justri.
www.justri.org

Mpox and HIV

a simple guide

JUSTRI is a UK-based not-for-profit organisation, dedicated to providing resources and education for those with and working with HIV and associated conditions. **www.justri.org**

justri.
www.justri.org

Written and compiled by Dr Mike Youle and Dr Nadia Ahmed

Additional contributions by Jane Akodu and Dr Cristiana Oprea

Cover image 2022 Monkeypox leaflets, montage by Geoff Sheridan

Design by Geoff Sheridan, **www.premonition.co.uk**

Special thanks to Brent Nicholls

Contents

Introduction

Welcome to this JUSTRI guide about monkeypox (now renamed Mpox) for people living with HIV infection (PLHIV) and healthcare professionals (HCPs) who care for them.

The aim of this guide is to provide information and advice for those at risk of catching Mpox who are living with HIV as well as guidance for those who are worried about if they have Mpox, with specific information on diagnosis, treatment, and care for HCPs they may be seeing.

We hope that this guide will be helpful for you to have a clearer understanding of the issues, and that by sharing the information that quality of care for Mpox will improve.

After this introduction, the guide is divided into four sections. The first gives basic information about Mpox, how it is transmitted and who is at risk. The second describes the symptoms and signs of Mpox, how it develops in those infected and how it is diagnosed and treated; also, important issues for PLHIV. The third section discusses the role of vaccines, with practical advice. The last section is designed to help HCPs best diagnose, care, and treat Mpox in PLHIV and has expanded information about the virus, how it presents and its treatment and prevention in this current epidemic.

HIV and Mpox is an area of constantly evolving information, so we have only referenced a few useful scientific findings in the text. However, there are many online sources that provide a wealth of information about the subject, there are hyperlinks throughout the guide and a weblink section (page 29). As with all printed information please check for up-dates to the guide, especially if reading this after December 2025; the latest version is online at **www.justri.org**.

We welcome comments, corrections and ideas or suggestions; please send them to **home@justri.org**.

SECTION ONE

Mpox - what is it and how might you catch it?

Mpox - what is it and how might you catch it?

Mpox, also known as monkeypox, is a viral infection caused by the monkeypox virus. It causes fever, a painful blistering rash which scabs over, and sometimes leads to more serious illness and occasionally death.

It was originally discovered in monkeys kept for research in Denmark in 1958, with the first case in humans seen in 1970 in the Democratic Republic of Congo (DRC), with episodic further outbreaks in other central and western African countries until the present day.

In May 2022, a new much larger outbreak of Mpox infections appeared suddenly, and rapidly spread across Europe, the Americas and then to over 100 other countries. This global outbreak has affected primarily (but not only) gay, bisexual, and other men who have sex with men (MSM) and has spread person-to-person through sexual networks.

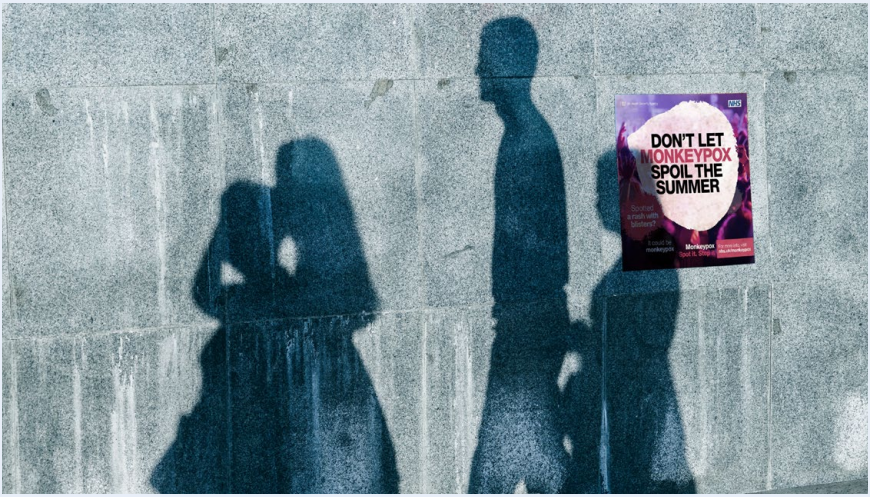
How is Mpox spread?

Mpox spreads from person to person, although not particularly easily. The virus enters the body through broken skin (even if not visible), the lungs, or the moist body surfaces (eyes, nose, or mouth, genitals) by:

- Contact with an infected person's rash, scabs, or body fluids – This seems to be the main way the infection is spreading during this global outbreak, and mostly through sexual activity.
- Contact with something that has touched an infected person – For example, if fluid from a person's rash gets on clothing, bedding, or sex toys, it is possible for the infection to spread if the items come in contact with broken skin or a person's genitals, anus, mouth, or eyes.
- Droplets from the lungs when kissing, of if someone with Mpox coughs or sneezes close to you.

It is also possible for someone who is pregnant and catches Mpox to pass the infection to their baby.

A person with Mpox can spread it to others from the time symptoms start until the rash has fully healed and a fresh layer of skin has formed. It also seems that some people can spread the infection to others from one to four days before their symptoms appear. The virus that causes Mpox is not as contagious as the virus that causes coronavirus disease (COVID-19), and you are unlikely to get it by being near someone unless you have direct contact with their skin or are face-to-face for a long time.

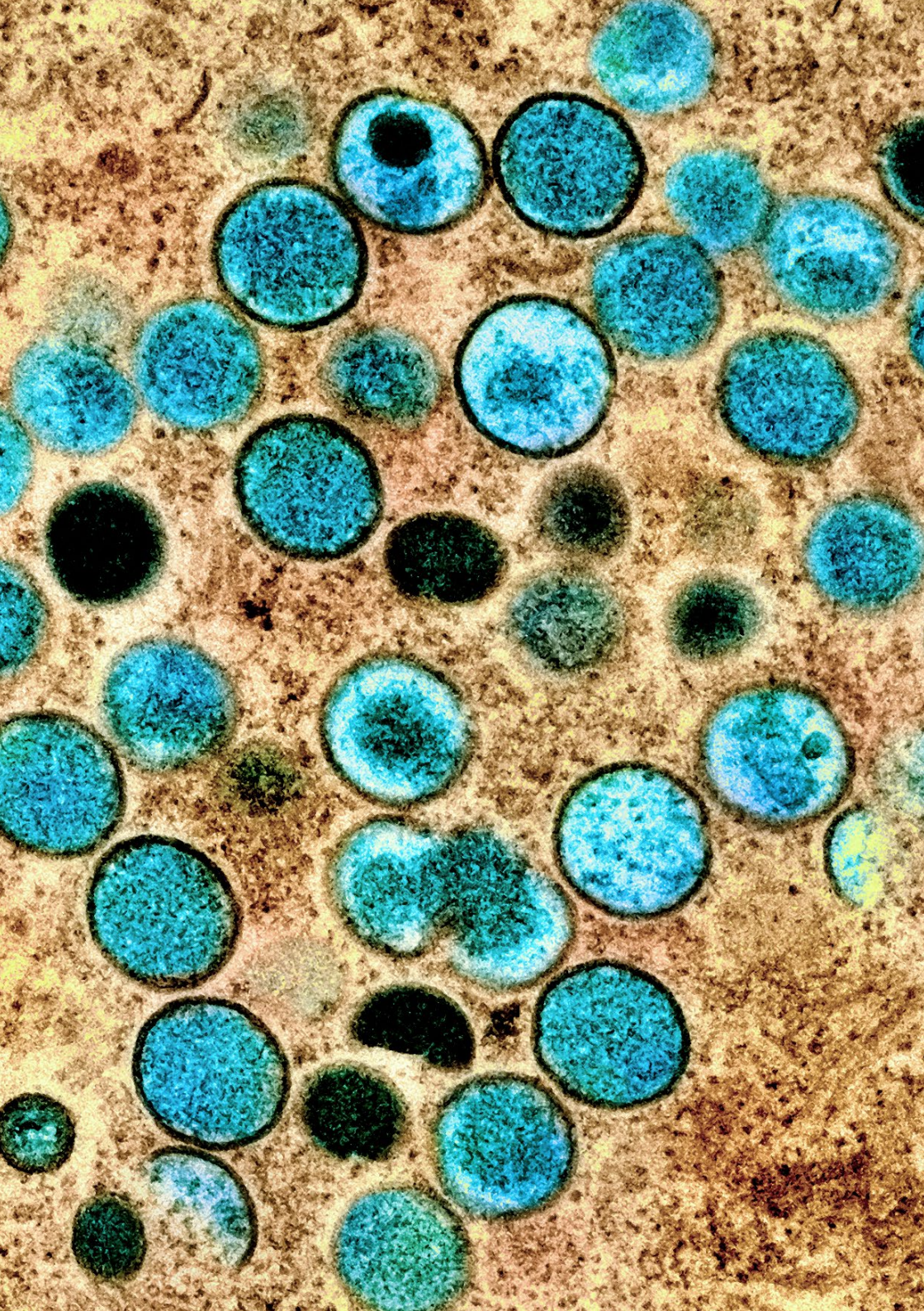


Who is at risk for Mpox?

Anyone can get Mpox if they have close contact with someone who is infected. During the recent outbreak, many of those infected were men who have sex with men (MSM), with a high proportion of PLHIV, but it is important to know that anyone can get the infection, no matter their sex, gender identity, sexual orientation, or sex practices. Thinking of Mpox as something that only affects certain people or groups is inaccurate and harmful.

SECTION TWO

How does Mpox affect you?
A guide for people at risk



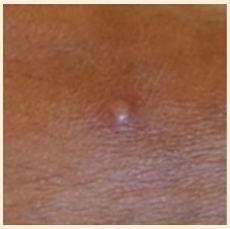
What are the symptoms or signs of Mpox infection?

Symptoms usually start between five and thirteen days after a person is infected with the virus. Some people have a few days of feeling sick or tired, similar to the flu.

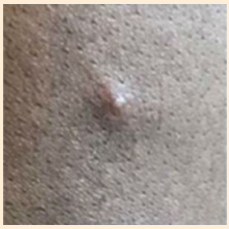
Symptoms can include fever, headache, feeling very tired, muscle aches or back pain, and swollen lymph nodes, which are the lumps in your groin and armpits that filter infections. However some people have none of these initial signs. For many, the Mpox rash is the first evidence of illness occurring within two weeks of them being infected. It usually:

- looks like pimples or blisters, which start as a few small spots, then more appear (*Figure 1*). Often people notice the rash first around the genitals or anus, which then spreads to other areas such as the inside of the mouth, hands, feet, and other parts of the body.
- these blisters are painful and can fill with fluid then pop, dry up and form scabs, which may be very itchy, eventually falling off over two or three weeks.

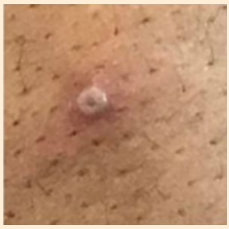
Figure 1 - *Mpox rash development over time*



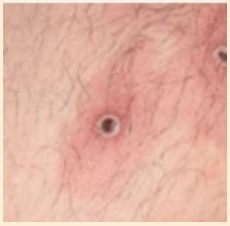
1. *Early vesticle, 3mm*



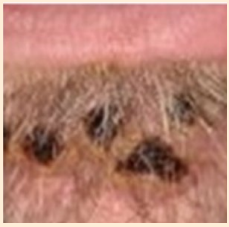
2. *Small pustule, 2mm*



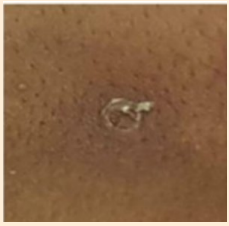
3. *Umbilicated pustule, 3-4mm*



4. *Ulcerated skin lesion, 5mm*



5. *Crusting of mature lesions*



6. *Partially removed scab*

Sometimes, people with Mpox also get other symptoms, such as:

- pain, swelling, and bleeding around, or inside, the anus.
- a sore throat which can make it painful or hard to swallow, eat or drink.
- eye symptoms such as swelling, irritation, pain, or trouble seeing clearly.

WHAT SHOULD I DO IF I THINK I HAVE BEEN EXPOSED?

If you have had close contact with someone who has or recently had Mpox, you should tell your doctor or nurse, even if you do not have any symptoms. They can tell you what to do next. This might include monitoring yourself for symptoms for three weeks, avoiding close contact or sex with others during this period and getting vaccinated.

WHAT SHOULD I DO IF I HAVE SYMPTOMS?

If you have any of these symptoms or a rash you are concerned about, call or visit your HIV clinic or local sexual health service, if available. They will ask you questions and examine you. If possible, avoid close contact or sex with others until you have been seen by a doctor or nurse.

IS THERE A TEST FOR MPOX?

Yes. If your doctor or nurse thinks that you might have Mpox, they will use a swab to take a sample of your rash. They will send it to a laboratory for testing to look for the Mpox virus. In some cases, they might also do blood tests or take a biopsy (small piece of skin or body tissue).

IS THERE TREATMENT FOR MPOX?

Yes. Mpox can cause various symptoms as well as complications. Treatment includes medicines to manage the symptoms e.g., paracetamol for fevers and pain, anti-histamines for itching and sometimes antibiotics for associated infections. If you are seriously ill, you will be admitted to hospital. There is also an antiviral treatment for Mpox called tecovirimat given as a course of capsules twice daily for 14 days to treat the virus if you have severe symptoms.

How to reduce spreading Mpox and simple treatments

Things to do

- stay home and in your own room if possible
- wash hands often with soap and water or hand sanitizer, especially before or after touching sores
- wear a mask and cover lesions when around other people until your rash heals
- keep skin dry and uncovered (unless in a room with someone else)
- avoid touching items in shared spaces and disinfect these areas frequently
- use saltwater rinses for sores in the mouth
- take baths or warm baths with baking soda or Epsom salts for body sores
- take over-the-counter medications for pain like paracetamol or ibuprofen.

Things not to do

- pop blisters or scratch sores, which can slow healing, spread the rash to other parts of the body, and cause the rash to become infected
- shave areas with sores until scabs have healed and you have new skin underneath (this can spread the rash to other parts of the body).

CAN I GET RE-INFECTED WITH MPOX?

It is not yet clear whether someone can get re-infected with Mpox. However, if you develop any symptoms suggestive of Mpox you should again call or visit your doctor, nurse, or sexual health service.

WHEN CAN I START HAVING SEX AGAIN?

It is not known how long Mpox remains in body fluids. After self-isolation has ended, condoms are recommended for 12 weeks after the rash has scabbed over and the scabs have fallen off.

Mpox in people living with HIV (PLHIV)

Since the beginning of this outbreak, more than 85 000 Mpox infections have been reported in 110 countries mainly in MSM. People living with HIV have accounted for between 38% and 50% of these cases.

For those with high CD4 cell counts and undetectable viral loads, illness with Mpox seems no different than people without HIV infection. However, in people who are sicker with their HIV, with low CD4 counts and or high viral loads, Mpox seems to be much more serious and in some cases has been fatal.

In a recent study, **www.pubmed.ncbi.nlm.nih.gov/36828001/**, a network of doctors from nineteen countries looked at confirmed Mpox cases between May 2022, and January 2023, in adults with HIV infection and a CD4 cell count of less than 350 cells/mm^3 or, in places where CD4 counts were not available, an AIDS diagnosis. Of the 382 cases in the study, 91% were already diagnosed with HIV and of those around 65% were on HIV treatment with an undetectable viral load. In those that had CD4 cell counts less than 100, severe complications were much commoner, including necrotising skins lesions, lung involvement, secondary infections and infections spreading to blood causing sepsis. About one third of all the cases needed to be admitted to hospital, and twenty-seven people died, all with a CD4 count less than 200 and mostly with a high viral load.

More recent reports from the United States of America (USA) have shown similar findings; 47 cases of severe Mpox in those with advance uncontrolled HIV infection, required hospitalisation, had prolonged Mpox illness, developed complications and five people died; more severe rectal disease was also commoner. However, even those without HIV may be seriously ill and need hospital care, as a UK study showed in which only 30% of 156 individuals hospitalsied with Mpox were PLHIV, see **www.pubmed.ncbi.nlm.nih.gov/36566771/**.

SECTION THREE

Vaccination to prevent or treat Mpox

Vaccination to prevent or treat Mpox

Mpox is caused by a similar virus to smallpox, so a smallpox vaccine (also called MVA vaccine in Europe) is used to protect against or treat early Mpox.

The vaccine dose, number of doses, frequency of doses and type of injections has changed over time due to the availability of the vaccine. Usually, two doses are recommended one month to three months apart. If you ever had the smallpox vaccine, then only a single dose of the Mpox vaccine is needed. Your doctor, nurse, or local sexual health service (if available) can talk to you about the vaccine and your options. Even if you get the vaccine, it is still important to avoid close contact with someone who has Mpox.

Experts recommend vaccination before potential exposure to Mpox for people who might be at higher risk. This is called "pre-exposure prophylaxis."

You might choose this if you are MSM or think you are at risk of Mpox, with or without HIV, and if in the last six months you have had:

- a sexually transmitted infection such as, chlamydia, gonorrhoea, or syphilis
- multiple sexual partners
- sex at a sex club or bathhouse or at an event or place where there have been cases of Mpox
- any sexual partners with any of the risks listed above.

Vaccination is also recommended for anyone exposed to the virus or have likely been exposed to it. This is called "post-exposure prophylaxis." To work, the vaccine needs to be given before any symptoms start.

You might choose this if you have had close contact with someone who had Mpox in the last 2 weeks. This could be through:

- kissing or cuddling, oral, anal, or vaginal sex, touching the person's rash, scabs, or body fluids
- touching something that touched the person's rash, scabs, or body fluids (like clothing, bedding, or sex toys).

Or if you are MSM or think you are at risk, and have done any of the following in the last 2 weeks:

- had sex with multiple partners or in a group
- had sex at a sex club or bathhouse or at an event or place where there have been cases of Mpox.

You can still get the vaccine if you have had confirmed Mpox, but once you have fully recovered.

SECTION FOUR

Mpox in PLHIV for healthcare professionals

Mpox in PLHIV for healthcare professionals

This section is more detailed and designed to support the effective diagnosis, treatment, and prevention of Mpox.

MPOX - KEY FACTS

- Mpox infection is caused by a virus, from the orthopoxvirus genus in the family poxviridae.
- It is a viral zoonotic disease that occurs primarily in tropical rainforest areas of central and west Africa, but has recently spread globally in a series of outbreaks.
- Mpox is transmitted to humans through close contact with an infected person or animal, or with material contaminated with the virus.
- Mpox virus spreads from one person to another via lesions, body fluids, respiratory droplets, and contaminated materials such as bedding.
- Monkeypox typically presents clinically with fever, rash and swollen lymph nodes and may lead to a range of medical complications.
- Mpox is usually a self-limited disease with the symptoms lasting from 2 to 4 weeks. Severe cases can occur, and may require hospital admission. In the recent outbreak the case fatality ratio is <1%.
- Only one antiviral agent, tecovirimat, has been approved for the treatment of monkeypox.
- The clinical presentation of monkeypox resembles smallpox, a related orthopoxvirus infection which was declared eradicated worldwide in 1980. Monkeypox is not as contagious as smallpox and causes less severe illness.
- Several vaccines are available for the prophylaxis and prevention of Mpox.

Mpox - the history and background

BACKGROUND

Mpox is an enveloped double-stranded DNA virus. Three clades of Mpox (monkeypox) virus are recognized: Clade I is present in the Congo Basin, has a 10% mortality rate, and is transmitted by rodents with little human-to-human spread; clade IIa exists in West Africa, has a low mortality, and is also a zoonosis; clade IIb is currently spreading globally by human transmission.

The clinical presentation of Mpox resembles that of smallpox, a related orthopoxvirus infection, which was more easily transmitted and more often fatal as about 30% of patients died. The last case of naturally acquired smallpox occurred in 1977, and by 1980 smallpox was declared to have been eradicated worldwide after a global campaign of vaccination and containment. It has been more than 40 years since all countries ceased routine smallpox vaccination with vaccinia-based vaccines. This vaccine also protects against Mpox, reflected in the current outbreak with low rates of Mpox in older individuals who would have usually been vaccinated against smallpox.

Whereas smallpox no longer occurs naturally, the global health sector remains vigilant in the event it could reappear through natural mechanisms, laboratory accident or deliberate release. To ensure global preparedness in the event of re-emergence of smallpox, newer vaccines, diagnostics, and antiviral agents have been and continue to be developed which may also prove useful for prevention and control of Mpox.

NATURAL HOSTS OF MPOX

Various animal species have been identified as susceptible to Mpox virus. These includes rope squirrels, tree squirrels, Gambian pouched rats, dormice, non-human primates, and other species. Uncertainty remains on the natural history of Mpox virus and further studies are needed to identify the exact reservoir(s) and how virus circulation is maintained in nature.

OUTBREAKS

Mpox was first identified in humans in 1970 in the Democratic Republic of the Congo in a 9-month-old boy from an area where smallpox had been eliminated in 1968. Since then, human cases of have been reported in eleven African countries: Benin, Cameroon, the Central African Republic, the Democratic Republic of the Congo, Gabon, Cote d'Ivoire, Liberia, Nigeria, the Republic of the Congo, Sierra Leone, and South Sudan; the true burden of Mpox is unknown. These African outbreaks continue to this day and vary in

transmission rates and mortality, which ranged from 0-11% in the early years and more recently 3-6%, such as in the outbreak of 2017 in Nigeria with more than 500 suspected Mpox cases and over 200 confirmed cases.

Mpox is a disease of global public health importance as it not only affects countries in west and central Africa, but the rest of the world. In 2003, the first Mpox outbreak outside of Africa was in the USA linked to contact with infected pet prairie dogs, which had been housed with imported Gambian pouched rats and dormice; this led to over seventy cases of Mpox. From 2018 to 2021, sporadic recent West African travel related Mpox cases were reported in Israel, the UK, the USA, and Singapore. The current global outbreak started in May 2022, when multiple cases of Mpox were identified in several non-endemic countries.

TRANSMISSION

Animal-to-human (zoonotic) transmission of Mpox can occur from direct contact with the blood, bodily fluids, or cutaneous or mucosal lesions of infected animals. Although the natural reservoir of Mpox has not yet been identified rodents are the most likely. Eating inadequately cooked meat and other products of infected animals is a possible risk factor. People living in or near forested areas may have indirect or low-level exposure to infected animals.

Human-to-human transmission results from close contact with respiratory secretions, skin lesions of an infected person or recently contaminated objects. Transmission via droplet respiratory particles usually requires prolonged face-to-face contact, which puts health workers, household members and other close contacts of active cases at risk. The longest documented chain of transmission in a community has risen in recent years from 6 to 9 successive person-to-person infections, which may reflect declining herd immunity due to cessation of smallpox vaccination. Transmission can also occur via the placenta from mother to foetus (congenital Mpox) or through contact during and after birth. While close physical (or sexual) contact is a well-known risk factor for transmission, it is unclear at this time if Mpox can be transmitted specifically through sexual transmission routes, although a high proportion of current cases appear to be contracted in sexual situations, especially in MSM. Research is ongoing to better understand this question as the Mpox epidemic evolves.

Mpox – signs and symptoms

The incubation period (interval from infection to onset of symptoms) of Mpox is usually from 6 to 13 days, but can range from 5 to 21 days. The course of the illness in most cases can be divided into two phases:

1 INVASION

Invasion lasts between 0–5 days and is characterized by fever, intense headache, lymphadenopathy (swelling of the lymph nodes), back pain, myalgia (muscle aches) and intense asthenia (lack of energy). Marked, painful lymphadenopathy is a distinctive feature of Mpox compared to other similar infections such as chickenpox, measles, or smallpox.

2 SKIN ERUPTION

This usually begins within 1–3 days of appearance of fever. The rash tends to be more concentrated on the face and extremities rather than on the trunk. It affects the face (95% of cases), and palms of the hands and soles of the feet (75%). Also affected are oral mucous membranes (70% of cases), genitalia (30%), and conjunctivae (20%), as well as the cornea. The rash evolves sequentially from macules (lesions with a flat base) to papules (slightly raised firm lesions), vesicles (lesions filled with clear fluid), pustules (lesions filled with yellowish fluid), and crusts which dry up and fall off. The number of lesions varies from a few to several thousand. In severe cases, lesions can coalesce until large sections of skin slough off.

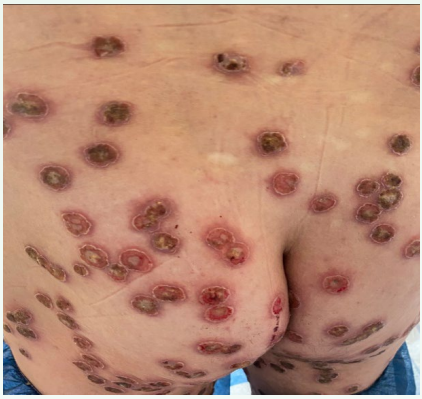
Mpox is usually a self-limited disease with the symptoms lasting from 2 to 4 weeks. Severe cases appear to be related to the extent of virus exposure, patient health status and nature of complications. A fulminant form of Mpox is characterised by massive necrotising skin, genital and non-genital cutaneous and mucosal lesions and is sometimes accompanied by lung involvement with multifocal nodular opacities or respiratory failure, and severe cutaneous and bloodstream secondary bacterial infections. Complications of Mpox can include secondary infections, bronchopneumonia, sepsis, encephalitis, and infection of the cornea with ensuing loss of vision. The extent to which asymptomatic infection may occur is unknown. Underlying immune deficiencies may lead to worse outcomes (see section on PLHIV). Immune reconstitution inflammatory syndrome to Mpox has also been suspected in 21 out of 85 cases of Mpox in PLHIV initiated or re-initiated in antiretroviral therapy, of whom 12 died. The case fatality ratio of Mpox in the current global outbreaks is <1%, although this may reflect better access to high quality healthcare than those in earlier outbreaks.

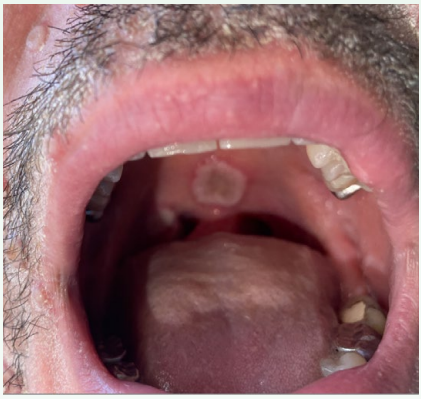
Mpox – diagnosis, treatment and care

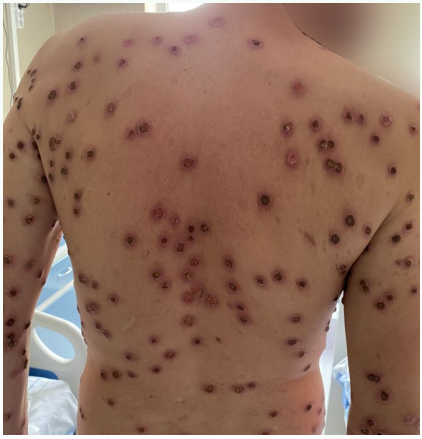
DIAGNOSIS

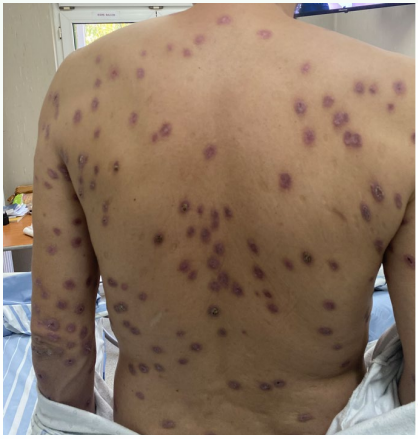
The clinical differential diagnosis to be considered includes other rash illnesses, such as chickenpox, measles, bacterial skin infections, scabies, syphilis, and medication-associated allergies.
Lymphadenopathy, often painful, during the prodromal stage of illness can be a clinical feature to distinguish Mpox from these conditions.

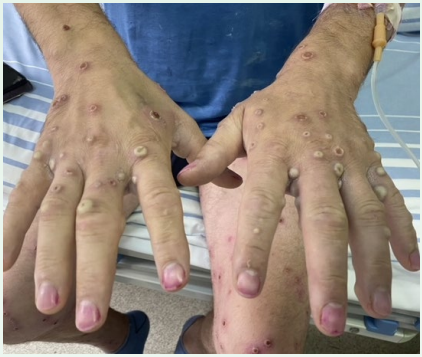
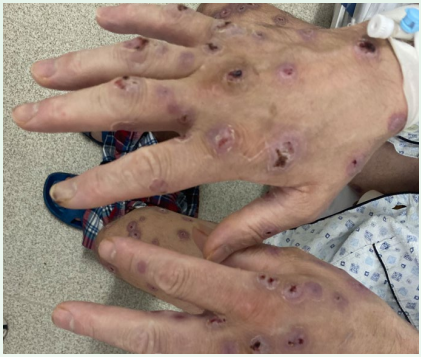
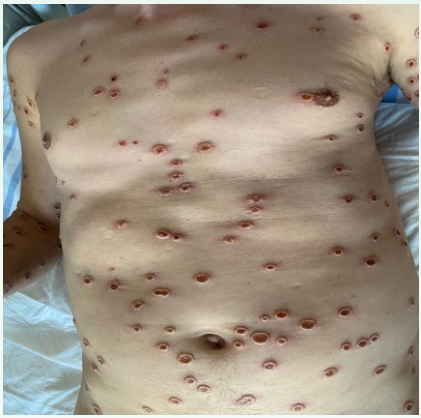
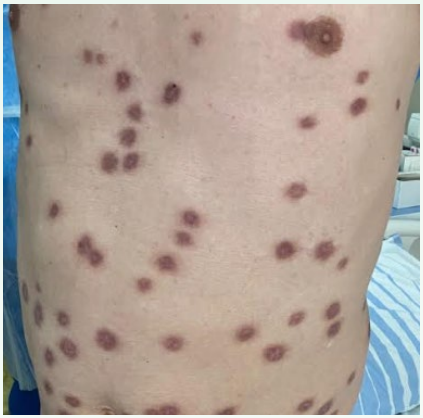
CASE REPORT PICTURES









PERSONAL PROTECTIVE EQUIPMENT

If Mpox is suspected, health workers should wear a medical mask, apron, and gloves. The patient should be placed in a single-person room (special air handling is not required), with the door kept closed if safe to do so, and movement in and out of the room limited to medically essential needs. If the patient needs to go outside of the room, they should wear a medical mask and any exposed lesions covered with a sheet or gown. Standard cleaning and disinfection procedures should be performed after the room has been used, with hospital disinfectant with an emerging viral pathogen claim. Other cleaning requirements should follow standard practice.

For confirmed cases of Mpox requiring ongoing clinical management (for example inpatient care or repeated assessment of an individual who is clinically unwell or deteriorating), the minimum recommended protection for healthcare workers is a fit-tested FFP3 respirator, eye protection, a long sleeved, fluid repellent, disposable gown, and gloves.

SAMPLING

The healthcare worker should collect an appropriate sample and have it transported safely to a laboratory with suitable capability. Confirmation of Mpox depends on the type and quality of the specimen and the correct laboratory test. Thus, specimens should be packaged and shipped in accordance with national and international requirements. Polymerase chain reaction (PCR) is the preferred laboratory test, given its accuracy and sensitivity. For this, optimal diagnostic samples for Mpox are from skin lesions – the roof or fluid from vesicles and pustules, and dry crusts. Where feasible, biopsy is an option. Lesion samples must be stored in a dry, sterile tube (no viral transport media) and kept cold. PCR blood tests should not routinely be taken as they are usually inconclusive due to the short duration of viremia after symptoms begin.

As orthopoxviruses are serologically cross-reactive, antigen and antibody detection methods do not provide Mpox-specific confirmation. Serology and antigen detection methods are therefore not recommended for diagnosis or case investigation where resources are limited. Additionally, recent, or remote vaccination with a vaccinia-based vaccine such as those vaccinated before smallpox eradication can lead to false positive results.

In order to interpret test results, it is critical that patient information be provided with the specimens including date of onset of fever, date of onset of rash, date of specimen collection, current status of the individual (stage of rash), and age.

TREATMENT AND CARE

Clinical care for Mpox should be fully optimized to alleviate symptoms as needed e.g., analgesia, anti-histamines, laxatives and to manage complications such as second bacterial infections, and prevent long-term sequelae. Other measures such as salt baths and avoiding plasters can be helpful too. Patients should be given fluids and food to maintain adequate nutritional status. Admission to an inpatient unit might be needed according to the severity of the symptoms and complications.

Patients should also be advised to isolate at home if possible or in hospital if needed, for the duration of the infectious period i.e., onset of symptoms until lesions have healed and scabs fallen off. Covering lesions and wearing a mask may help prevent spread, but while condoms may reduce the risk of spread, they will not prevent it, so infected individuals should be advised to abstain or use condoms for 12 weeks after the skin lesions have completely healed.

Tecorivimat, an antiviral drug that was developed for smallpox was licensed by the European Medicines Agency (EMA) for Mpox in 2022 based on data in animal and human studies. It works by inhibiting the viral envelope protein p37 that is present and highly conserved (approximately 98% amino acid identity) in all orthopoxviruses. Inhibition of p37 prevents the formation and egress of enveloped virions, which are essential for orthopoxvirus virulence.

Tecovirimat is generally used where Mpox has been confirmed AND the patient is symptomatic AND has one or more symptoms of severe disease. Hypersensitivity to components within tecovirimat and a weight less than 13kg exclude its use. Dosing is according to body weight and given every 12 hours for 14 days. The most common side effects are headache (more than 1 in 10), nausea (up to 1 in 10). The special characteristics of product and/or package leaflet should be reviewed for further details on contraindications, special precautions, and side effects, see: **www.ema.europa.eu/en/medicines/human/EPAR/tecovirimat-siga**.

Suggested dosage for tecovirimat		
Body Weight	**Dosage**	**Number of Capsules**
13 kg to less than 25 kg	200 mg every 12 hours for 14 days	One tecovirimat 200mg capsule
25 kg to less than 40 kg	400 mg every 12 hours for 14 days	Two tecovirimat 200mg capsules
40 kg and above	600 mg every 12 hours for 14 days	Three tecovirimat 200mg capsules

METHOD OF ADMINISTRATION

Tecovirimat hard capsules are for oral use and should be taken within 30 minutes after a meal of moderate or high fat content to aid with drug absorption and increased plasma concentration.
For patients who cannot swallow tecovirimat hard capsules, the capsules may be opened and the contents mixed with approximately 30mls of liquid such as milk or soft food e.g. yoghurt and swallowed within 30 minutes of completing a meal.

RE-DOSING IN CASE OF VOMITING

If vomiting occurs within 30 minutes of taking Tecovirimat hard capsules, another dose may be administered immediately. If vomiting occurs more than 30 minutes after taking Tecovirimat hard capsules, no additional dose should be given and dosing should resume as usual after 12 hours.

OTHER ANTIVIRAL AGENTS

Other antiviral agents including brincidofovir (cidofovir pro-drug) approved by the US Food and Drug Administration (FDA) for use against smallpox and cidofovir usually used to treat cytomegalovirus infections, have been considered for use in for severe cases of Mpox but currently there is limited data on their use, see **www.thelancet.com/journals/laninf/article/PIIS1473-3099(22)00228-6/**.

Vaccinia Immune Globulin has been used for the treatment of complications related to the smallpox vaccine, but there is no data available on effectiveness and no proven clinical benefit in Mpox cases. However, the USA has considered its use in severe cases of Mpox where the development of a robust antibody response may be impaired, see **www.cdc.gov/poxvirus/mpox/data/VIGIV-Protocol.pdf**.

RE-INFECTION

At time of writing, there have been two cases of possible re-infection of Mpox, one in a PLHIV with an undetectable viral load and CD4 greater than 1000, and another in an individual without HIV. While the tests confirmed Mpox again, there is uncertainty of whether this was actually a re-infection, a relapse of the original Mpox infection or Mpox virus from the original infection that was still picked up from the testing, The posibility of re-infection is an area of ongoing study.

Mpox – vaccination and prevention

VACCINATION

In the past, vaccination against smallpox was also protective against Mpox, but today people younger than 40 to 50 years old (depending on the country) have no protection since global smallpox vaccination campaigns ceased after eradication of the disease. Several observational studies, suggest smallpox vaccination to be about 85% effective in preventing or minimising the severity of Mpox and animal challenge studies have shown similar results. Thus, prior smallpox vaccination may result in milder illness; evidence of prior vaccination against smallpox can usually be found as a scar on the upper arm.

At the present time, the original (first-generation) smallpox vaccines are no longer available to the general public. Some countries have stock-piled them, however, they are not recommended for Mpox as they do not meet current safety and manufacturing standards. Some laboratory personnel or health workers may have received a more recent smallpox vaccine to protect them in the event of exposure to orthopoxviruses in the workplace.

A second generation live attenuated replicating smallpox vaccine, ACAM2000, licensed by the USA FDA for immunization against smallpox, but has been made available for the prevention of Mpox under an expanded access programme for individuals who decide potential benefits of vaccination outweigh potential risks from ACAM2000 adverse events. Effectiveness of

ACAM2000 against Mpox is unknown, but it is suggested by one study that its precursor, the first-generation vaccine Dryvax, was 85% effective against monkeypox. Maximum immunity is reached 4 weeks after a single dose, administered by the percutaneous route (scarification) through 15 punctures with a bifurcated needle. A major cutaneous reaction by day 6-8, is considered as evidence of a successful 'take' and acquisition of protective immunity, followed by development of a scar. However, any prior smallpox vaccination may reduce the cutaneous response upon revaccination. Virus is shed from the vaccination site during the period starting with the development of a papule (day 2–5); shedding ceases when the scab separates and the lesion is re-epithelialized, about 14–21 days after vaccination.

Common side effects of ACAM2000 include inoculation site reactions (erythema, pruritus, pain and swelling), lymphadenitis and systemic reactions, such as malaise, fatigue, fever, myalgia, and headache. Serious adverse events associated with ACAM2000 include rare progressive vaccinia, generalized vaccinia, skin infections, erythema multiforme including Stevens-Johnson syndrome, and eczema vaccinium. Cardiac manifestations such as myocarditis and pericarditis and neurological manifestations, have postvaccine encephalitis, encephalomyelitis, or encephalopathy, have been reported. ACAM2000 is contraindicated for anyone with a history of a severe allergic reaction to vaccine components (vaccine contains neomycin and polymyxin B) or who has an immune deficiency disorder, eye disease treated with topical steroids, three or more major cardiac risk factors, atopic dermatitis/eczema or other acute or exfoliative skin conditions, pregnant or breastfeeding or under 12 months of age.

There are two third-generation vaccines that are currently used. The first, Modified Vaccinia Ankara-Bavarian Nordic (MVA-BN), is a live attenuated non-replicating smallpox vaccine approved as a smallpox vaccine in the European Union in 2013, with approval further extended to active immunization against both smallpox and monkeypox in the European Union in 2022. The vaccine is made available under several brand names (Imvanex®, Imvamune® or Jynneos®) in different markets across Europe.

MVA-BN is administered to adults as two 0.5 ml dose subcutaneous injections, separated by at least 28 days. Maximum immune response is reached 14 days after the second dose. The European Medicines Agency (EMA) has stated that national authorities may decide as a temporary measure to use Imvanex®, as an intradermal injection at a lower dose while supply of the vaccine remains limited. The USA FDA issued emergency authorization for such a dose-sparing strategy of 0.1 ml (one fifth of the vial) to be administered intradermally, based on results of an immunogenicity study on

healthy adults comparing this strategy against a standard subcutaneous dose, which has been adopted by some other countries in Europe. MVA-BN is characterized by its lower reactogenicity compared to other smallpox vaccines. The most common adverse reactions observed in clinical trials were injection site reactions, such as pain, erythema, swelling, induration and pruritus, and common systemic reactions, such as fever, headache, nausea, myalgia, chills, and fatigue, which were mild to moderate in intensity and resolved without intervention within seven days following vaccination. There are no specific contraindications to this vaccine other than serious allergy to a vaccine component, including egg/chicken protein, Serratia marcescens, gentamicin, ciprofloxacin, and trometamol. Following vaccination, persons with atopic dermatitis may experience more intense local skin reactions and other general symptoms, as well as a flare-up or worsening of their skin condition.

The second vaccine is LC16m8, a live attenuated replicating smallpox vaccine was licensed for active immunization against smallpox in Japan in 1975 and in 2022 the approval was extended for the prevention of Mpox. LC16m8 generates neutralizing antibody titres to multiple poxviruses, including vaccinia, monkeypox, and variola major, and broad T-cell responses, indicating that it may have efficacy in protecting individuals. LC16m8 is the only smallpox vaccine approved for use in infants and children. Maximum immunity is reached 4 weeks after a single 0.01 ml dose, administered by the percutaneous route (scarification). LC16m8 vaccine response is also characterized by development of a vesicular or pustular reaction ('take') at the site of inoculation, resulting in a pitted scar after 14–21 days. LC16m8 is characterized by lower virulence and replication competency than ACAM2000. The majority of vaccine recipients exhibit symptoms of local or systemic reactogenicity. Reported major reactions include axillary lymph node tenderness, tenderness at the inoculation site, swollen axillary lymph nodes and low-grade fever. Rare cases of rash, allergic dermatitis, and erythema multiforme suspected to have been caused by vaccination have been documented. Very rare cases of eczema vaccinatum, autoinoculation, vaccinia virus infection have been documented among 10 578 children, vaccinated in 1974, whose clinical symptoms could be observed. No specific clinical evaluation of LC16m8 in immunocompromised individuals and/or those suffering from active skin barrier disorders that are linked to immune function (e.g., eczema) is available, therefore the LC16m8 vaccine should be used with caution in any person who is immunocompromised, has atopic dermatitis, or who has experienced an allergic reaction to

any vaccine component. Anyone who is breastfeeding should consider continuation or discontinuation of breastfeeding basing on benefits and risks assessment. The vaccine is contraindicated in people who have an illness causing severe abnormality in immune function or are undergoing immune-suppressive treatments, have generalized skin disease, are pregnant or have ever experienced anaphylaxis due to the components of the vaccine including gelatine, streptomycin, or erythromycin.

Vaccination should still be offered to those who have had Mpox, once they have fully recovered, with the recommended dosing schedule as for those who have not had Mpox. Supply issues with the vaccine halted this from happening during the recent outbreak, but this has since been resolved.

PREVENTION

Combined public health measures are crucial in the outbreak response in order to contain the spread of Mpox, and include prevention, early detection of cases, contact tracing and isolation and care of patients. Raising awareness of risk factors and educating people about Mpox and the measures they can take to reduce exposure to the virus is the main prevention strategy for Mpox. Assessing and managing suspected and confirmed cases as per standard infection control precautions, will also prevent further spread. Vaccination for the prevention and control of Mpox, especially in those at risk of acquiring the infection is now being rolled out in many countries, and there are many policies to offer vaccine to persons who may be at risk such as laboratory personnel, rapid response teams and health workers. A multidisciplinary team approach in conjunction with relevant governmental and non-governmental local, national, and international should be established.

Further information can be found at **www.who.int/europe/emergencies/situations/monkeypox**

WEB LINKS

USEFUL LINKS FOR MPOX AND HIV

- JUSTRI: **www.justri.org**
- British HIV Association: **www.bhiva.org**
- National AIDS Treatment Advocacy Project: **www.natap.org**
- National AIDS Manual: **www.aidsmap.com**
- HIV i-Base: **www.i-base.info**
- Liverpool HIV Drug Interactions Checker: **www.hiv-druginteractions.org**
- British Association for Sexual Health and HIV: **www.bashh.org/news/monkeypox-resources/**
- World Health Organisation: **www.who.int/news-room/fact-sheets/detail/monkeypox** & **www.who.int/europe/publications/i/item/WHO-EURO-2022-5988-45753-65829**
- US Center for Disease Control: **www.cdc.gov/poxvirus/mpox/clinicians/treatment.html**
- European Medicines Agency - tecovirimat **www.ema.europa.eu/en/medicines/human/EPAR/tecovirimat-siga**
- Mpox in people with advanced HIV infection: a global case series **www.pubmed.ncbi.nlm.nih.gov/36828001/**
- Clinical features and management of individuals admitted to hospital with monkeypox and associated complications across the UK: a retrospective cohort study. **www.pubmed.ncbi.nlm.nih.gov/36566771/**

USEFUL PICTURES OF MPOX

Centers for Disease Control and Prevention (CDC) 2022 Mpox outbreak global map
https://www.cdc.gov/poxvirus/monkeypox/response/2022/world-map.html

https://dermnetnz.org/images/monkeypox-images

https://www.today.com/health/health/monkeypox-pictures-symptoms-rcna30113

justri.

www.justri.org

with thanks to our sponsor

GILEAD