# Epidemiological update on monkeypox

Teymur Noori

# Global figures and trends on the MPX outbreak

## 2022 Monkeypox Outbreak: Global Trends

World Health Organization

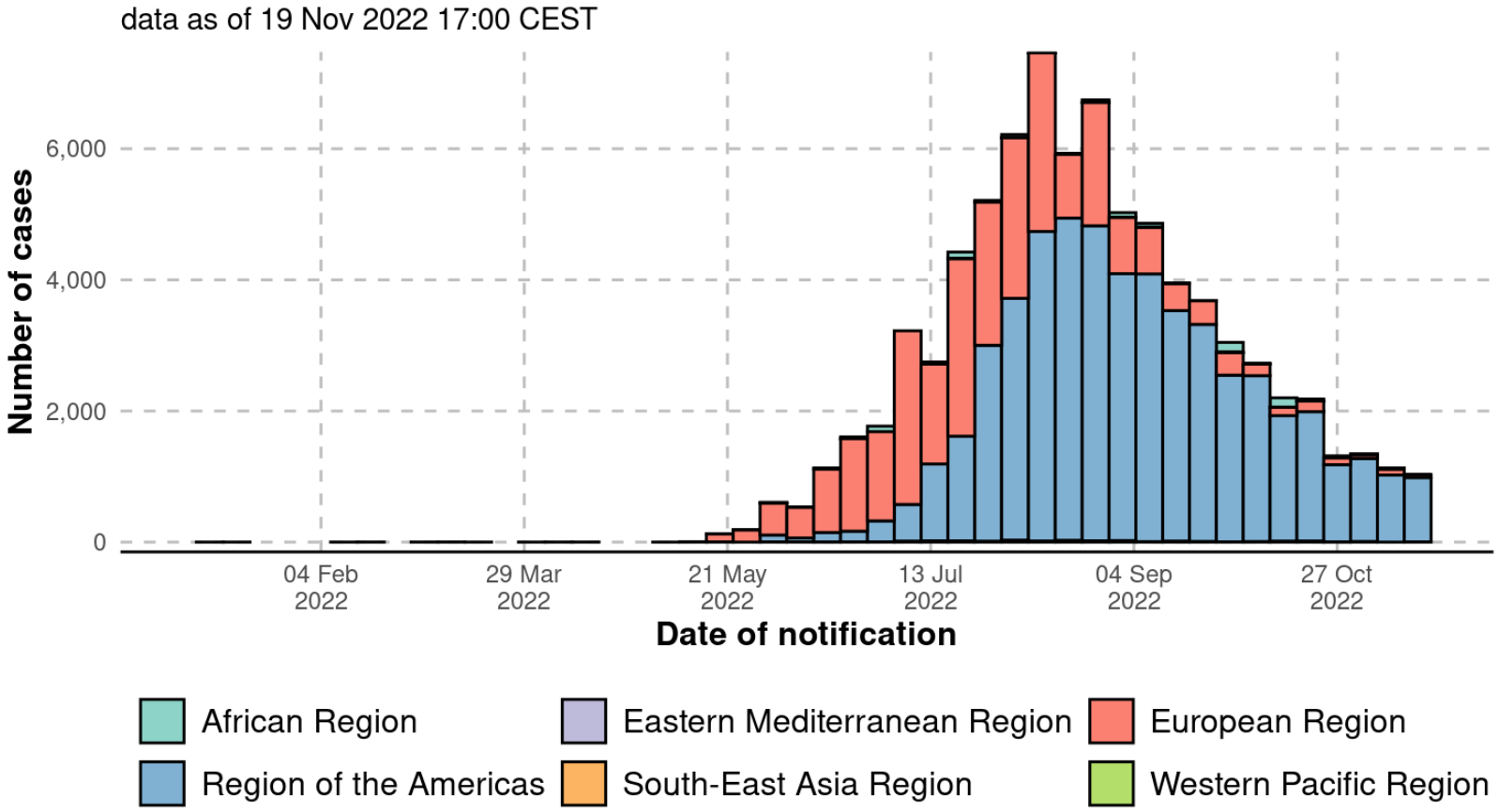
Produced on 21 November 2022

### Key Figures

**80,460**
Confirmed cases

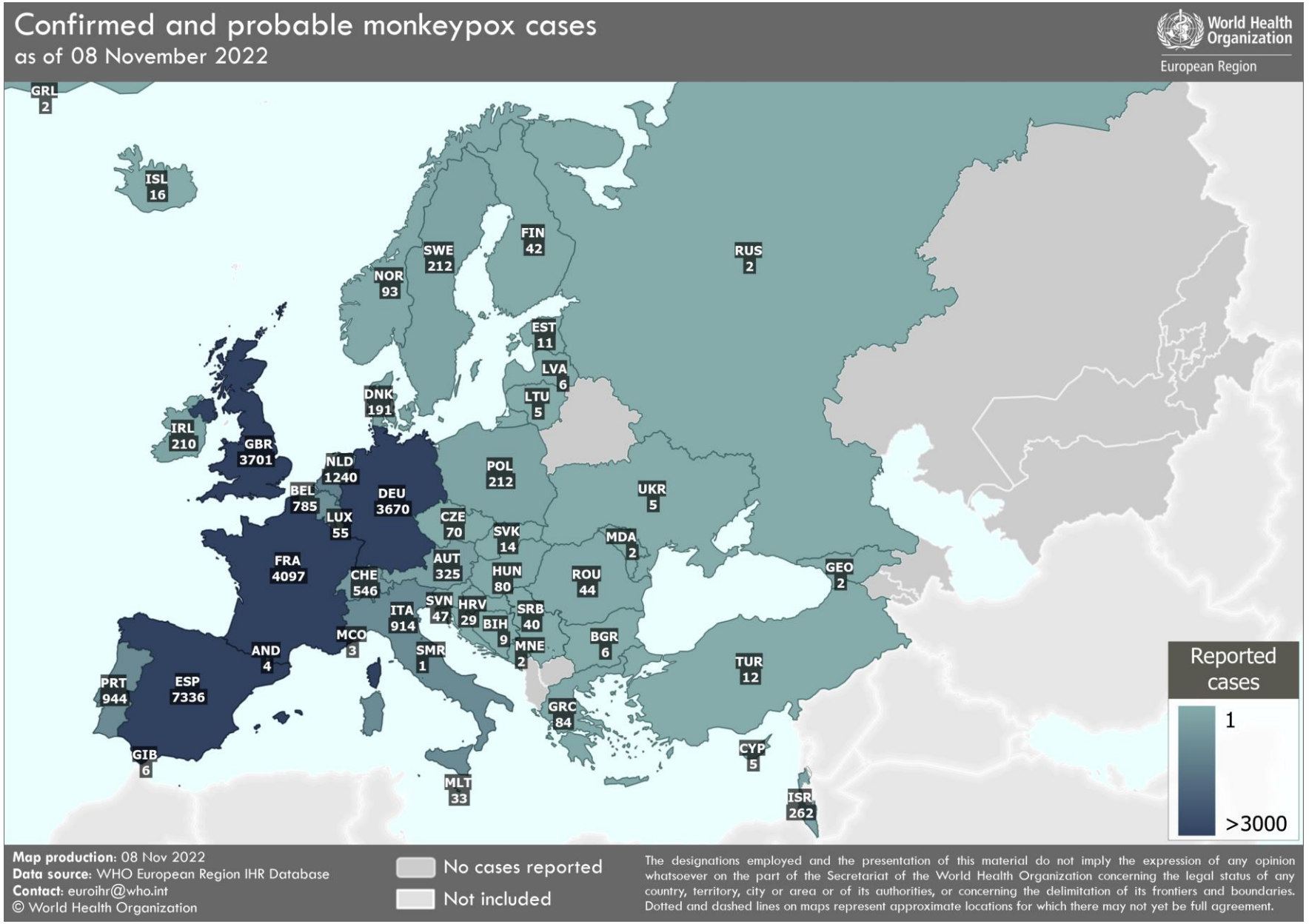
**53**
Deaths

**110**
Countries reporting cases




Source: WHO

Source: WHO: https://worldhealthorg.shinyapps.io/mpx_global/#section-fns2

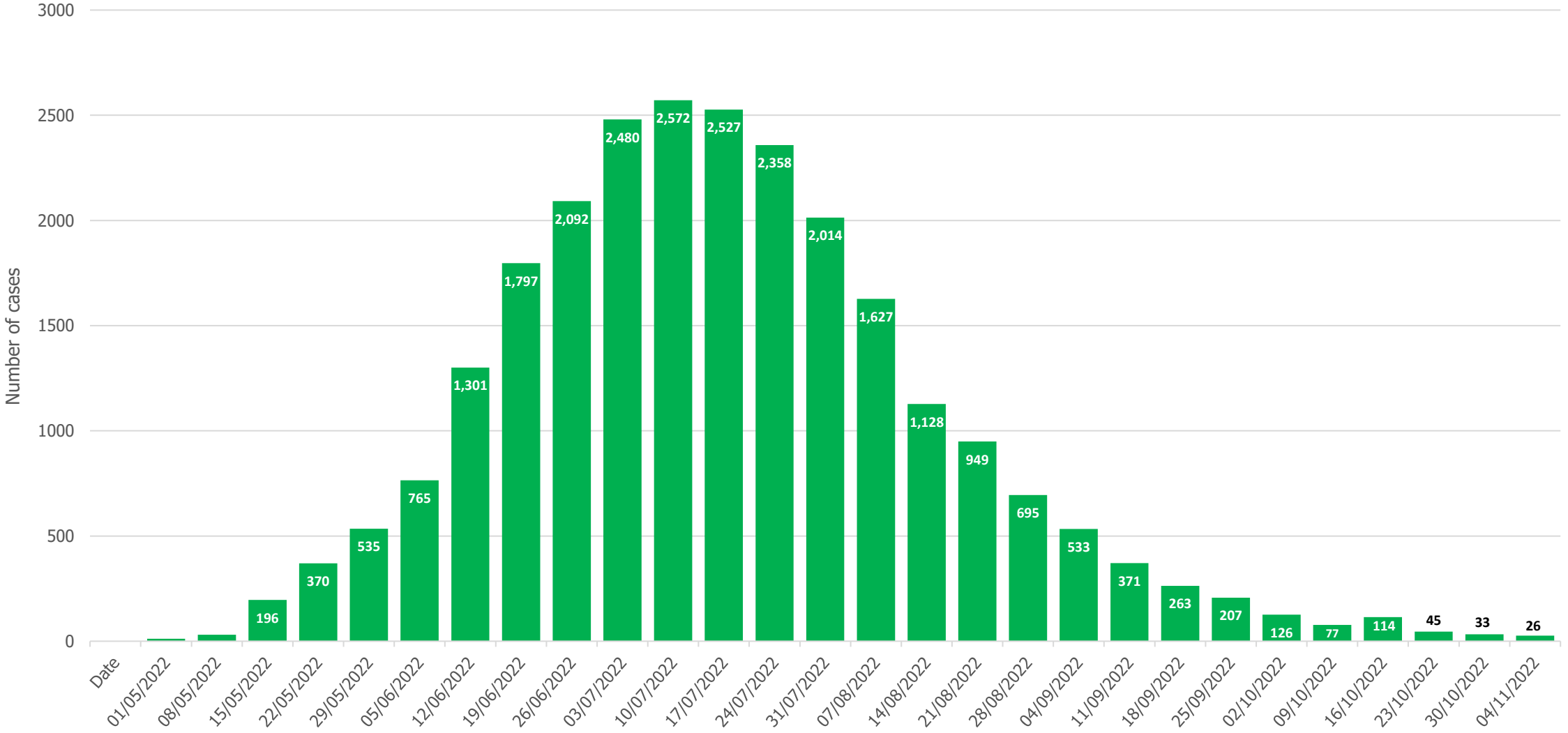



**25,375 cases of MPX reported from 45 countries as of 8 November**

**Most cases since the start of the outbreak in Spain (7,336), France (4,097), United Kingdom (3,701) Germany (3 670) and the Netherlands (1,240)**

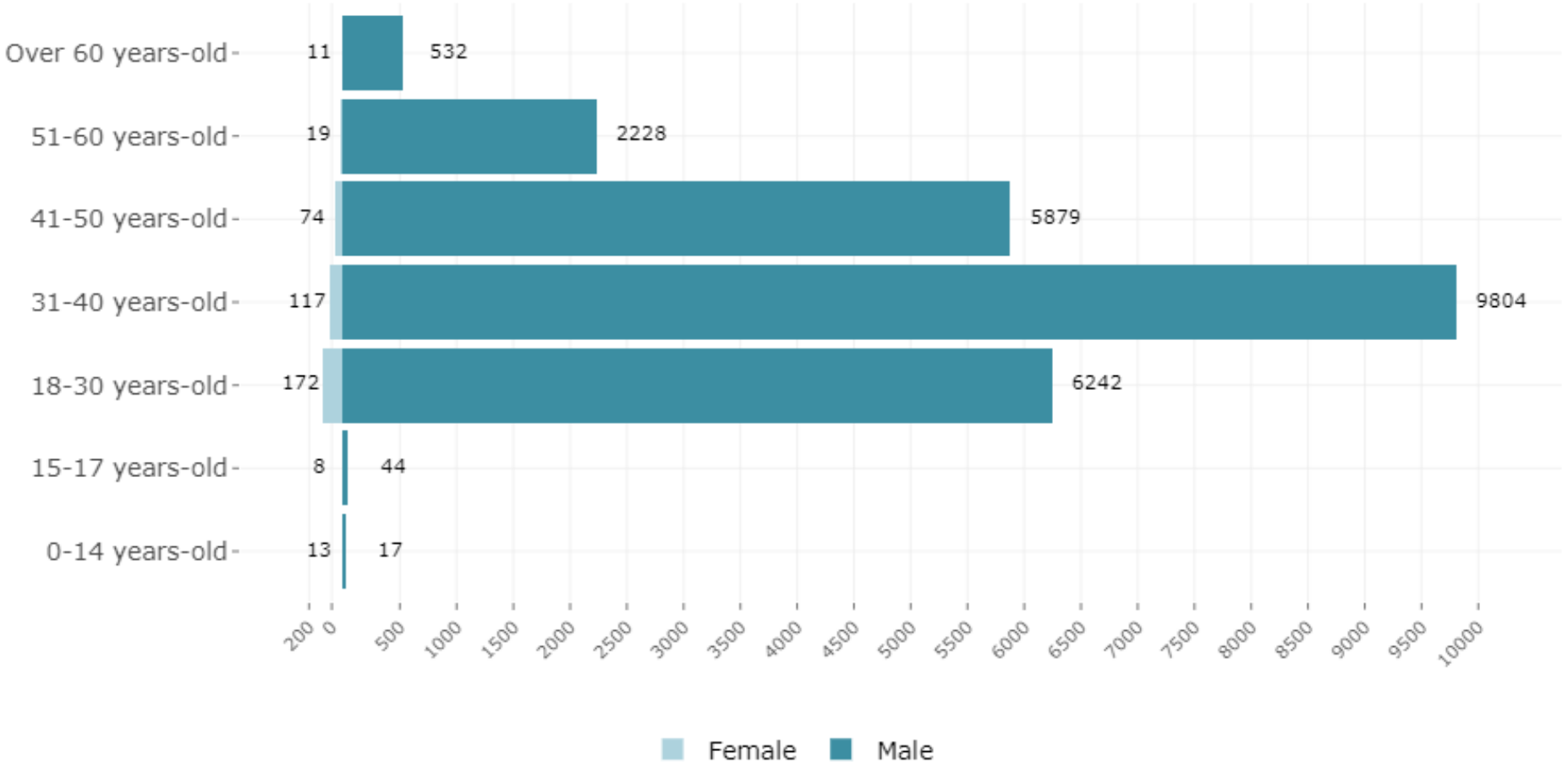
Source: ECDC/WHO Europe. Monkeypox, Joint Epidemiological overview, 9 November, 2022. https://monkeypoxreport.ecdc.europa.eu/

# Number of monkeypox cases per week in the WHO European region since May 2022




Source: ECDC/WHO Europe. Monkeypox, Joint Epidemiological overview, 9 November, 2022. https://monkeypoxreport.ecdc.europa.eu/

# Age and gender distribution of monkeypox cases, European region

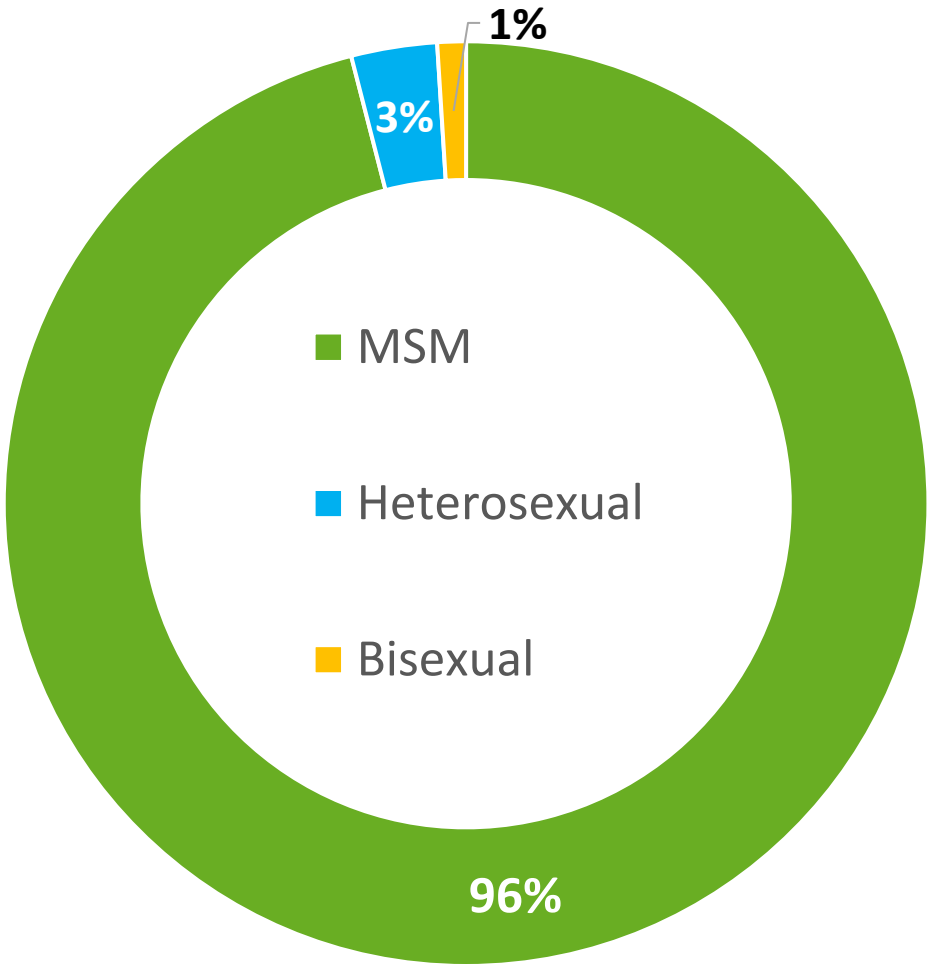



**98% of cases among male**

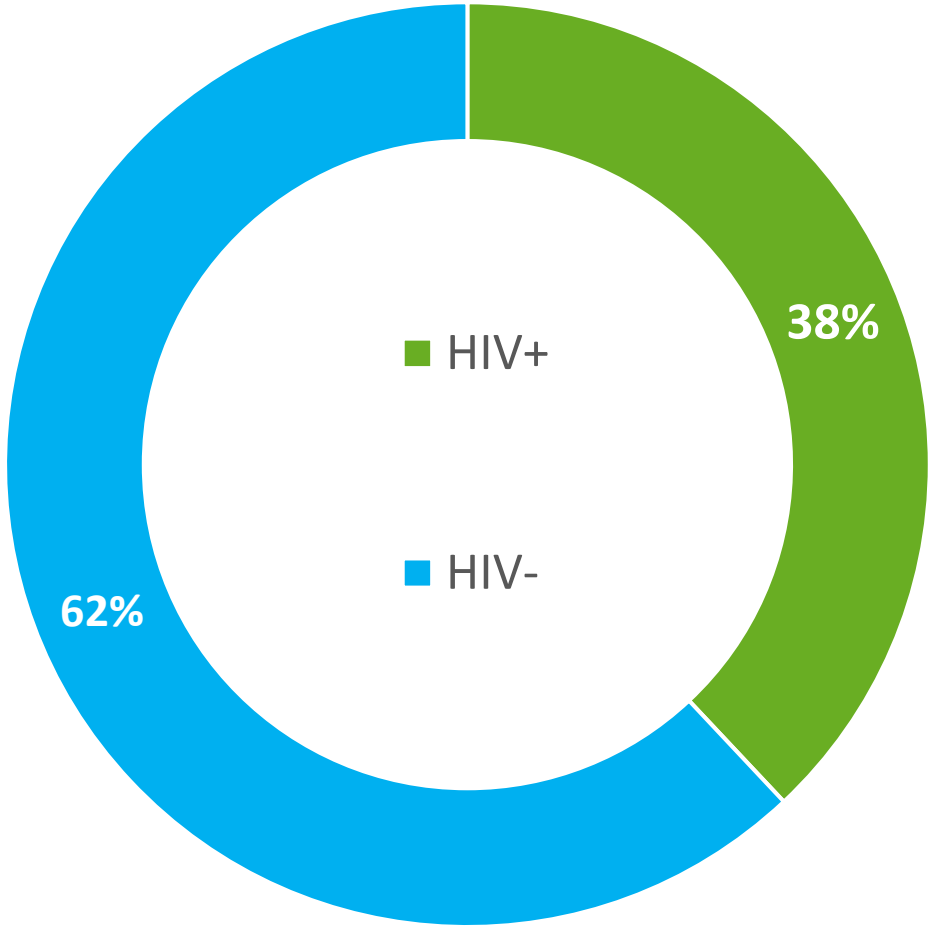
**39% of cases among those aged 31-40**

Source: ECDC/WHO Europe. Monkeypox, Joint Epidemiological overview, 9 Novemebr, 2022. https://monkeypoxreport.ecdc.europa.eu/

## Sexual orientation of male MPX cases in Europe (n=10,933)



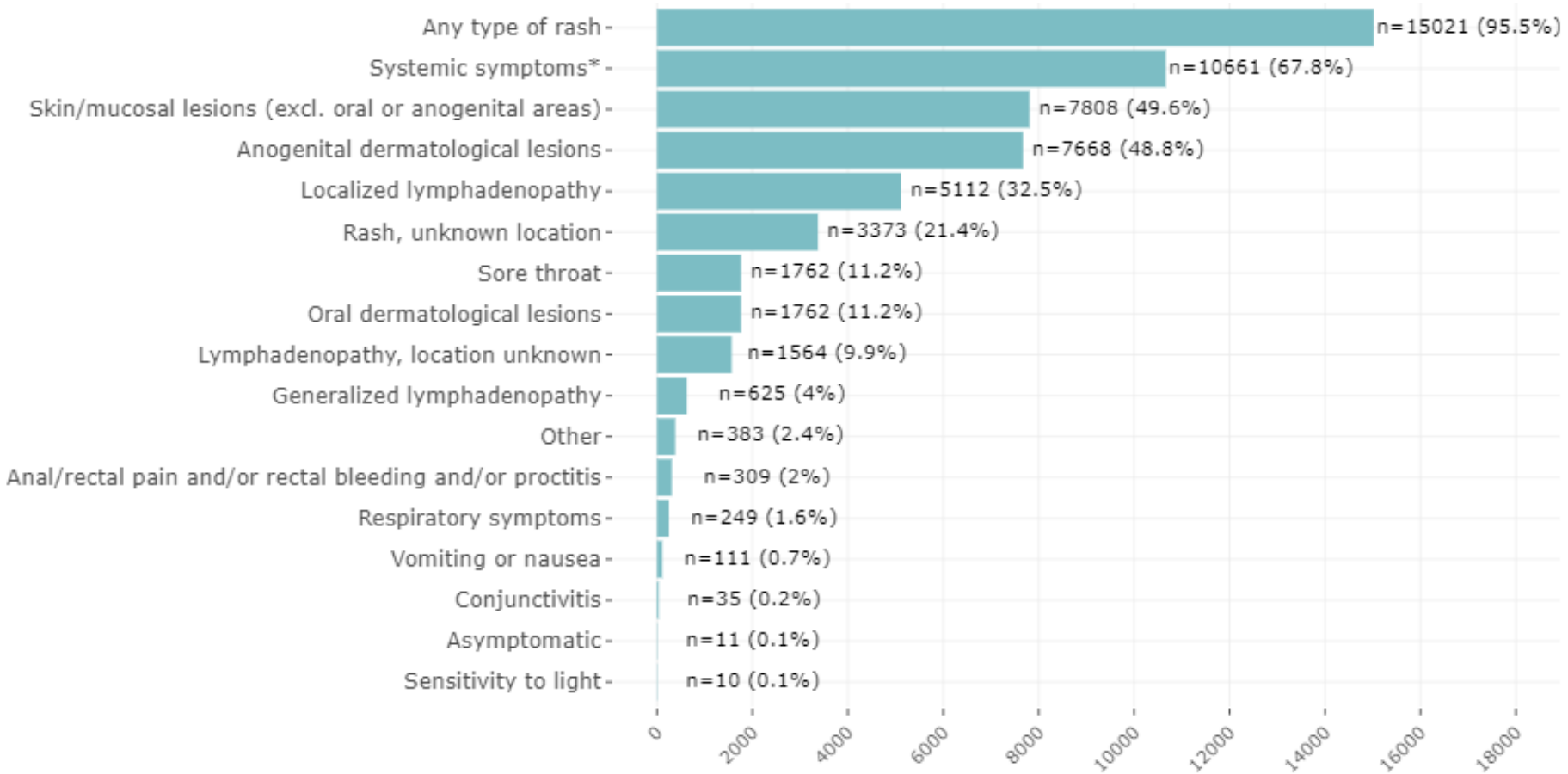

## HIV status of reported MPX cases in Europe (n=10,206)




Source: ECDC/WHO Europe. Monkeypox, Joint Epidemiological overview, 9 November, 2022. https://monkeypoxreport.ecdc.europa.eu/

# Distribution of symptoms (n=15,525) in the European Region

The median time between symptom onset and diagnosis was 7 days




*Fever, fatigue, muscle pain, chills, headache

Source: ECDC/WHO Europe. Monkeypox, Joint Epidemiological overview, 9 November, 2022. https://monkeypoxreport.ecdc.europa.eu/

# Outcomes of MPX cases in the European region

| | Yes | No | Total |
|---|---|---|---|
| Hospitalized* | 757 (6.4%) | 11,103 (93.6%) | 11,860 (100%) |
| Admitted to ICU | 6 (0.1%) | 6,855 (99.9%) | 6,861 (100%) |
| Died** | 4 (0.0%) | 17,627 (100%) | 17,631 (100%) |

** Includes cases hospitalized for isolation or treatment (187 cases were hospitalized for isolation purposes,* ***255 required clinical care*** *and 315 were hospitalized for unknown reasons)*

*** 2 Spain, 1 Belgium, 1 Czech Republic*

Source: ECDC/WHO Europe. Monkeypox, Joint Epidemiological overview, 25 October, 2022. https://monkeypoxreport.ecdc.europa.eu/

# Immunological signature in human cases of monkeypox infection in 2022 outbreak: an observational study

Andrea Antinori, National Institute for Infectious Diseases Lazzaro Spallanzani

Lancet Infect Dis 2022

# Immunological signature in human cases of monkeypox infection in 2022 outbreak: an observational study

Chiara Agrati*, Andrea Cossarizza*, Valentina Mazzotta, Germana Grassi, Rita Casetti, Sara De Biasi, Carmela Pinnetti, Simona Gili, Annalisa Mondi, Flavia Cristofanelli, Domenico Lo Tartaro, Stefania Notari, Gaetano Maffongelli, Roberta Gagliardini, Lara Gibellini, Camilla Aguglia, Simone Lanini, Alessandra D'Abramo, Giulia Matusali, Carla Fontana, Emanuele Nicastri, Fabrizio Maggi, Enrico Girardi, Francesco Vaia, Andrea Antinori

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# Background

- The immune response to Monkeypox infection is not well characterized.
- Experiments in animal models suggested that all the immune players contribute to viral clearance**, with CD4 and CD8+ T cells playing the main role**.

- **MKPV and HIV**: SIV- infected macaques with CD4+ T cell counts <300 cells mm–3 were not able to produce VACV- specific IgG following vaccination and died when challenged with MPXV. This observation is of high concern to both VACV- vaccinated and unvaccinated individuals with uncontrolled HIV-1 infection
- **Asymptomatic infection:** The generation of poxvirus-specific immune response was reported in some **contacts who did not develop monkeypox infection**.
- Can cytokine profile mirror the disease severity?

**The aim of this study was to describe kinetics of T-cell response, inflammatory profile, and pox-specific T-cell induction in patients with laboratory-confirmed monkeypox.**

# Study Population

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Age, years | 39 | 38 | 32 | 28 | 30 | 31 | 46 | 43 | 38 | 40 | 46 | 42 | 33 | 35 | 46 | 42 | 47 |
| Sex | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male | Male |
| Men who have sex with men | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| HIV status | Pos | Pos | Neg | Neg | Pos | Neg | Neg | Neg | Neg | Neg | Pos | Pos | Neg | Neg | Pos | Neg | Pos |
| CD4 count in the past 3 months* (cells/µl) | 884 | 413 | NA | NA | 686 | NA | NA | NA | NA | NA | 787 | 792 | NA | NA | 1622 | NA | 828 |
| CD4/CD8 ratio | NA | 2·13 | NA | NA | 1·9 | NA | NA | NA | NA | NA | 1·2 | 1·0 | NA | NA | 0·8 | NA | NA |
| Last viral load (copies per mL) | ND | ND | .. | .. | ND | .. | .. | .. | .. | .. | ND | ND | .. | .. | ND | .. | ND |
| Receipt of antiretroviral therapies | TC plus DTG | TAF plus FTC plus BIC | .. | .. | TC plus DTG | .. | .. | .. | .. | .. | TAF plus FTC plus BIC | TC plus DTG | .. | .. | TAF plus FTC plus BIC | .. | TC plus DTG |
| Receipt of pre-exposure prophylaxis | No | No | Yes | No | No | No | No | Yes | Yes | Yes | No | No | Yes | Yes | No | Yes | No |
| Total lymphocytes count, cells/µl | NA | 890 | 1630 | 2140 | NA | 2960 | 3440 | 4660 | NA | NA | 1870 | 3200 | 2880 | 2880 | 4280 | NA | NA |
| Transmission route | SCC | SCC | SCC | SCC | SCC | SCC | SCC | SCC | SCC | Household | Household | SCC | SCC | SCC | SCC | SCC | Not known |
| Systemic symptoms | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No | Yes | Yes | Yes | Yes | No | Yes |
| Number of lesions | >20 | 11–20 | >20 | <5 | <5 | >20 | 11–20 | >20 | 5–10 | <5 | <5 | 11–20 | 11–20 | <5 | <5 | 5–10 | 5–10 |
| Lesions in face or body skin | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Lesions on palms or soles | Yes | Yes | No | No | No | Yes | Yes | No | No | No | No | No | No | No | No | Yes | No |
| Genital lesions | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | No | No | No | Yes | Yes | Yes | No | No | No |
| Anal lesions | Yes | Yes | Yes | Yes | No | No | Yes | Yes | No | No | No | Yes | Yes | No | Yes | Yes | No |
| Nasal or oral lesions | Yes | No | Yes | Yes | No | No | No | No | No | No | No | No | No | No | No | No | No |
| PCR positive | | | | | | | | | | | | | | | | | |
| Skin lesions | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | No |
| Throat swab | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | Yes |
| Monkeypox treatment | No | No | No | Cidofovir | No | No | No | No | No | No | no | No | Tecovirimat | Tecovirimat | Tecovirimat | No | Tecovirimat |
| Smallpox vaccination history | Yes | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No | No |

BIC=bictegravir. DTG=dolutegravir. FTC=emtricitabine. NA=not available. ND=not detected. Neg=negative. Pos=positive. SCC=sexual close contact. TAF=tenofovir. TC=lamivudine. *Most recent CD4 count in the 3 months before monkeypox diagnosis.

*Table:* **Demographic and clinical characteristics of patients with monkeypox virus infection (n=17)**

17 participants with a laboratory-confirmed monkeypox virus positivity admitted at the Lazzaro Spallanzani National Institute for Infectious Diseases (INMI; Rome, Italy), from May 19, to July 7, 2022, were prospectively enrolled in this study.

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives, Protecting People™

Morbidity and Mortality Weekly Report (*MMWR*)

CDC

# Epidemiologic and Clinical Features of Children and Adolescents Aged <18 Years with Monkeypox — United States, May 17–September 24, 2022

*Weekly* / November 4, 2022 / 71(44);1407–1411

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**Ian Hennessee, PhD, MPH**

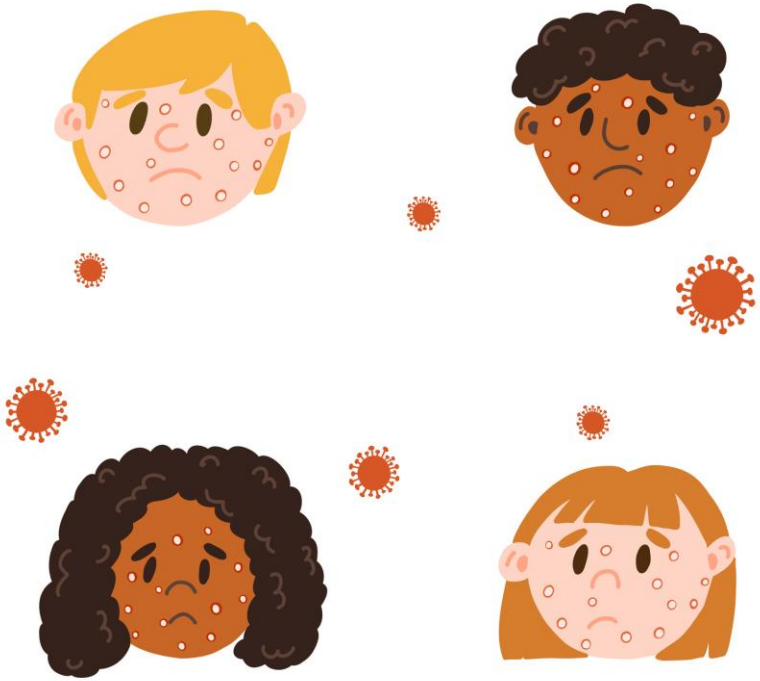
**Epidemic Intelligence Service Officer**

**CDC Monkeypox Response| Epidemiology Task Force**

# Limited data on burden, exposures, and clinical characteristics of monkeypox in children & adolescents

- Background:
  - Previous evidence: severe disease in young children
  - Limited data from current outbreak

- Methods
  - Children & adolescents aged <18 years, May 17 – Sept 24
    - Compatible symptoms &
    - Positive PCR test result
  - Excluded cases with high Ct values (≥34) AND
    - Atypical clinical features or no known epi link
  - Age strata: 0–12 yrs, & 13–17 yrs



# Epidemiological characteristics

# May 17th – September 24th: 83 monkeypox infections in children and adolescents in US

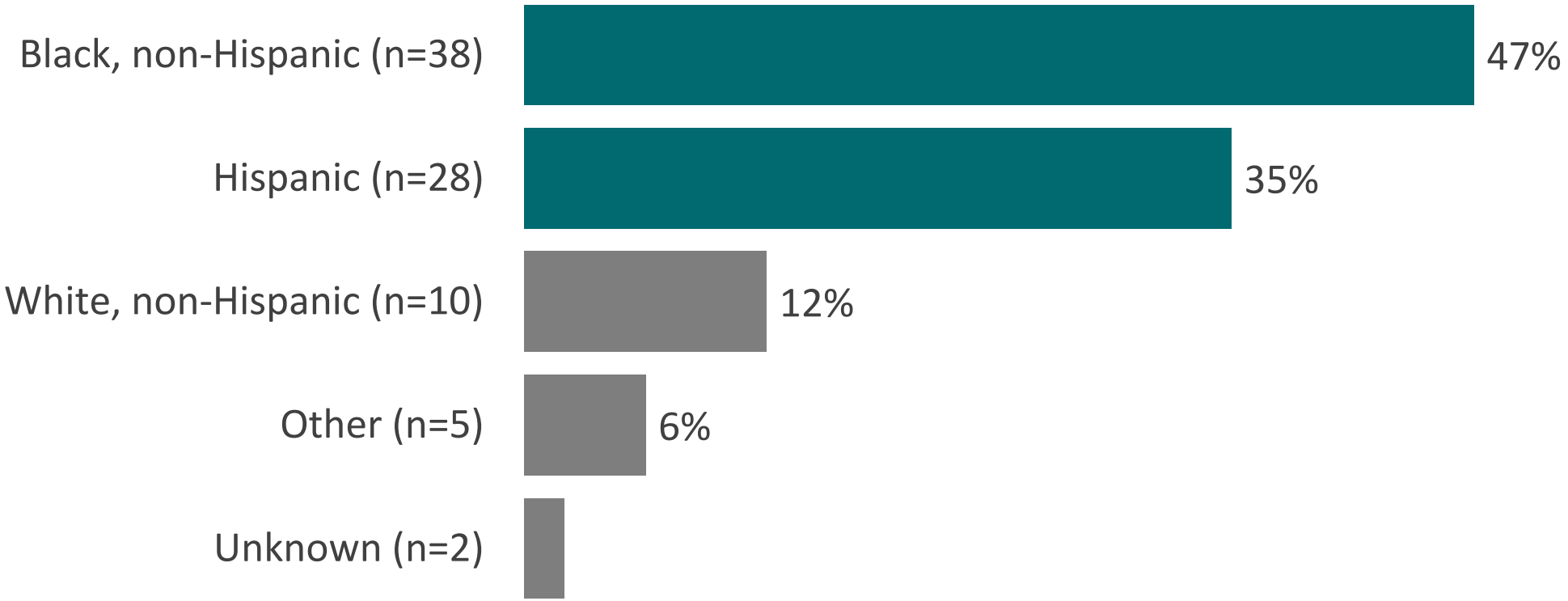
- 28 children 0 – 12 years
  - 18 (66%) male at birth
- 55 adolescents 13 – 17 years
  - 48 (89%) male at birth

# Monkeypox was rare in children and adolescents

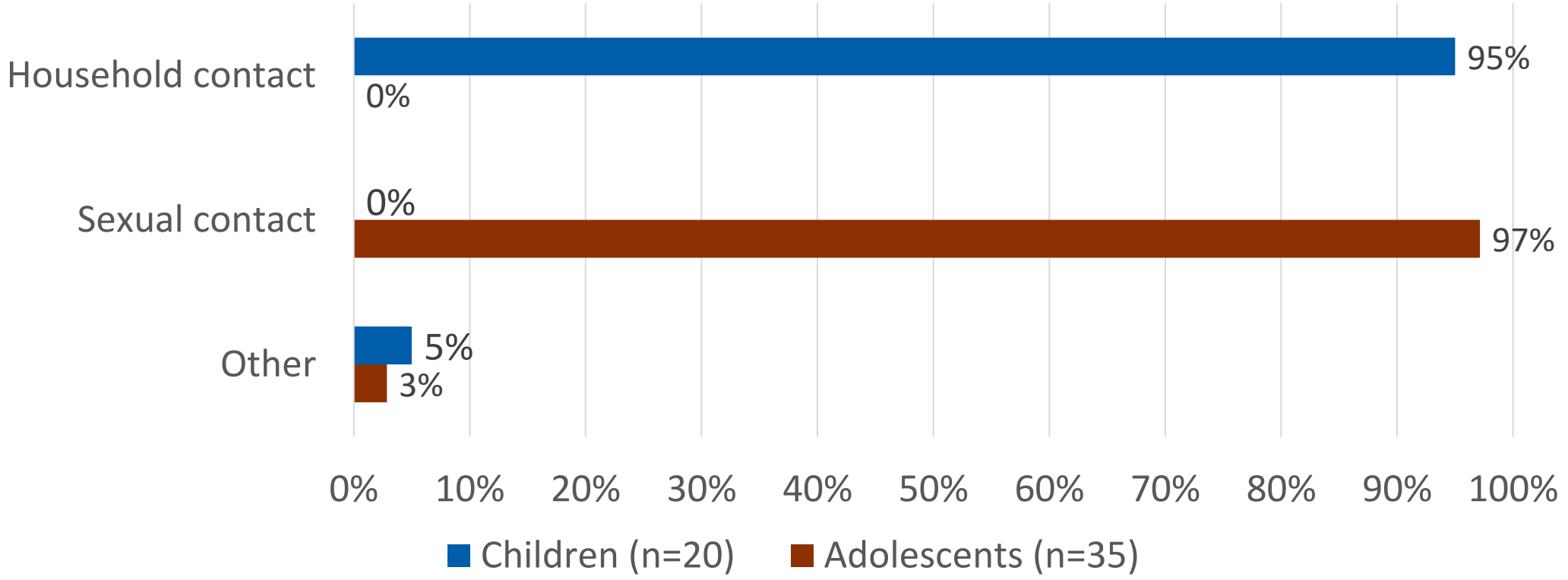
0.3%

of all US cases during time period

# >80% of cases were in Black and Hispanic children & adolescents



# Most likely exposure routes: Household contact for children, sexual contact for adolescents

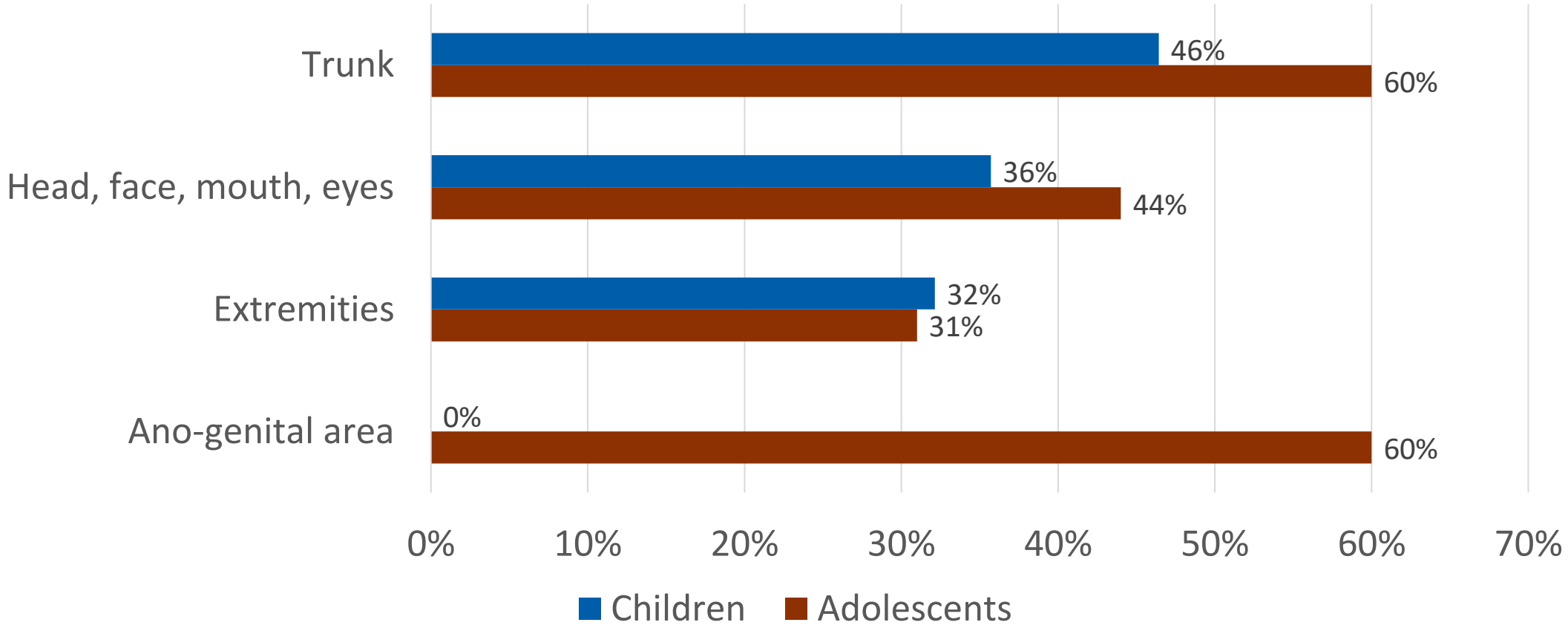


# Clinical characteristics

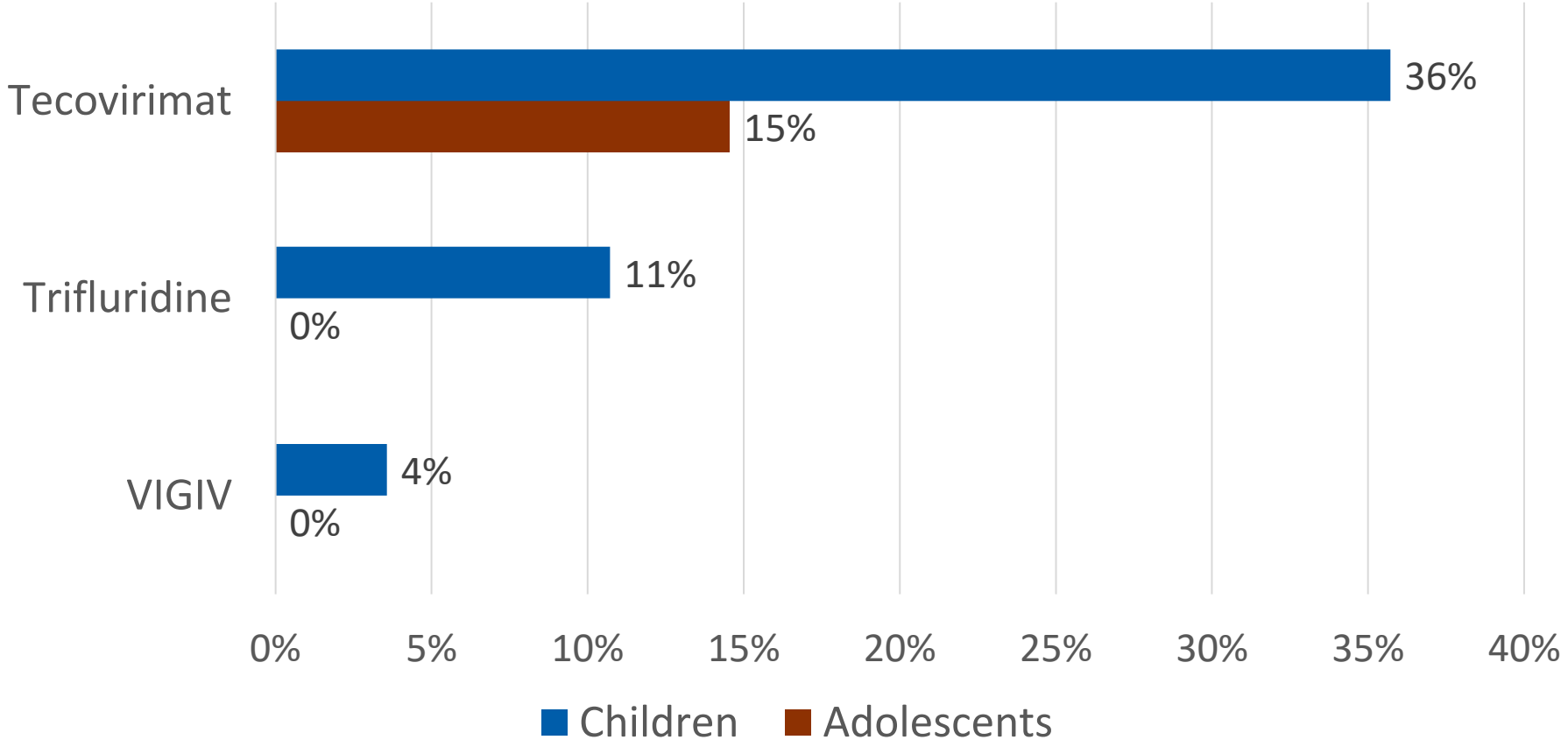
# Symptoms

- 100% had rash
- 20% - 40% reported fever, malaise, lymphadenopathy
- Fever, malaise, lymphadenopathy somewhat more common in adolescents

# Lesion locations differed by age group



# Most did not receive monkeypox-directed treatments; tecovirimat more common in young children



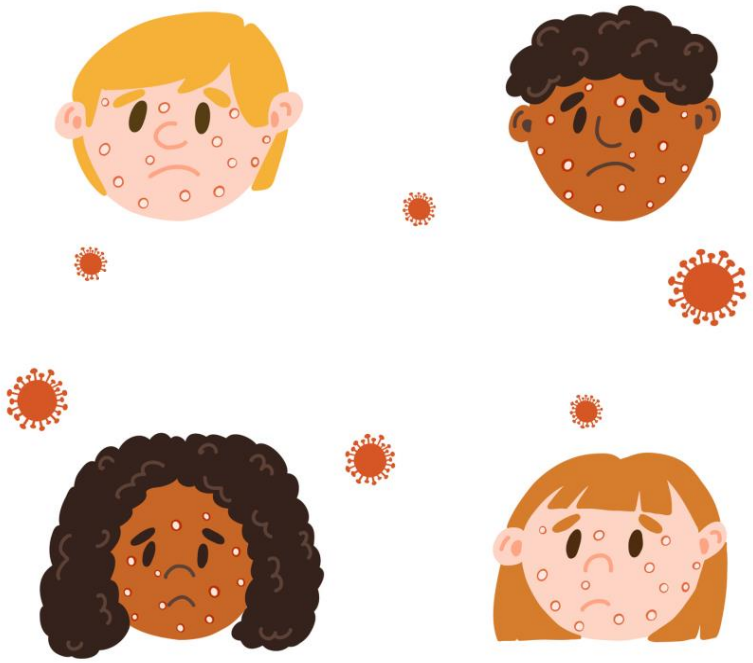
# 11% were hospitalized; none required critical care

- 9 children and adolescents hospitalized (11%)
  - 3 children 0 – 12 years
  - 6 adolescents
- No critical illness, no deaths
- All hospitalized patients discharged and recovered

# Conclusions & public health implications

# Conclusions

- Monkeypox was rare and generally not severe in children and adolescents
- Black and Hispanic children and adolescents were disproportionately affected
- Household exposures most common for younger children, sexual exposures most common for older adolescents
- Limitations: missing exposure data, social desirability bias, case ascertainment



# Public health implications

- Improve equitable access to prevention, testing, & treatment
- Provide prevention info for caregivers with monkeypox caring for young children:
  - Household prevention (e.g., isolation)
  - PEP for exposed children
- Clinicians caring for sexually active adolescents, especially MSM
  - Consider vaccination
  - Provide education on monkeypox prevention, HIV and STI testing

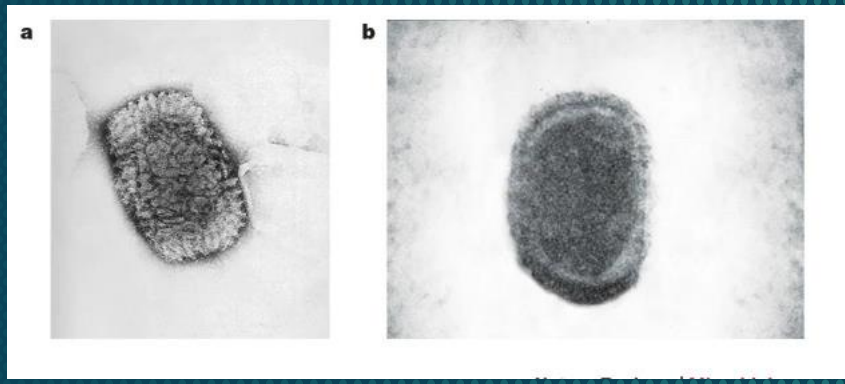
# Monkeypox — A Sobering Sentinel for Pandemic Preparedness and Sexual Health System Capacity

Matthew Golden, University of Washington

Public Health
Seattle & King County

# Monkeypox – ECDC/EACS Presentation

Matthew Golden, MD, MPH
Director, PHSKC HIV/STD Program
Professor of Medicine, University of Washington
Director, UW Center for AIDS and STD




Last Updated: November 22, 2022

UNIVERSITY of WASHINGTON
CENTER for AIDS & STD

# Overview

- Public Health Communications
- MPV as an STI
- Role of Sexual Health Clinics

# Creating Balanced Communication

- Multiple audiences
  - General public
  - Most affected population – men who have sex with men
- Sometimes conflicting motivations
  - Commitment to truthful and transparent communication
  - Desire to avoid stigmatizing populations that are the object of prejudice

# Public Health Communication

The Seattle Times

Health | Local News

## How we talk about monkeypox could protect lives

July 18, 2022 at 6:00 am | *Updated July 19, 2022 at 12:12 pm*

"What we understand from the epidemiology and the biology of viruses in general is that they're not unique to any particular social group. But that isn't the way that messaging is coming out to the general community," he said. For many people, Wallace said, it's coming across that "only gay men can get monkeypox."

**"I think we need to really take a collective pause here on how we're communicating this and really think about this from an equity lens — as well as the anti-stigma lens — to ensure that we're not perpetuating the same sorts of stigmas that we saw with the early HIV epidemic,"**

The Washington Post
*Democracy Dies in Darkness*

Sadly, state and local public health departments in the United States are failing to report to the CDC vital demographic details about people diagnosed with monkeypox. This stymies the nation's capacity to respond to the outbreak with impactful interventions, such as targeted vaccines, and to promote health equity.

**Gay men deserve to hear the unvarnished truth about monkeypox so we can take action accordingly. We're adults. Please be honest with us.**

# Creating Balanced Communication

- Difficult dilemma
- Truth and transparency are sacrosanct values
  - Public health under attack for not being clear enough with the public
  - These attacks and this controversy should reenforce our commitment to clear communication unvarnished by speculation about what some part of the population might do with the information

# Is Monkeypox an STI?

- What's an STI?
- In most instances, sex involves close contact
- The idea that an infection is an STI or not an STI is not exactly right
  - Many infections that are not usually transmitted through sex can be transmitted through sex – Shigella, Hepatitis C, Ebola, Zika
  - Some infections we think of as STIs can be transmitted via other means
    - HIV/syphilis/Hepatitis B – Can be transmitted through blood and from mother to child
    - Syphilis and perhaps gonorrhea can be transmitted through kissing
- **Would we have this outbreak in the absence of sex?**

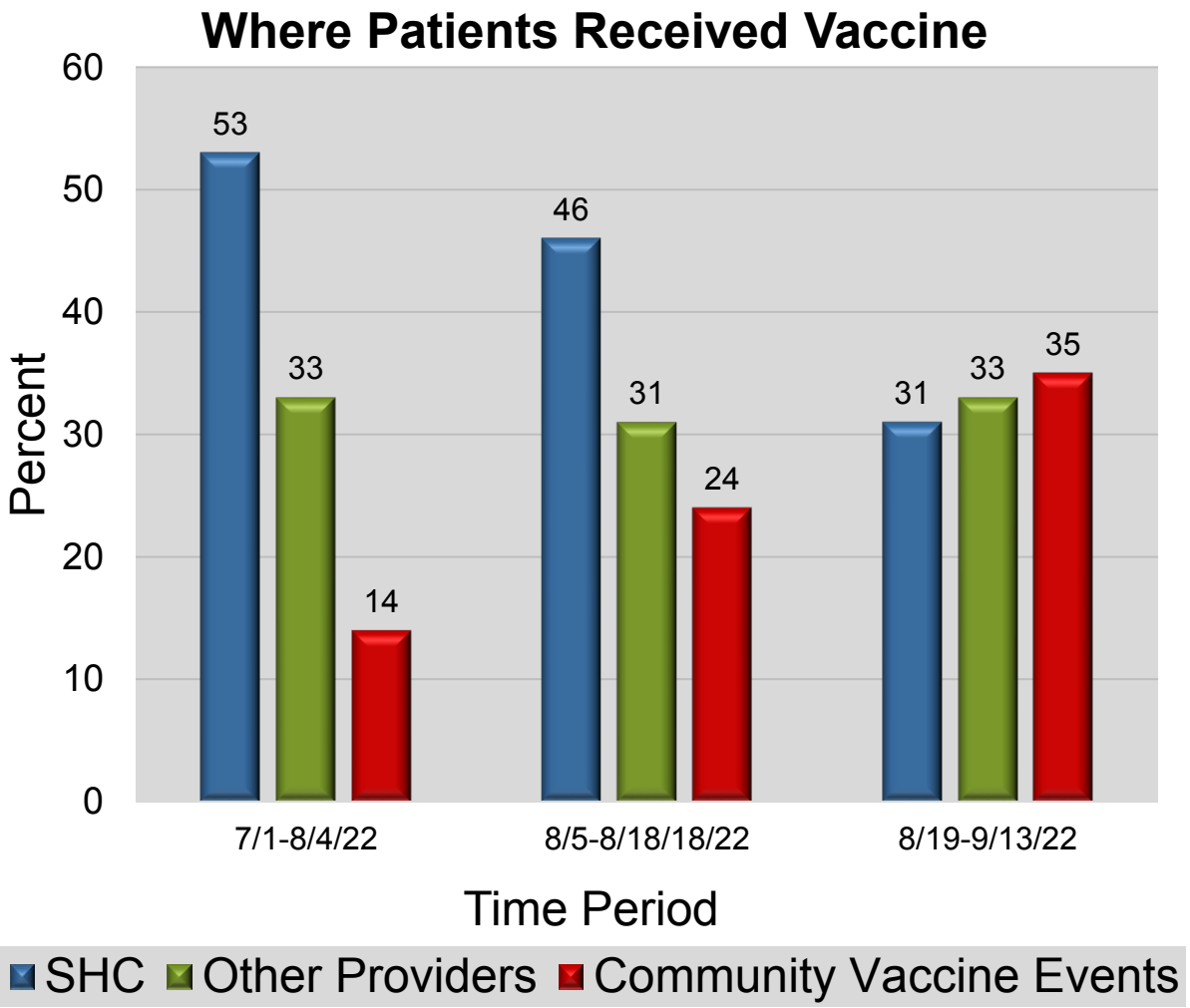
# Role of Sexual Health Clinics

- Sexual health clinics – walk-in clinics that provide STI evaluation and treatment
  - Availability of such clinics in the U.S. is highly variable
  - STI control often relies on primary care
- Monkeypox epidemic highlighted the critical role of these clinics

# King County, WA, USA Experience Diagnosis and Treatment

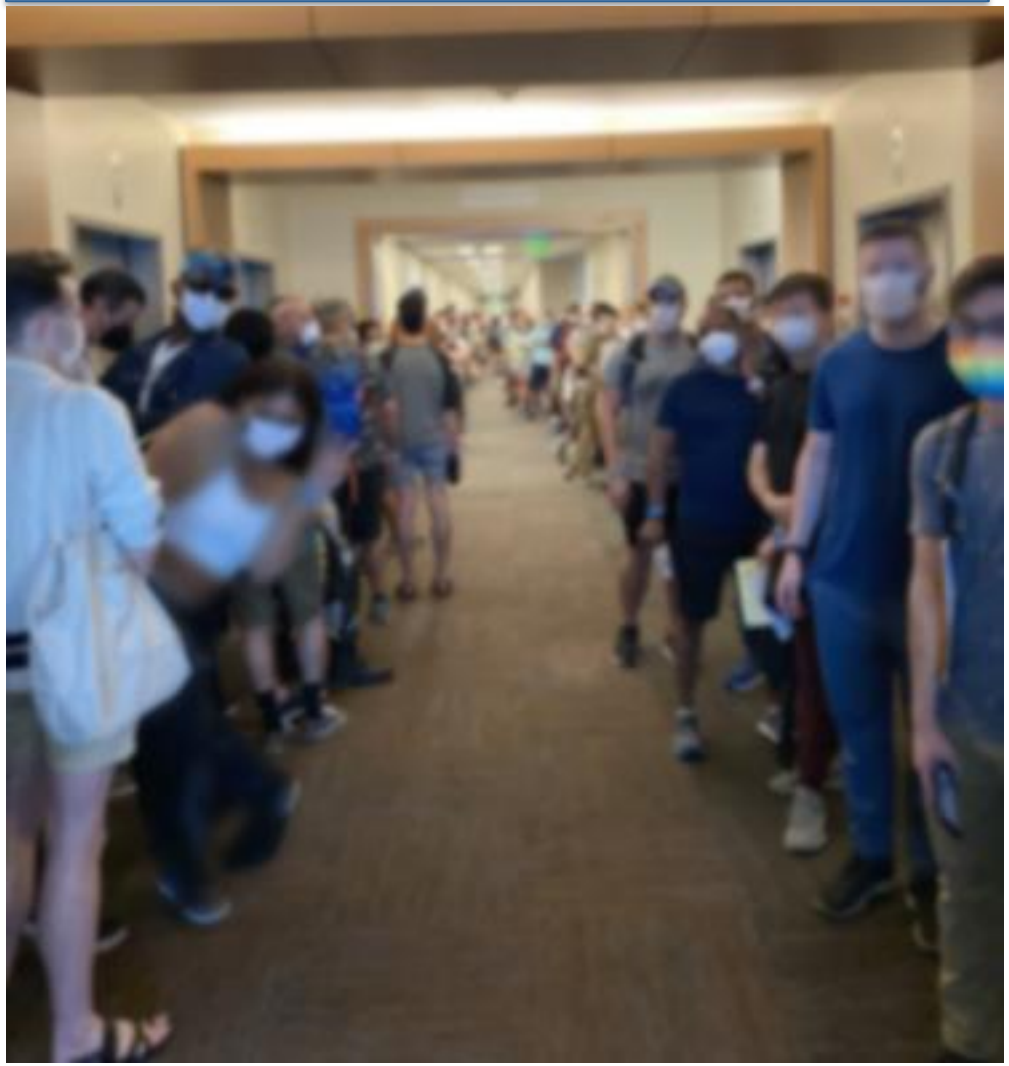
- Sexual health clinics – 36% of all cases diagnosed in a single sexual health clinic
  - Clinic able to get up and running much faster than community providers
- Tecovirimat
  - CDC criteria included persons with lesions on genitals, anus or mouth – most people
  - Among 464 cases county-wide, 66$+% were treated
    - 88% of sexual health clinic patients
    - ~50% of persons diagnosed elsewhere in King County
    - Most sexual health clinic patients treated empirically based on signs and symptoms

# King County, WA, USA Experience
# Vaccine Distribution




47% of All Vaccine Provided in the Sexual Health Clinic

PHSKC Sexual Health Clinic



# Conclusions

- Public health communications related to MPV were controversial – focus on truth and transparency
- In the context of the current pandemic, MPV is an STI
- MPV response highlights the importance of infrastructure dedicated to sexual health