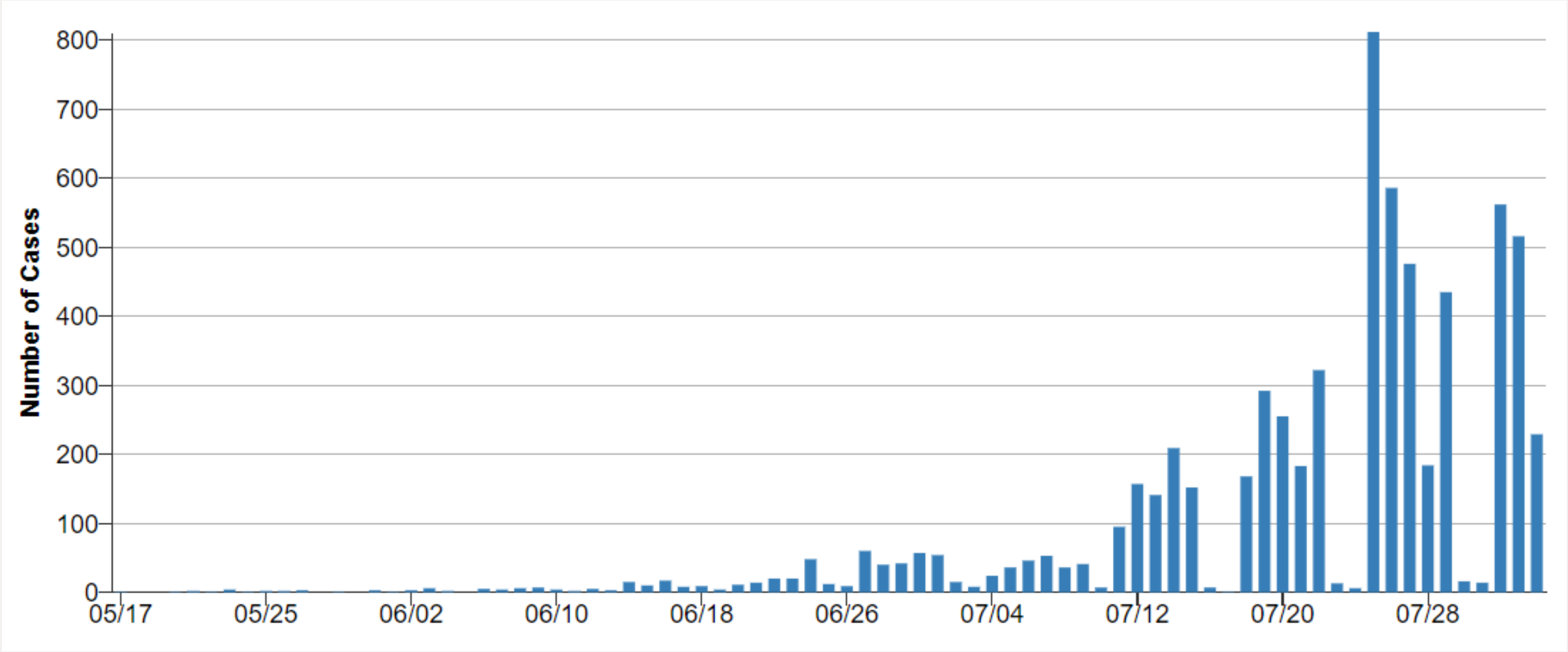
Total confirmed monkeypox/orthopoxvirus cases: **8,934** (August 8, 2022, at 5pm)



Source: [2022 U.S. Map & Case Count | Monkeypox | Poxvirus | CDC]

MONKEYPOX

Total confirmed monkeypox/orthopoxvirus cases: **8,934** (August 8, 2022, at 5pm)



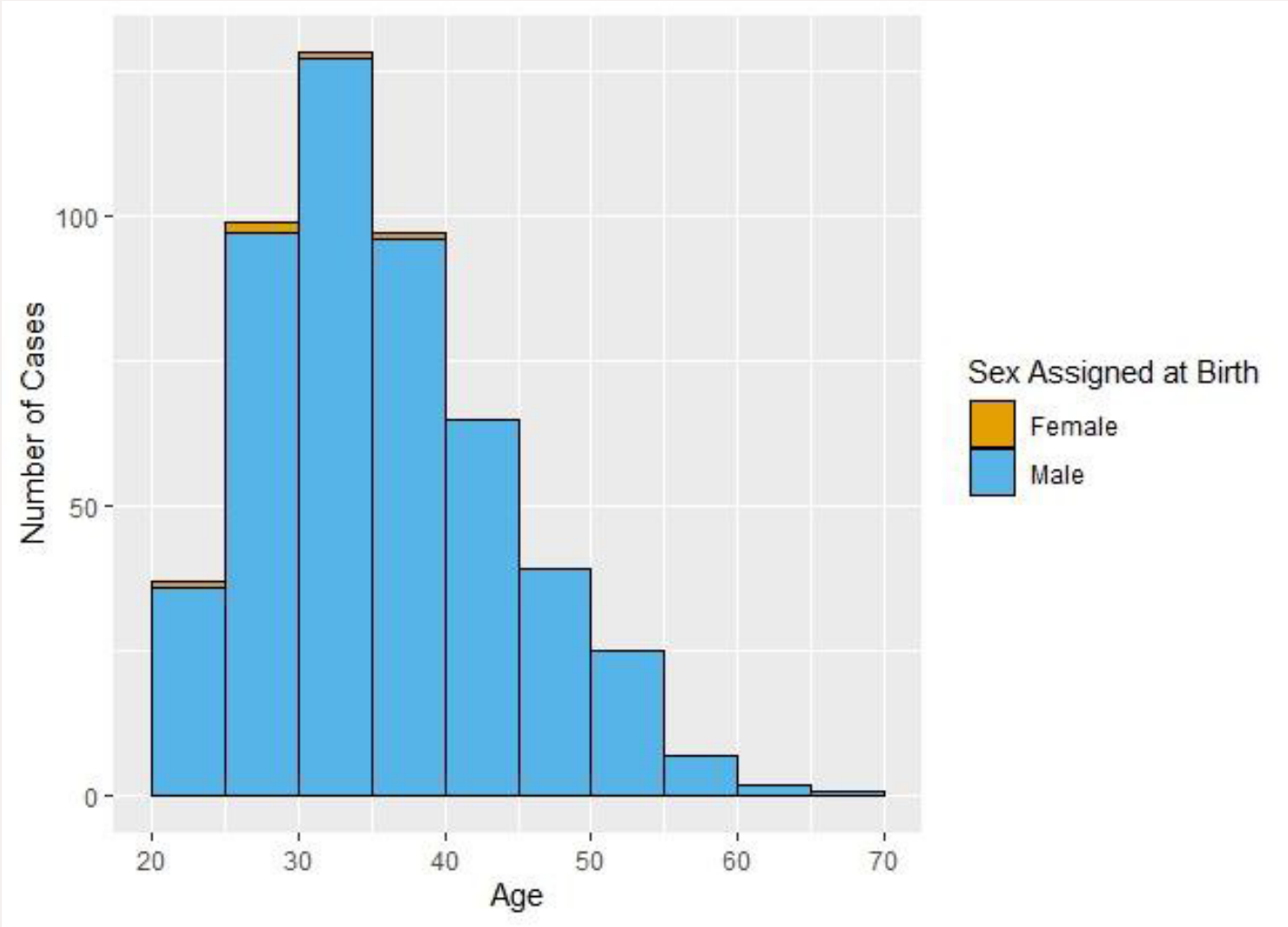
Source: [2022 U.S. Map & Case Count | Monkeypox | Poxvirus | CDC]

MONKEYPOX

Monkeypox cases reported to CDC: Demographics (Official counts as of July 25, 2022, at 2pm EST)

- Age:
  - Median: 35 years
  - Range: 18 – 76 years[1]
- Male sex at birth: 1,373 (99.1%)
- Female sex at birth: 13
- MMSC[2]: 304/309 (98.4%)

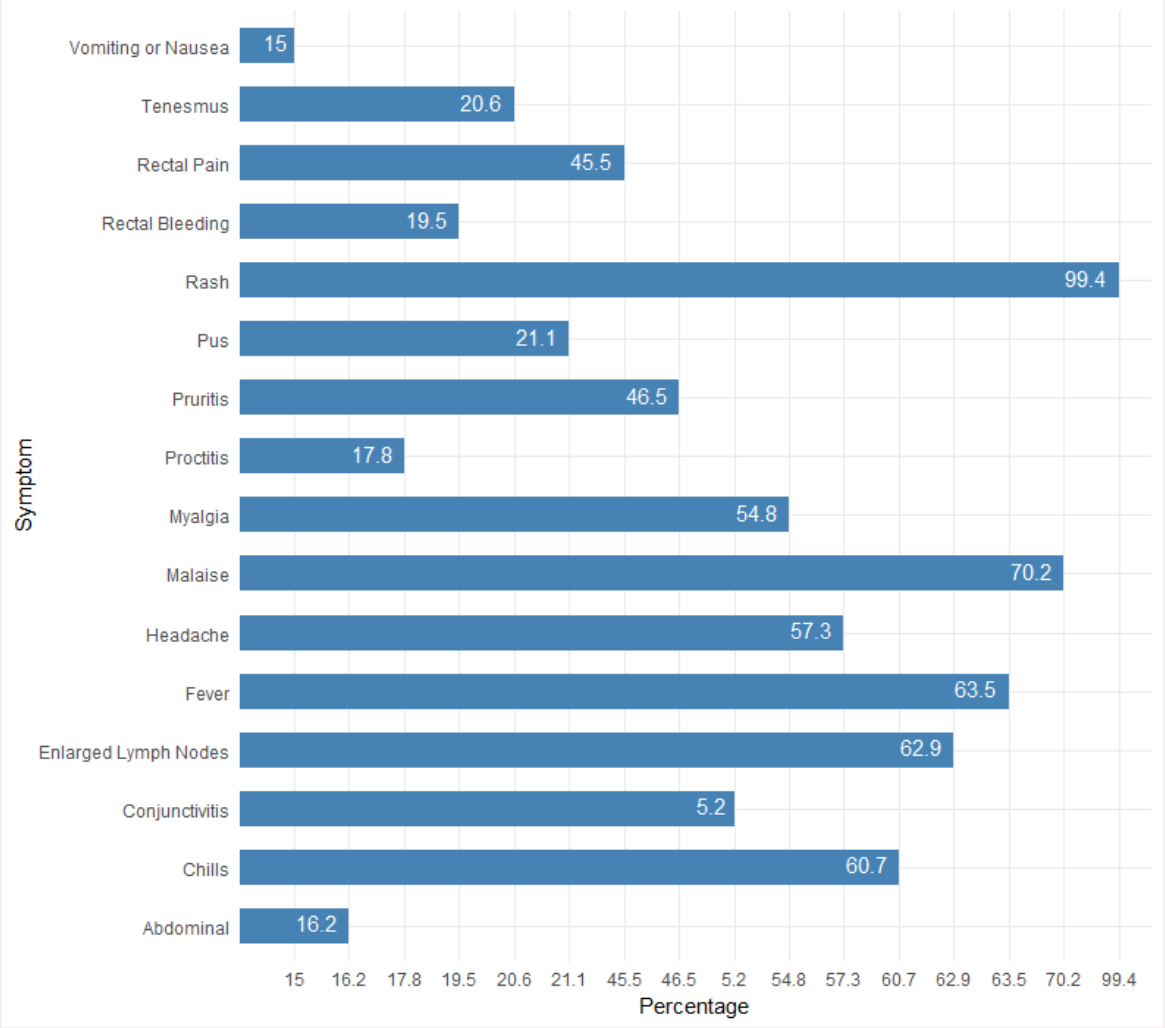
[1]Pediatric cases not reflected here
[2]Male-to-male sexual contact



MONKEYPOX

Monkeypox cases reported to CDC: Symptoms (Official counts as of July 25, 2022, at 2pm EST)

- Most common symptoms:
  - Rash (99%)
  - Malaise (70%)
  - Fever (64%)
  - Lymphadenopathy (63%)



MONKEYPOX

Transmission

- **Spread person-to-person through:**
  - **Direct contact** with the infectious rash, scabs, or body fluids
  - **Respiratory secretions** during prolonged, face-to-face contact, or during intimate physical contact, such as kissing, cuddling, or sex
  - **Touching items (such as clothing or linens)** that previously touched the infectious rash or body fluids
  - **Through placenta** in an infected pregnant person to their fetus
- **Patients are infectious once symptoms begin (whether prodromal or rash symptoms) and remain infectious until lesions form scabs, scabs fall off, and a fresh layer of skin forms**

MONKEYPOX

Examination and Diagnosis

- **Collect a complete sexual and travel history for past 21 days**
  - Consider possibility of foreign or domestic animal or animal product contact
- **Perform a thorough skin and mucosal examination** (e.g., genital, anal, oral) in a room with *good lighting*
- **If rash present, consider a broad differential** (e.g., syphilis, varicella zoster, herpes simplex, molluscum contagiosum), especially if the person has epidemiologic risk factors for monkeypox infection in the current outbreak
- **Evaluate for STIs per the 2021 CDC STI Treatment Guidelines**
  - Persons with monkeypox have had STIs including acute HIV

Reduce Stigma & Provide Affirming Care

We have heard concerning reports of patients being turned away by providers. Delays in diagnosis and care result in:

- **Needless suffering**
- **Increases in community spread**
- **Perpetuation of stigma and inequities**

Be prepared to evaluate patients with monkeypox symptoms while providing a welcoming and affirming care environment. Some examples of affirming care:

- **Ask patients for their gender pronouns: "What name and pronouns would you like us to use?" or "I would like to be respectful—how would you like to be addressed?" Additionally, ask what terms they use for their bodies or specific body parts**
- **When taking a sexual history, consider saying: "It's important for me to understand your medical history in detail to provide you the best health care possible."**
- **Avoid assumptions about patients' sexual orientation or the gender or gender identity of their partners.**
- **Avoid assumptions regarding the types of sexual activity (e.g., oral, anal, vaginal, or no sexual activity at all) that people engage in. Elicit this information with open-ended questions.**
- **Do NOT assume that a patient is at high risk on the basis of gender identity; rather, risk assessment should be based on each individual's sexual history.**

https://www.cdc.gov/hiv/clinicians/transforming-health/health-care-providers/sexual-history.html

MONKEYPOX

If you suspect you have a case…

- **Obtain specimens**
  - https://www.cdc.gov/poxvirus/monkeypox/clinicians/prep-collection-specimens.html
  - Note: testing in population with low prevalence more likely to have falsely positive results
- **Notify health department and your facility's infection control team**
  - Can be helpful with contact tracing and identifying person eligible for post-exposure prophylaxis
- **Consider consultation for treatment (contact health department)**
  - Antivirals (**tecovirimat**, cidofovir, brincidofovir)
  - Vaccinia immune globulin (VIGIV)

MONKEYPOX

Testing for Suspect MPX Cases

- US Laboratory Response Network (LRN) labs (10,000 tests/week)
  - LRN labs (located within the state public health labs) perform CDC's FDA cleared non-variola Orthopoxvirus (NVO)-specific PCR test
  - Send samples to CDC for MPX-specific PCR and sequencing

- Commercial laboratory testing is now available (70,000 additional tests/week)
  - 40,000 testing capacity per week using CDC NVO test
  - 30,000 tests of commercial MPOX-specific laboratory test

- Current testing capacity is at least 80,000 tests per week

MONKEYPOX

Testing for Suspect MPX Cases

- **Specimen type**
  - Commercial and LRN labs-accepted specimen type is lesion material
  - Swab of lesion from any part of the body is acceptable
  - Approximately 3 lesion specimens per patient are suggested
  - CDC is evaluating other specimen types through a research protocol

- **Specifics on the acceptable lesion specimen type accepted within the LRN and commercial laboratories may vary (e.g., dry swab or swab in VTM or UTM)**
  - This is based on the laboratory's CLIA approval
  - Clinicians should initiate diagnostic testing for any suspect monkeypox patient
  - Based on clinical presentation and/or epidemiologic criteria
  - Testing of persons who belong to populations for which the incidence of monkeypox is expected to be very low decreases the positive predictive value of test results
  - Other differentials should also be considered if there are no known monkeypox epi links or risk factors

MONKEYPOX

Testing for Suspect MPX Cases

- Billing information (commercial labs)
  - No specific CPT codes for monkeypox testing is available at commercial labs yet
    - Each commercial lab performing testing may have their own CPT billing codes for monkeypox that can be accessed on their website by clinicians
  - The company performing the testing will bill private insurance, Medicaid, or Medicare

- Orthopoxvirus Results Interpretation
  - There are no other circulating orthopoxviruses within the United States that cause systemic disease
  - Clinical care such as isolation recommendations should begin based on the orthopoxvirus test result and should not wait on any additional viral characterization testing
    - Probable MPX: positive OPX PCR
    - Confirmed MPX: positive MPX-specific PCR or sequence analysis

Immediately reportable:

- Any confirmed case of monkeypox

Report within 24 hours:

- Positive or negative monkeypox or non-variola orthopoxvirus test results

Maine Center for Dise

A

Phone: (800) 821-

Maine Health Alert Network (HAN) System

PUBLIC HEALTH ALERT

To: All HAN Recipients

From: Dr. Isaac Benowitz, State Epidemiologist

Subject: **Temporary Updates to the Notifiable Diseases and Conditions List: Monkeypox Now a Reportable Condition in Maine**

Date / Time: Friday, July 15, 2022 at 11:30AM

Temporary Updates to the Notifiable Diseases and Conditions List: Monkeypox Now a Reportable Condition in Maine

Background: Reporting of notifiable diseases and conditions is required under 22 M.R.S., Chapter 250, §802 and §822. Failure to report could result in preventable morbidity or mortality. Maine CDC is authorized to advise through publicly noticed Health Alerts the public health need for the temporary reporting of any disease or condition in the state of Maine in order to study and control any apparent outbreak or unusual occurrence of communicable diseases.

This Health Alert serves as notice for a temporary change to the Notifiable Diseases and Conditions List:

- Any confirmed case of **monkeypox** is immediately reportable to Maine CDC within 24 hours; and
- All **monkeypox** or **non-variola orthopoxvirus** test results (positive or negative) are reportable to Maine CDC within 24 hours.

All results should be reported electronically as required by statute. These changes will remain in effect for a period of one year and may be reassessed at any time.

As previously noted, swab samples for monkeypox testing can be sent to Maine CDC's Health and Environmental Testing Laboratory (HETL) or to a commercial laboratory. Currently there are several commercial labs that offer monkeypox testing; other labs are expected to become available in coming weeks and months.

Healthcare IPC 101 – Monkeypox

Identify

Have processes in place to rapidly identify transmissible infectious organisms at patient/resident presentation.

- Examples: screening algorithms or questions.

Isolate

Standard Precautions AND

- **Personal Protective Equipment: Gowns, Gloves, eye protection, and N95 or higher-level respirator**
- **Place in single-person room with door closed** (if safe to do so)**; dedicated bathroom**
- Patient should wear a well-fitting mask as source control and have any exposed skin lesions covered when transported outside of the room.
- Aerosol generating procedures should be performed in an airborne infection isolation room (*AIIR), (negative pressure room)*
- See next slide for additional IPC guidance.

Inform

- Notify Infection Prevention and Control (IPC) Department or Designee
  - To ensure appropriate IPC prevention measures are instituted and to monitor potential healthcare worker or patient/resident exposures.
- Notify Maine CDC at 1-800-821-5821
  - Any confirmed case of **monkeypox** is immediately reportable to Maine CDC within 24 hours; and
  - All **monkeypox** or **non-variola orthopoxvirus** test results (positive or negative) are reportable to Maine CDC within 24 hours

U.S. CDC IPC guidance: https://www.cdc.gov/poxvirus/monkeypox/clinicians/infection-control-healthcare.html

Healthcare Infection Prevention and Control Questions, contact MECDC.HAI@maine.gov

Healthcare IPC 101 – Monkeypox

Environmental Considerations

- **Cleaning/Disinfection**:
  - Standard cleaning & disinfection procedures using an EPA-registered hospital-grade disinfectant with an emerging viral pathogen claim https://www.epa.gov/pesticide-registration/disinfectants-emerging-viral-pathogens-evps-list-q
  - Use wet cleaning methods if possible. Avoid activities that could resuspend dried material from lesions, e.g., use of portable fans, dry dusting, sweeping, vacuuming.
- **Soiled Laundry** (*e.g., bedding, towels, personal clothing*):
  - Handle in accordance with recommended standard practices, avoiding contact with lesion material that may be present on the laundry.
  - Should be gently and promptly contained in an appropriate laundry bag and should never be shaken or handled in manner that may disperse infectious material.
- **Waste management**:
  - West African Clade currently circulating based on testing. In general, manage waste as **Regulated Medical Waste (RMW), Category B**.
  - If you have determined that patient has known epidemiological risk for the Congo Basin clade (*e.g., history of travel to the Democratic Republic of the Congo, the Republic of Congo, the Central African Republic, Cameroon, or Gabon in the prior 21 days)*, manage waste as Category A infectious substance pending clade confirmation.

Duration of Precautions

- Minimally Isolation Precautions should be maintained until all lesions have crusted, those crusts have separated, and a fresh layer of healthy skin has formed underneath. For questions/consultations please feel free to reach out to Maine CDC.

Exposure Management

- Utilizes a degree of exposure risk assessment, see: https://www.cdc.gov/poxvirus/monkeypox/clinicians/monitoring.html

Medical Countermeasures Currently Stockpiled for Orthopoxviruses

- **Vaccines**
  - JYNNEOS
  - ACAM2000
- **Treatment**
  - Tecovirimat
  - Vaccinia Immune Globulin Intravenous (VIGIV)
  - Cidofovir

JYNNEOS

- **JYNNEOS is a live virus vaccine produced from the strain Modified Vaccinia Ankara-Bavarian Nordic (MVA-BN), an attenuated, non-replicating orthopoxvirus**
  - Also known as IMVAMUNE, IMVANEX, MVA
- **Licensed by FDA in September 2019**
- **Indication**
  - JYNNEOS is indicated for prevention of smallpox and monkeypox disease in adults 18 years of age and older determined to be at high risk for smallpox or monkeypox infection
  - CDC is developing an Expanded Access Investigational New Drug Protocol to allow the use of JYNNEOS for monkeypox in pediatric populations

https://www.fda.gov/vaccines-blood-biologics/jynneos

ACAM2000

- **ACAM2000 is a live, replicating vaccinia virus vaccine**
- **Licensed by FDA in August 2007**
- **Replaced Dryvax - license withdrawn by manufacturer and remaining vaccine destroyed**
- **Indication**
  - ACAM2000 is indicated for active immunization against smallpox disease for persons determined to be at high risk for smallpox infection
  - CDC-held Expanded Access Investigational New Drug Protocol allows use for Non-Variola Orthopoxvirus Infection (e.g., monkeypox) during an outbreak

https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5708a6.htm
https://www.fda.gov/media/75792/download

ACAM2000 and JYNNEOS

	ACAM2000	JYNNEOS
Vaccine virus	Replication-competent vaccinia virus	Replication-deficient Modified vaccinia Ankara
“Take”	“Take” occurs	No “take” after vaccination
Inadvertent inoculation and autoinoculation	Risk exists	No risk
Serious adverse event	Risk exists	Fewer expected
Cardiac adverse events	Myopericarditis in 5.7 per 1,000 primary vaccinees	Risk believed to be lower than that for ACAM2000
Effectiveness	FDA assessed by comparing immunologic response and “take” rates to Dryvax*	FDA assessed by comparing immunologic response to ACAM2000 & animal studies
Administration	Percutaneously by multiple puncture technique in single dose	Subcutaneously in 2 doses, 28 days apart

*Both ACAM2000 and Dryvax are derived from the NYC Board of Health strain of vaccinia; ACAM2000 is a “second generation” smallpox vaccine derived from a clone of Dryvax, purified, and produced using modern cell culture technology.

Monkeypox Vaccine Pre-Exposure Prophylaxis

- **On November 3, 2021, the Advisory Committee and Immunization Practices (ACIP) voted to recommend vaccination for select persons at risk for occupational exposure to orthopoxviruses**
- **Policy note published June 3, 2022**
  - Use of JYNNEOS (Smallpox and Monkeypox Vaccine, Live, Nonreplicating) for Preexposure Vaccination of Persons at Risk for Occupational Exposure to Orthopoxviruses: Recommendations of the Advisory Committee on Immunization Practices — United States, 2022

https://www.cdc.gov/mmwr/volumes/71/wr/mm7122e1.htm

Monkeypox Vaccine Pre-Exposure Prophylaxis

- People who should get PrEP include:
  - Clinical laboratory personnel who perform testing to diagnose orthopoxviruses, including those who use polymerase chain reaction (PCR) assays for diagnosis of orthopoxviruses, including Monkeypox virus
  - Research laboratory workers who directly handle cultures or animals contaminated or infected with orthopoxviruses that infect humans, including Monkeypox virus, replication-competent Vaccinia virus, or recombinant Vaccinia viruses derived from replication-competent Vaccinia virus strains
  - Certain healthcare and public health response team members designated by public health authorities to be vaccinated for preparedness purposes

https://www.cdc.gov/poxvirus/monkeypox/clinicians/smallpox-vaccine.html

Monkeypox Vaccine Pre-Exposure Prophylaxis

- At this time, most clinicians in the United States and laboratorians not performing the orthopoxvirus generic test to diagnose orthopoxviruses, including monkeypox, are not advised to receive orthopoxvirus PrEP
  - Laboratorians should consult with laboratory biosafety officers and supervisors to identify risks and precautions, depending on the type of work they are doing
  - Clinicians and laboratorians should use recommended infection control practices

https://www.cdc.gov/poxvirus/monkeypox/clinicians/smallpox-vaccine.html

ACIP Contraindications for ACAM2000 and JYNNEOS for PrEP for Persons at Risk for Occupational Exposure to Orthopoxviruses

Contraindication	ACAM2000 Primary Vaccinees	ACAM2000 Revaccinees	ACAM2000 Household Contacts[1]	JYNNEOS
History or presence of atopic dermatitis	X	X	X	
Other active exfoliative skin conditions	X	X	X	
Conditions associated with immunosuppression	X	X	X	
Pregnancy	X	X	X	
Aged <1 year	X	X	X	
Breastfeeding	X	X		
Serious vaccine component allergy	X	X		X
Known underlying heart disease (e.g., coronary artery disease or cardiomyopathy)	X	X		
Three or more known major cardiac risk factors	X			

Vaccine Strategy Considerations

- **Jurisdictions with larger numbers of cases are reporting that high percentages of contacts cannot be identified**
  - Desire to plan and implement expanded vaccination programs
  - Electing similar approaches to strategies being used in Montreal and the U.K.
- **Monkeypox Vaccine Post-Exposure Prophylaxis (PEP)++**
  - Vaccination of people with certain risk factors that might make them more likely to have been recently exposed to monkeypox
  - Aims to reach these individuals for post-exposure prophylaxis vaccination even if they have not had confirmed exposure to monkeypox

Vaccine Strategy Considerations

- Currently limited supply of JYNNEOS although more expected in July and later this year
- Goal - focus allocation of currently available JYNNEOS doses in areas of highest transmission
- Distribute JYNNEOS to states for immediate use for expanded monkeypox vaccine post-exposure prophylaxis (PEP++)
- Allocation based on:
  - Areas of highest transmission based on current and projected population-adjusted incident cases
  - Weighted by population of MSM with HIV or eligible for HIV PrEP

Vaccination

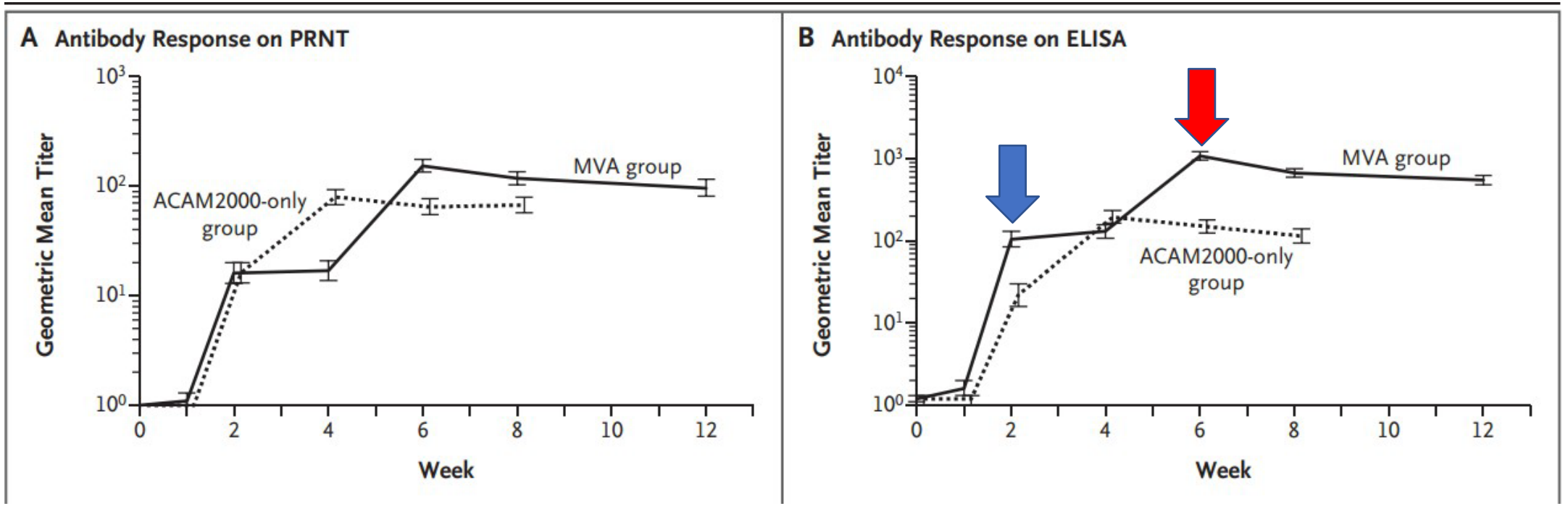
- Jynneos is an FDA-approved vaccine used to prevent monkeypox infection among at-risk individuals 18 years and older.
- Made from a non-replicating virus, so Jynneos can be given to people with weakened immune systems, and those who are pregnant or who have other health conditions.
- Subcutaneous vaccine series with two-doses at 0 and 28 days (+/- 7 days).
- CDC recommends that the vaccine be given within 4 days from the date of exposure in order to prevent onset of the disease.
- If given between 4–14 days after the date of exposure, vaccination may reduce the *symptoms* of disease, but may not *prevent* the disease.
- People who receive Jynneos are not considered vaccinated until 2 weeks after they receive the second dose of the vaccine.

JYNNEOS

- Replication-deficient *Vaccinia* virus
- Licensed as a series of two subcutaneous injections, 4 weeks apart
- Recommended by the Advisory Committee on Immunization Practices as pre-exposure prophylaxis for laboratory and other personnel with occupational exposure to orthopoxviruses
- Booster doses recommended every 2 years for those with exposure to monkeypox
- The only contraindication is severe allergy to a vaccine component.
- Side effects include injection site reactions; serious side effects are rare.
- The vaccine can be given to people with HIV and immunocompromising conditions.

Rao AK, et al; MMWR; 2022

Antibody response with JYNNEOS are non-inferior to those with ACAM2000.



Antibody titers at 2 weeks (ie, after a single dose) are similar between JYNNEOS and ACAM2000.

Peak antibody titers are achieved at 6 weeks (ie, 2 weeks after the second dose).

Pittman PR, et al; N Engl J Med; 2019

JYNNEOS

- Guidance for coadministration with other vaccines
  - o JYNNEOS typically may be administered without regard to timing of other vaccines. This includes simultaneous administration of JYNNEOS and other vaccines on the same day, but at different anatomic sites if possible. See ACIP's general best practices and *Epidemiology and Prevention of Vaccine-Preventable Diseases* (Pink Book) for further information.(See Interim Clinical Considerations for Use of COVID-19 Vaccines | CDC)

- Given potential common risk factors for acquiring hepatitis A and monkeypox, those seeking Jynneos vaccine due to elevated risk factors should also be protected against hep A through co-administration with the hepatitis A vaccine.

Source: https://www.cdc.gov/poxvirus/monkeypox/considerations-for-monkeypox-vaccination.html#:~:text=Monkeypox%20Vaccine%20Post%2DExposure%20Prophylaxis%20(PEP)&text=CDC%20recommends%20that%20the%20vaccine,prevent%20onset%20of%20the%20disease.
https://www.cdc.gov/hepatitis/outbreaks/2017March-HepatitisA.htm

MONKEYPOX

Current National Vaccine Strategy

- **Monkeypox Vaccine Post-Exposure Prophylaxis (PEP)**
  - For the current outbreak, this approach can be considered as “standard PEP” for monkeypox
  - People can be vaccinated following exposure to monkeypox to help prevent illness from monkeypox virus
    - **High degree of exposure:** PEP recommended
    - **Intermediate degree of exposure:** Informed clinical decision making recommended on an individual basis to determine whether benefits of PEP outweigh risks
    - Brief interactions and those conducted using appropriate PPE in accordance with Standard Precautions are not high risk and generally do not warrant PEP

https://www.cdc.gov/poxvirus/monkeypox/clinicians/monitoring.html#exposure
https://www.cdc.gov/poxvirus/monkeypox/considerations-for-monkeypox-vaccination.html

MONKEYPOX

Considerations for PEP

- CDC recommends that the vaccine series be initiated within 4 days from the date of exposure for the best chance to prevent onset of the disease
- If initiated between 4 and 14 days after the date of exposure, vaccination may reduce the symptoms of disease, but may not prevent the disease
- However, when coupled with self-isolation and other prevention measures when symptoms first occur, PEP is important for controlling outbreaks and preventing further transmission of monkeypox

https://www.cdc.gov/poxvirus/monkeypox/considerations-for-monkeypox-vaccination.html

MONKEYPOX

Current National Vaccine Strategy, cont.

- **Monkeypox Vaccine Expanded Post-Exposure Prophylaxis (PEP)**
  - For the current outbreak, this expanded approach can be considered as “individual-directed PEP” for monkeypox
  - Public health officials refer to it as “expanded PEP” (or “PEP++”)
  - People with certain risk factors are more likely to have been recently exposed to monkeypox; the PEP++ approach aims to reach these people for post-exposure prophylaxis, even if they have not had documented exposure to someone with confirmed monkeypox
- **Monkeypox Vaccine Pre-Exposure Prophylaxis (PrEP):** This approach refers to administering vaccine to someone at high risk for monkeypox (e.g., lab workers who handle specimens that might contain monkeypox virus)

https://www.cdc.gov/poxvirus/monkeypox/considerations-for-monkeypox-vaccination.html

MONKEYPOX

Considerations for Monkeypox Vaccination

- No data are available yet on the effectiveness of these vaccines in the current outbreak
- People who get vaccinated should continue to take steps to protect themselves* from infection by avoiding close, skin-to-skin contact, including intimate contact, with someone who has monkeypox
- To better understand risks and benefits of these vaccines in the current outbreak, CDC is working with partners to collect data on vaccine safety and vaccine effectiveness

*https://www.cdc.gov/poxvirus/monkeypox/prevention.html
https://www.cdc.gov/poxvirus/monkeypox/considerations-for-monkeypox-vaccination.html

MONKEYPOX

Vaccine Supply

- **JYNNEOS**
  - 56,000 doses in Phase 1 (June 28, 2022)
  - 240,000 doses across Phase 2a (July 8, 2022) Phase 2b (July 15, 2022)
  - >750,000 doses to be made available in Phase 3
  - HHS anticipates making ~1.9 million doses available in 2022, with an additional 2.2 million doses available during the first half of 2023

- **ACAM2000**
  - >100 million doses

https://www.whitehouse.gov/briefing-room/statements-releases/2022/06/28/fact-sheet-biden-harris-administrations-monkeypox-outbreak-response/;
https://www.hhs.gov/about/news/2022/07/07/biden-harris-administration-make-additional-144000-doses-jynneos-vaccine-available-states-jurisdictions-for-monkeypox-response.html;
https://aspr.hhs.gov/ASPRBlog/Pages/BlogDetailView.aspx?ItemID=432

MONKEYPOX

Considerations for JYNNEOS

- **Two doses of JYNNEOS are required, as this is the FDA-approved dosing regimen**
  - Second dose should be administered 28 days after the first dose
- **JYNNEOS has been evaluated in clinical studies involving people with HIV infection** and atopic dermatitis and shown to be safe and effective in eliciting an immune response in these populations
- **People who receive JYNNEOS are considered to reach maximal immunity 14 days after their second dose**
- **We do not know if JYNNEOS will fully protect against monkeypox virus infection in this outbreak**
  - Individuals should take additional preventive measures and self-isolate as soon as they develop monkeypox symptoms, such as a rash
  - Infections despite vaccination may occur, and there are currently no data on effectiveness of JYNNEOS from the current outbreak

https://www.cdc.gov/poxvirus/monkeypox/considerations-for-monkeypox-vaccination.html

Supply of Monkeypox Vaccine

- U.S. CDC has allocated **440 doses** of Jynneos to Maine.
- Maine may receive an additional 660 doses over the next two months.
- We must balance the use of vaccination for close contacts and those at risk of exposure. *This supply includes 1st and 2nd doses.*

Vaccine Allocations

Total Available Doses:	
Post Exposure Prophylaxis (PEP)	**Expanded Post Exposure Prophylaxis (Expanded PEP)**
Close contacts of confirmed cases of monkeypox infection *Close contacts of unconfirmed cases of monkeypox infection*	*For people who are possible close contacts not identified through public health investigations, and otherwise meet eligibility criteria*

**This planned vaccine allocation could change if Maine identifies confirmed cases in coming weeks, as priority will be given to close contacts of confirmed cases (i.e., PEP). If high cases are recorded, PEP++ may be paused, based on vaccine supply.

Expanding Vaccine Eligibility and Access

- Current Jynneos eligibility is for:
  - High-risk close contacts of someone with monkeypox, OR
  - Gay, bisexual, or other men who have sex with men, and/or transgender, gender non-conforming, or gender non-binary who have had multiple sexual partners
- Maine is also expanding the number of clinics that will offer the vaccine.

Expanded PEP Vaccination Locations

Location	Clinic Name
Augusta	Maine Family Planning
	MaineGeneral-Horizon Clinic
Bangor	Maine Family Planning
Ogunquit/Kennebunk	Local Roots Health Care
Lewiston	Maine Family Planning
Portland	City of Portland
	MMP Gilman St. Clinic
South Portland	Greater Portland Health

MONKEYPOX

Resources

- **Smallpox vaccination information:** https://www.cdc.gov/smallpox/clinicians/vaccination.html
- **JYNNEOS**
  - 2022 ACIP Recommendations: https://www.cdc.gov/mmwr/volumes/71/wr/mm7122e1.htm
  - Package insert: https://www.fda.gov/media/131078/download
  - VIS (English): https://www.cdc.gov/vaccines/hcp/vis/vis-statements/smallpox-monkeypox.pdf
  - VIS (Spanish): https://www.immunize.org/vis/pdf/spanish_smallpox_monkeypox.pdf
- **ACAM2000**
  - 2016 ACIP Recommendations: https://www.cdc.gov/mmwr/volumes/65/wr/mm6510a2.htm
  - Package insert: https://www.fda.gov/media/75792/download
  - Medication guide: https://www.fda.gov/media/75800/download
  - CDC videos on administering ACAM2000: https://www.cdc.gov/smallpox/clinicians/administering-acam2000.html
  - Smallpox vaccination and adverse reactions, guidance for clinicians: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5204a1.htm

Treatment

Who to treat for monkeypox

How to prescribe TPOXX

Where to access treatment

MONKEYPOX

Treatment Considerations for Monkeypox

- Many individuals infected with monkeypox virus have a mild, self-limiting disease course in the absence of specific therapy

- The prognosis for monkeypox depends on multiple factors such as previous vaccination status, initial health status, and concurrent illnesses or comorbidities

MONKEYPOX

Treatment Considerations for Monkeypox

Patients who should be considered for treatment following consultation with CDC might include:

- People with severe disease (e.g., hemorrhagic disease, confluent lesions, sepsis, encephalitis, or other conditions requiring hospitalization)
- People who may be at high risk of severe disease:
    - People with immunocompromise (e.g., human immunodeficiency virus/acquired immune deficiency syndrome infection, leukemia, lymphoma, generalized malignancy, solid organ transplantation, therapy with alkylating agents, antimetabolites, radiation, tumor necrosis factor inhibitors, high-dose corticosteroids, being a recipient with hematopoietic stem cell transplant <24 months post-transplant or ≥24 months but with graft-versus-host disease or disease relapse, or having autoimmune disease with immunodeficiency as a clinical component)1
    - Pediatric populations, particularly patients younger than 8 years of age2
    - People with a history or presence of atopic dermatitis, persons with other active exfoliative skin conditions (e.g., eczema, burns, impetigo, varicella zoster virus infection, herpes simplex virus infection, severe acne, severe diaper dermatitis with extensive areas of denuded skin, psoriasis, or Darier disease [keratosis follicularis])
    - Pregnant or breastfeeding women3
    - People with one or more complications (e.g., secondary bacterial skin infection; gastroenteritis with severe nausea/vomiting, diarrhea, or dehydration; bronchopneumonia; concurrent disease or other comorbidities)4
- People with monkeypox virus aberrant infections that include accidental implantation in eyes, mouth, or other anatomical areas where monkeypox virus infection might constitute a special hazard (e.g., the genitals or anus)

Treatment Information for Healthcare Professionals, https://www.cdc.gov/poxvirus/monkeypox/clinicians/treatment.html

MONKEYPOX

Clinical Considerations for Treatment and Prophylaxis in People with HIV

- People with advanced HIV or who are not virologically suppressed with antiretroviral therapy can be at increased risk of severe disease related to monkeypox virus infection
- Post-exposure prophylaxis and antiviral treatments are available for persons exposed to monkeypox or with monkeypox virus infection
- Antiviral treatments have few interactions with antiretroviral therapy
- Vaccination with JYNNEOS is considered safe for people with HIV

https://www.cdc.gov/poxvirus/monkeypox/clinicians/people-with-HIV.html

Clinical Presentation

- No known mortality for the current outbreak, **but morbidity higher than expected**
- **Severe presentations can be debilitating with potential for long-term sequelae**
  - Proctitis (with or without ulcers) – tenesmus, bleeding, severe pain
  - Urethritis (urethral ulcers) – dysuria, hematuria
  - Pharyngitis (pharyngeal ulcers) – dysphagia, odynophagia
  - Balanitis/balanoposthitis
  - Perichondritis
  - Bacterial superinfection
    - Penile/testicular, pharyngeal, testicular lesions
- **Co-infections are common**
  - GC, chlamydia, syphilis, HSV, acute HIV, VZV

NYC Health

Supportive Care

- Gastrointestinal symptoms
  - Managed with appropriate hydration and electrolyte replacement
  - Antiemetics as needed
  - Anti-motility agents not generally recommended given the potential for ileus

- Skin lesions
  - Keep clean and dry when not showering or bathing to prevent bacterial superinfection
  - Pruritus managed with oral antihistamines and inert, anti-irritant topical agents such as calamine lotion or petroleum jelly

- Oral lesions
  - Compounds such “magic” or “miracle” mouthwashes (prescription solutions used to treat mucositis) to manage pain
  - Oral antiseptics to keep lesions clean (e.g., chlorhexidine mouthwash)
  - Topical benzocaine/lidocaine gels for temporary relief, especially to facilitate eating and drinking, but limit to recommended doses

https://www1.nyc.gov/assets/doh/downloads/pdf/cd/monkeypox-treatment-guidance-interim.pdf

NYC Health

Supportive Care

- Proctitis can occur with or without internal or external lesions
  - May be manageable with appropriate supportive care
  - Can progress to become severe and debilitating
    - Stool softeners such as docusate should be initiated early.
    - Sitz baths may calm inflammation
    - Over the counter pain medications such as acetaminophen
    - Topical anesthetics (e.g., dibucaine cream, lidocaine gel)

- Pain from proctitis and genital lesions may require prescription medications
  - Balance use with the possibility of side effects, like constipation
- Proctitis may be accompanied by rectal bleeding
  - Observed to be self-limited but should be evaluated by a healthcare provider

https://www1.nyc.gov/assets/doh/downloads/pdf/cd/monkeypox-treatment-guidance-interim.pdf

NYC Health

Tecovirimat – NYC Experience

Experience in NYC to date:

- Prescribed for ~215 patients
- About 20-25% meet criteria for tecovirimat
- Most common indication is severe proctitis
  - Other indications include painful anal or penile lesions, bacterial superinfection, painful oral lesions
- Significant improvements reported after just a few days of starting treatment
- No significant adverse events reported

https://www1.nyc.gov/assets/doh/downloads/pdf/cd/monkeypox-treatment-guidance-interim.pdf

NYC Health

Challenges – Treatment Access

- Demand high, but patients not getting linked to treatment in timely manner
- Very few providers/facilities have enrolled to prescribe
  - Extensive and time-consuming paperwork and documentation needed for IND protocol
  - No reimbursement process
  - Heavy reliance on academic medical centers with research programs
- Equity concerns
  - Limited access for patients that are rural, uninsured or without primary care provider
  - Many safety net systems with fewer resources to scale up treatment under IND requirements

NYC Health

MONKEYPOX

Tecovirimat

- Tecovirimat (TPOXX or ST-246) is an antiviral medication developed for smallpox and is available from the Strategic National Stockpile

- **Oral capsule and IV formulations** approved by FDA for the treatment of human smallpox disease in adults and pediatric patients under Animal Rule
  - Efficacy based on studies of non-human primates infected with monkeypox and rabbits infected with rabbitpox
  - Safety evaluation in 359 healthy adults (18-79 years)

- Tecovirimat use for unapproved indications (i.e., uses not covered by the FDA-approved labeling) requires an alternative regulatory mechanism (e.g., Expanded Access Investigational New Drug (EA-IND) or Emergency Use Authorization)

https://www.accessdata.fda.gov/drugsatfda_docs/label/2018/208627s000lbl.pdf

MONKEYPOX

Dosing: oral

<13 kg: Safety and efficacy not established
13 kg to <25 kg: 200 mg PO BID for 14 days
25 kg to <40 kg: 400 mg PO BID for 14 days
40 kg to <120 kg: 600 mg PO BID for 14 days
≥120 kg: 600 mg PO TID for 14 days

Take within 30 minutes after eating a full meal

MONKEYPOX

Dosing: IV

Use for patients weighing <13 kg OR if unable to take PO
If IV treatment is necessary, conversion from IV to oral is recommended as soon as oral treatment can be tolerated
In patients receiving an IV infusion, give the first oral dose at the next scheduled IV dosing

<3 kg: Safety and efficacy not established
3 kg to <35 kg: 6 mg/kg IV over 6 hr q12hr for 14 days; patients weighing ≥13 kg should switch to capsules to complete 14-day treatment as soon as oral therapy can be tolerated
35 kg to <120 kg: 200 mg IV over 6 hr q12hr for 14 days
≥120 kg: 300 mg IV over 6 hr q12hr for 14 days

MONKEYPOX

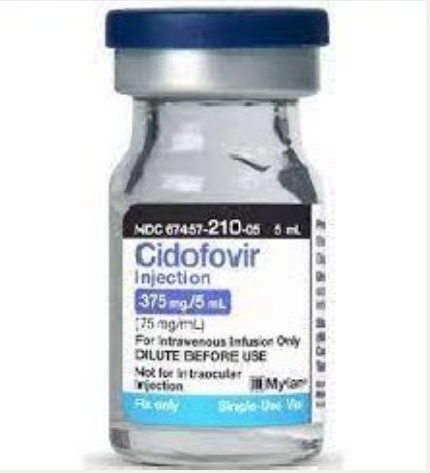
Tecovirimat EA-IND

- EA-IND provides an umbrella regulatory coverage
  - Clinicians and facilities do not need to request and obtain their own INDs
  - Provides liability coverage under the PREP Act for compensation to patients if injured via the Countermeasure Injury Compensation Program
- Treatment with TPOXX can begin upon receipt of the medication and after obtaining informed consent
  - No pre-registration is required for clinicians or facilities
- Forms requested under the EA-IND can all be returned to CDC after treatment begins
- CDC IRB serves as the central IRB for review and approval of the EA-IND
  - Determined that its use does not constitute research involving human subjects and federal-wide assurance requirements do not apply
  - For facilities requiring a reliance agreement, CDC IRB will provide a pre-signed reliance agreement for facilities to sign documenting reliance on CDC IRB (huma@cdc.gov)

https://www.cdc.gov/poxvirus/monkeypox/clinicians/obtaining-tecovirimat.html

Other Treatment Options

- VIGIV is licensed by FDA for the treatment of complications due to vaccinia vaccination
- Cidofovir (also known as Vistide) is an antiviral medication that is approved by the FDA for the treatment of cytomegalovirus (CMV) retinitis in patients with Acquired Immunodeficiency Syndrome (AIDS)
- CDC-held Expanded Access Investigational New Drug Protocol allows use of VIGIV and Cidofovir for Non-Variola Orthopoxvirus Infection (e.g., monkeypox)



MONKEYPOX

Tecovirimat EA-IND (also known as compassionate use)

- CDC holds an EA-IND to provide an umbrella regulatory coverage
  - Allow use of tecovirimat for non-variola orthopoxvirus infection (e.g., monkeypox, complications from replication-competent vaccinia virus vaccine)
  - CDC IRB serves as central IRB for review and approval
    - Non-research determination and that federal-wide assurance requirements do not apply
    - CDC IRB will provide a reliance agreement for facilities that elect to rely on CDC IRB approval
  - Clinicians and facilities do not need to request and obtain their own INDs
  - Provides liability coverage under the Public Readiness and Emergency Preparedness (PREP) Act for healthcare providers prescribing, administering, or dispensing the drug and for patients to seek compensation if they are seriously injured by the medication via the Countermeasure Injury Compensation Program

https://www.cdc.gov/poxvirus/monkeypox/clinicians/obtaining-tecovirimat.html

MONKEYPOX

Revised Tecovirimat EA-IND Protocol

Required

- Obtain Informed Consent prior to treatment
- Conduct a baseline assessment and complete the Patient Intake Form
- Document progress once during and once after treatment on the Clinical Outcome Form
- Report life-threatening or serious adverse events associated with tecovirimat by completing a PDF MedWatch Form and returning it to CDC
- FDA Form 1572: One signed 1572 per facility

Optional

- Photos of lesions
- Pharmacokinetic samples for testing
- Clinical laboratory parameters (hematology, chemistry, and urinalysis parameters)
- Lesion samples for resistance testing, if feasible, on new onset of lesions during and after completion of treatment
- Patient Diary, if feasible, give the form for patient to complete and voluntarily return it directly to CDC

https://www.cdc.gov/poxvirus/monkeypox/clinicians/obtaining-tecovirimat.html

MONKEYPOX

Summary of Revised Tecovirimat EA-IND Protocol

- Recently updated to make it easier for providing tecovirimat treatment
- Streamlined and substantially reduces the number of patient visits and required forms
  - All patient visits can be conducted via **telemedicine**
  - All laboratory testing is **optional**
  - Required safety reporting on **serious adverse events only**
  - No pre-registration is required for clinicians and healthcare facilities to begin providing tecovirimat treatment
  - Forms required under the EA-IND can all be returned to CDC after treatment begins

https://www.cdc.gov/poxvirus/monkeypox/clinicians/obtaining-tecovirimat.html

MONKEYPOX

Revised Tecovirimat EA-IND Protocol – additional clarification

- Primary tecovirimat use under the IND remains for **treatment** of laboratory confirmed or suspected OPXV infection based on known exposure and compatible clinical symptoms
- Post-exposure prophylaxis (PEP) on **individual case-by-case basis** for certain individuals for whom an alternative to PEP vaccination may be clinically necessary
  - Added in anticipation of potential PEP considerations for certain individuals while keeping the IND protocol evergreen
  - Any PEP use must be in clinical consultation with CDC
- Refer to CDC's Interim Clinical Considerations for the treatment of monkeypox for most up to date guidance regarding patients who should be considered for treatment
- No lower weight cap for use of IV tecovirimat. Allowed use in neonates under the IND protocol
- Includes explanation on IV administration over 6 hours and administration through syringe pumps

https://www.cdc.gov/poxvirus/monkeypox/clinicians/obtaining-tecovirimat.html

MONKEYPOX

Tecovirimat Availability for Treatment

- CDC is committed to ensuring that healthcare providers are able to readily access TPOXX for patient care.

- Based on early feedback from several providers, healthcare facilities, and academic centers, we feel optimistic that the revised protocol will help to lessen the burden and facilitate access to treatment for monkeypox.

- To request TPOXX, clinicians and care facility pharmacists should contact their state/territorial health department. To reach the CDC on-call clinical staff, contact the CDC Emergency Operations Center 770-488-7100 or Poxvirus@cdc.gov.

- Greatly appreciate timely return of patient intake and clinical outcome forms by providers and healthcare facilities as they enable CDC to monitor clinically appropriate and safe use of tecovirimat.

Expanding TPOXX Eligibility and Access

- Maine is taking aggressive, proactive steps to expand the availability of a monkeypox treatment, TPOXX.
- TPOXX is an oral and IV medication that may reduce the severity of symptoms in patients with monkeypox.
- It is well tolerated and easy to dispense.
- Maine is ordering large volumes to place across the state, including at hospitals, certain health clinics, and potentially commercial pharmacies.

TPOXX access in Maine:

Location	Hospital or Facility	Notes
Augusta	**ConvenientMD – Augusta**	*Oral ONLY*
Bangor	**Northern Light Eastern Maine Medical Center** *(outpatient dispensing at State Street pharmacy)*	*Oral and IV (inpatient and ED)*
Bangor	**ConvenientMD – Bangor**	*Oral ONLY*
Blue Hill	**Northern Light Blue Hill Hospital**	*Oral and IV (inpatient and ED)*
Brunswick	**ConvenientMD – Brunswick**	*Oral ONLY*
Dover-Foxcroft	**Northern Light Mayo Hospital**	*Oral and IV (inpatient and ED)*
Ellsworth	**Northern Light Maine Coast Hospital**	*Oral and IV (inpatient and ED)*
Ellsworth	**ConvenientMD – Ellsworth**	*Oral ONLY*
Greenville	**Northern Light CA Dean Hospital**	*Oral and IV (inpatient and ED)*
Pittsfield	**Northern Light Sebasticook Valley Hospital**	*Oral and IV (inpatient and ED)*
Portland	**Greater Portland Health Center**	*Oral ONLY*
Portland	**Maine Medical Center**	*Oral and IV*
Portland	**Spring Street Health Center**	*Oral ONLY*
Portland	**Northern Light Mercy Hospital** *(outpatient dispensing at Fore River Pkwy pharmacy)*	*Oral and IV (inpatient and ED)*
Portland	**ConvenientMD – Portland**	*Oral ONLY*
Presque Isle	**Northern Light AR Gould Hospital**	*Oral and IV (inpatient and ED)*
Saco	**ConvenientMD – Saco**	*Oral ONLY*
Sanford	**ConvenientMD – Sanford**	*Oral ONLY*
Waterville	**Northern Light Inland Hospital**	*Oral and IV (inpatient and ED)*
Westbrook	**ConvenientMD – Westbrook**	*Oral ONLY*

Coming soon:

City of Portland STD Clinic

York Hospital

Saint Joseph Hospital

Other MaineHealth facilities

Central Maine Healthcare facilities

Resources

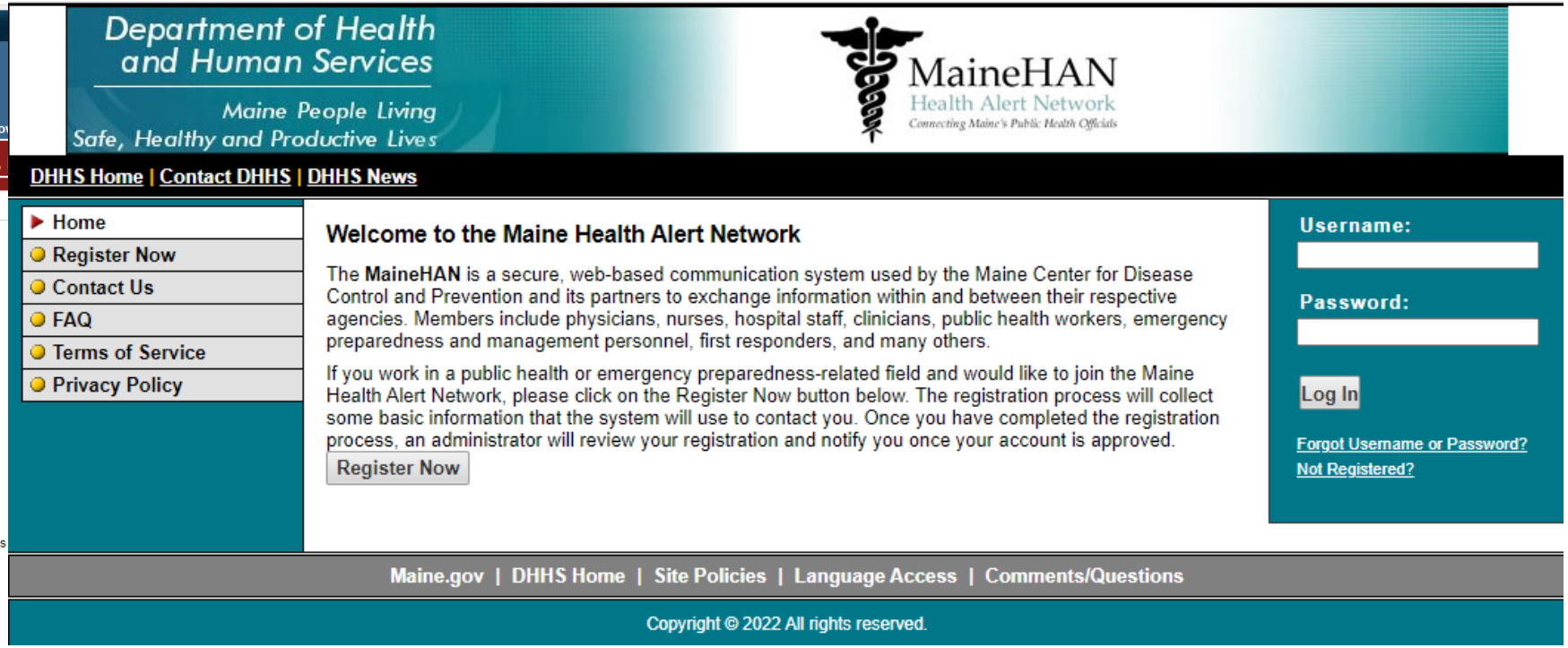
US CDC Resources

- https://www.cdc.gov/poxvirus/monkeypox/clinicians/infection-control-healthcare.html
- https://www.cdc.gov/poxvirus/monkeypox/clinicians/monitoring.html
- https://www.cdc.gov/poxvirus/monkeypox/transmission.html
- https://emergency.cdc.gov/han/

Maine CDC Resources

- https://www.maine.gov/dhhs/mecdc/infectious-disease/epi/zoonotic/monkeypox.shtml
- https://www.maine.gov/dhhs/mecdc/newhan.shtml

Maine Health Alert Network



https://www.mainehan.org/

https://www.maine.gov/dhhs/mecdc/newhan.shtml