



Monkeypox: A current emergency global health threat

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Outline

- Introduction
- Historical epidemiology
- Natural reservoir
- Risk of infection and mode of transmission
- The perplexities of the outbreak
- Clinical presentation
- Virological characteristics
- Epidemic risk management
- Control and prevention

Objective of this review paper

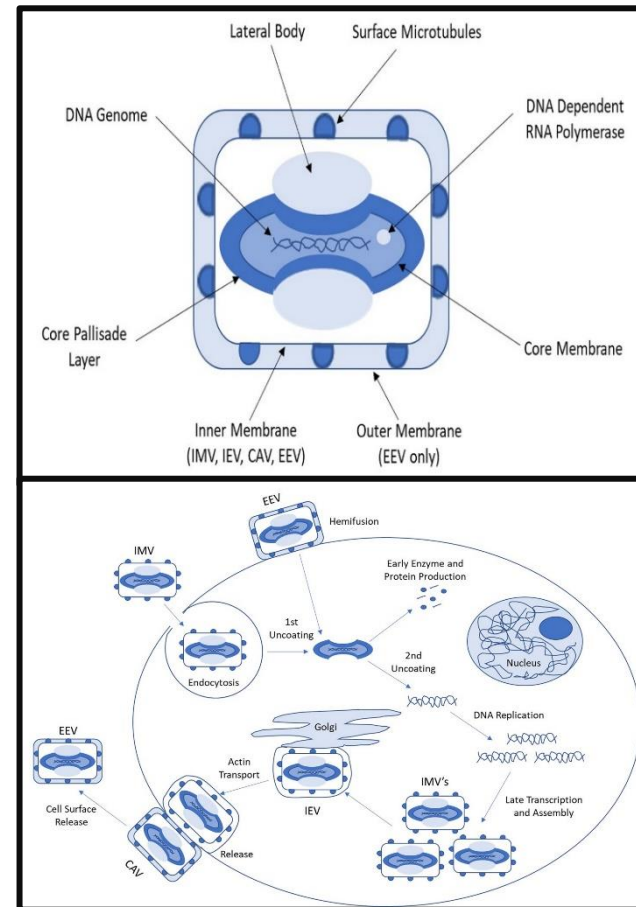
- This is a multidisciplinary review of the current MPVX outbreak including virology, prevention, clinical presentation, and disaster management
- Infectious diseases are without borders, our world has a delicate balance between animals, the environment, and humans reflecting the need for a **“one globe, one health approach”** to address this risk.

Historical epidemiology of MPVX

- MPVX was first discovered at an animal facility in Copenhagen, Denmark in 1958.
- The first case in humans was described in 1970 in the Democratic Republic of the Congo.
- There are two distinct genetic clades of the MPVX: **Central African clade (clade I) and the West African clade (clade II).**
- West African clade historically caused more severe disease and was thought to be more transmissible

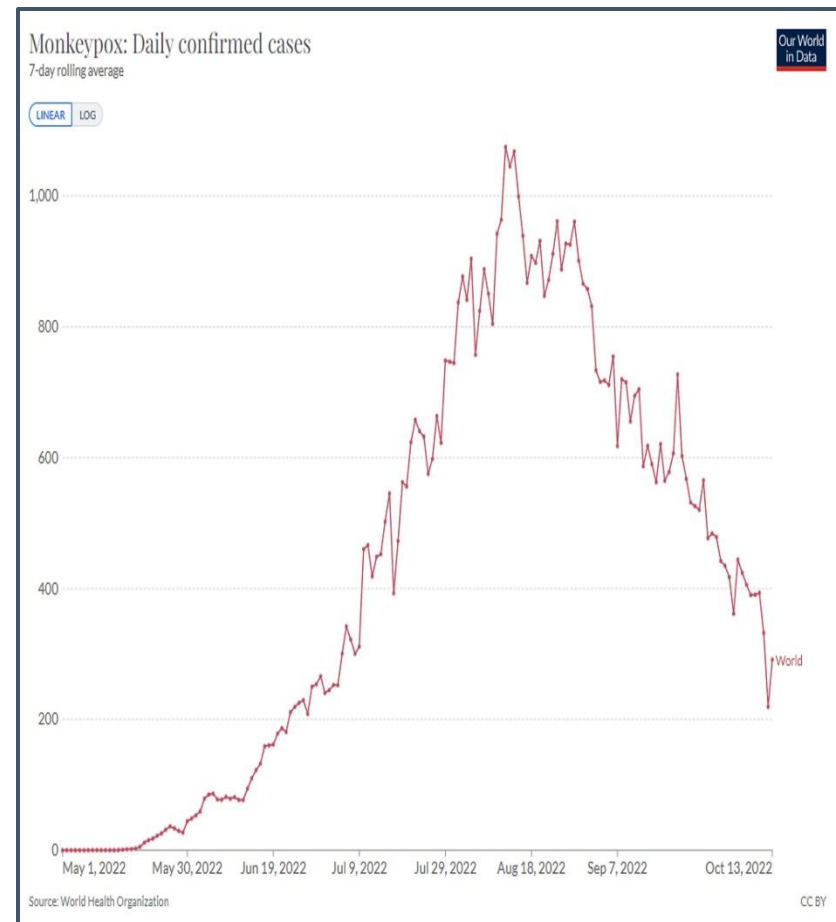
Virological Characteristics

- MPVX is a double-stranded DNA virus that belongs to the Orthopoxvirus genus.
- The viruses are unusual DNA viruses in that they **replicate within the cytoplasm of the infected cells rather than the nucleus.**
- They have the ability to manipulate the host immune system.



Reported cases in non-endemic countries

- The global outbreak continues to be a serious global public health threat with **85,110 confirmed cases from 110 countries and 182 deaths (23rd Jan 2023)**.
- Recently, WHO recommends new name for monkeypox disease: **Mpox**



Natural reservoir

- The natural reservoir of MPVX has not yet been identified.
- Research revealed that MPXV infects many species that inhabit all strata of the lowland tropical forest within Central and West Africa, therefore no one reservoir rather, several animal species may support MPVX. ([civil war & Deforestation](#))
- The only reported case of MPVX being isolated from a wild animal consisted of MPVX being isolated from a diseased squirrel.
- Animal transmission may occur via contact with infected animals, their body fluids, lesion materials, and respiratory droplets.

Current Epidemic in Non-Endemic countries

- The 2022 MPVX outbreak in Europe was caused by the West African clade IIb of the monkeypox virus
- The largest previous MPVX outbreak occurred in Nigeria during 2017-2018.
- Cases in Europe were linked to travelers from endemic area, Nigeria, to the UK, and Israel.
- All cases whose samples were confirmed by PCR have been identified as being infected with the West African clade.

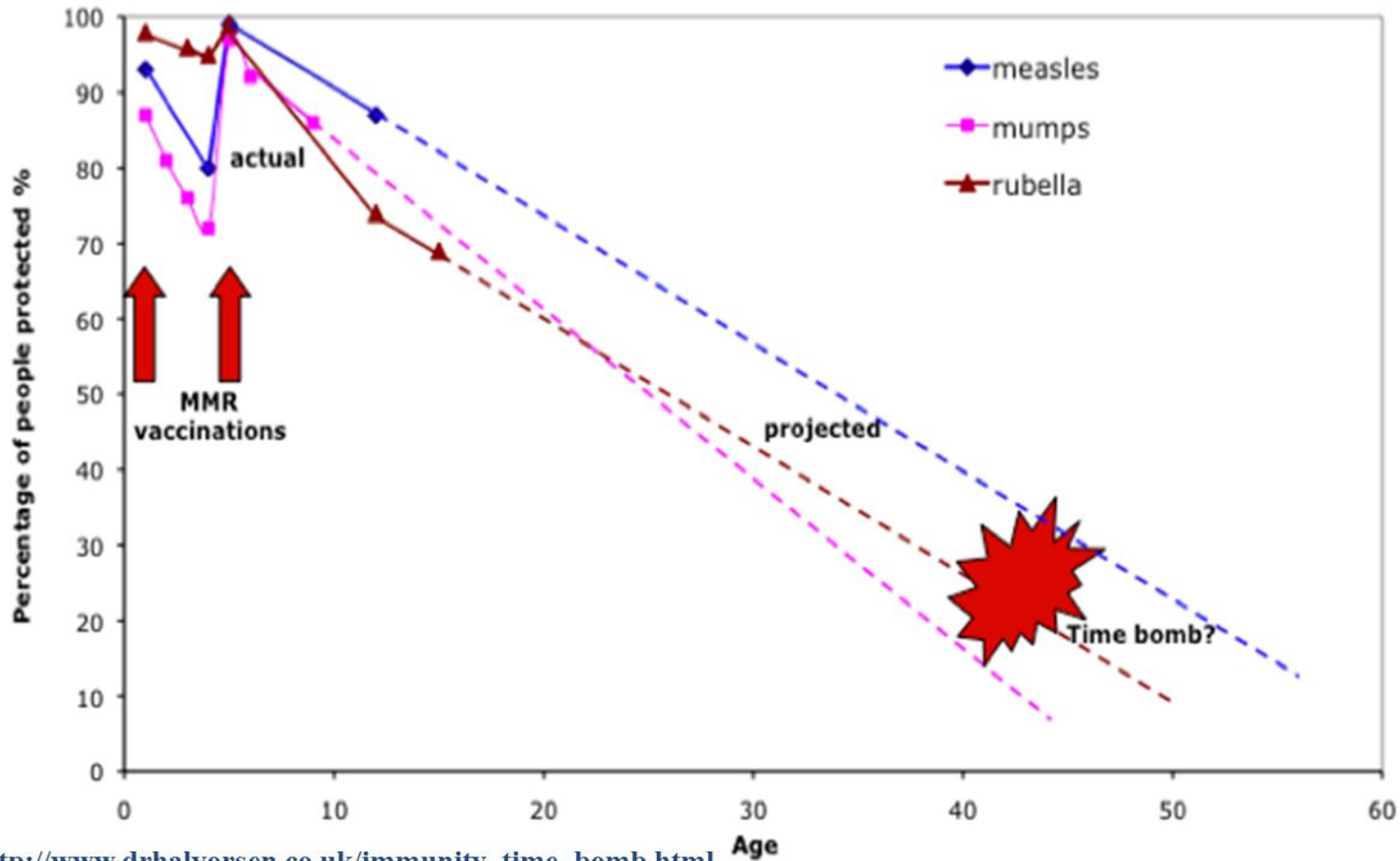
Risk of Infection and Mode of Transmission

- Almost half of the world's population has no immunity against orthopox viruses.
- Preventive measures should be adopted to protect vulnerable communities, especially young children, and to prevent transmission from those already affected.
- The WHO risk assessment implies that vaccination against smallpox might be cross-protective against MPVX.
- Immunity from smallpox vaccination will only be present in those older than 40 years, with varying ages depending on the country, because the smallpox vaccination program ended worldwide in 1980.

The Perplexities of the Monkeypox Virus Outbreak

- While the first MPVX case was diagnosed in 1970, it only started to spread among humans during the period of 2010-2019.
- This might be due to the cessation of smallpox vaccination, which previously provided some cross-protection against Mpox, or alternatively due to genetic mutations that increased transmission outside the endemic areas.
- The actual reasons for the delayed spread of the disease are not yet known as the above possible reasons are hypothetical and not confirmed scientifically.

Time bomb for Measles and Rubella



http://www.drhalvorsen.co.uk/immunity_time_bomb.html

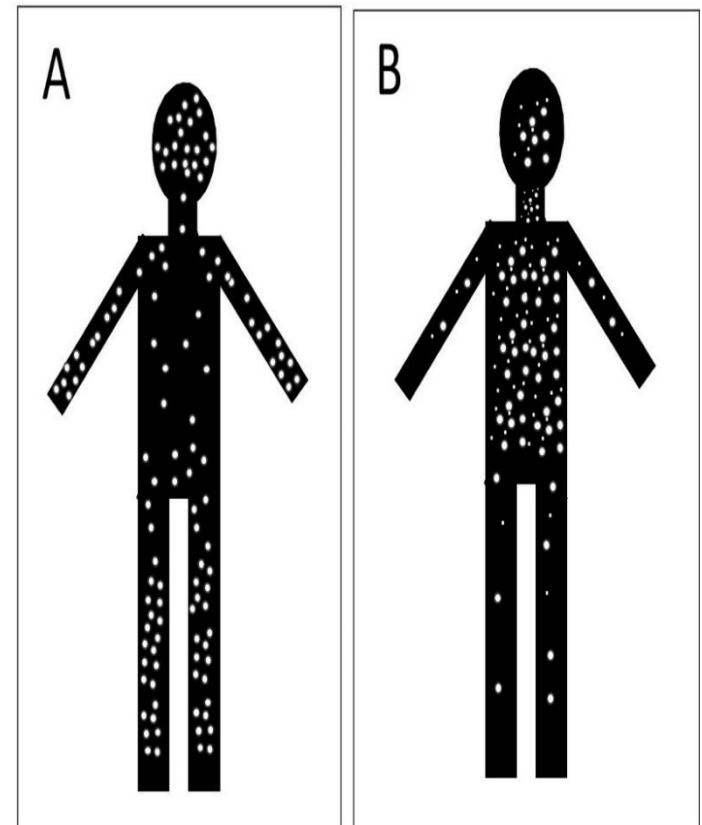
Clinical Presentation 1/2

- MPVX disease starts with an incubation period of 3-17 days during which the person has no symptoms, followed by 2 to 4 weeks of active viral infection.
- At the onset of fever, a localized lymphadenopathy in the neck, axilla, and groin may occur.
- This is a distinctive clinical sign of MPVX disease when compared with smallpox and chickenpox.
- With the current 2022 outbreak, prodromal symptoms including lymphadenopathy are often mild or non-existing or may appear after the onset of the rash.
- Clinicians are strongly advised to be alert about these atypical features and test patients with rash consistent with MPVX regardless of whether the rash was preceded by a typical prodrome.

Clinical Presentation 2/2

- The skin lesions usually, but not necessarily, are of the same stage which start on the face and then involve the whole body with a centrifugal distribution (A).
- The lesions become concentrated on the face and distal extremities (hands and feet) with fewer lesions on the trunk.
- The centripetal distribution of the skin lesions involves the face and trunks with fewer lesions on the extremities (B).
- This is usually seen in chickenpox disease (B)

Monkeypox (A) vs chickenpox (B)



Epidemic risk management

- Healthcare professionals caring for patients with suspected or confirmed MPVX disease should wear appropriate PPE.
- Contaminated surfaces must be disinfected.
- Public Health Department must be also notified as per local policies.
- Supportive care including rehydration and pain control are the mainstay treatment for patients with MPVX disease.

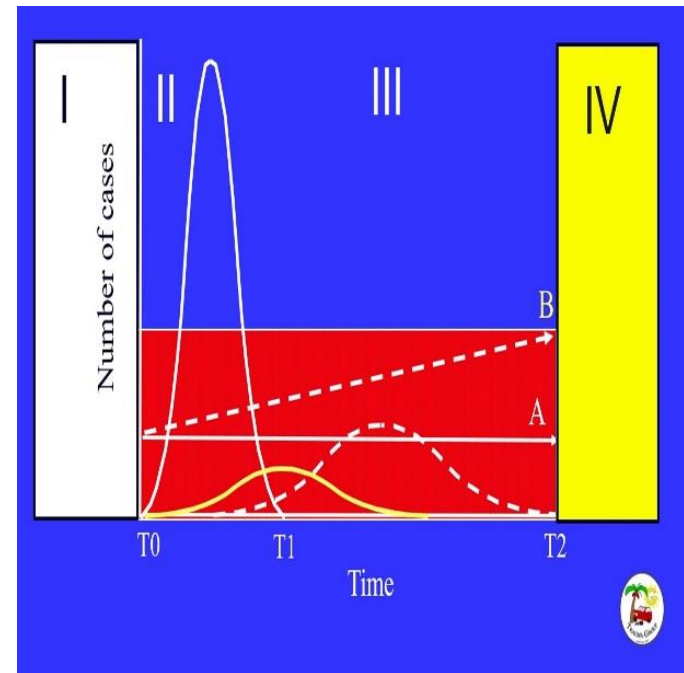
Principles of disaster management

Preparedness which includes building up the proper infrastructure, prepare its needed resources, have a clear plan for response, and train staff on this plan;

Mitigation by reducing the impact and effects of the disaster;

Response by establishing a command centre that coordinates the response activities through proper communication; and

Recovery by restoring the normal community functions.



Vaccination : Control and Prevention

- JYNNEOS and MVA are live attenuated, non-replicating viruses which produce neutralizing antibody responses in humans for the prevention of smallpox and MPVX.
- ACIP recommends the vaccination of individuals who have a high risk of contracting orthopoxviral infections (including MPVX) like healthcare workers.
- ACAM2000 was the only available vaccine in 2015.
- In 2021, ACIP permitted the use of JYNNEOS as prophylaxis for the high-risk group.
- These two vaccines are available now. The booster doses are recommended on regular basis for those having continued occupational risk.
- A recent systematic review of 18 studies indicated that JYNNEOS provides slightly better prevention compared with ACAM2000 with fewer side effects.

Thank you for your attention



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Invited Review Article

Monkeypox: A current emergency global health threat

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Abstract:

Monkeypox (MPXV) is an emerging zoonotic disease carrying a global health threat. Using a multi-disciplinary approach, we review the current MPXV virus infection outbreak including virology, prevention, clinical presentation, and disaster management. MPXV is caused by a double-stranded deoxyribonucleic acid virus. Despite its clinical similarities with smallpox, it is less severe with low mortality. Human-to-human transmission occurs through prolonged direct or close contact, or through blood, body fluids, or mucosal lesions. Risk groups include frontline health workers who care for MPXV patients, household members of an infected patient, and men who have sex with men. Skin lesions are usually, but not always, at the same stage. They may affect the face followed by the distal extremities with fewer lesions on the trunk (centrifugal distribution). Lesions may involve the mouth, genitalia, conjunctiva, and rectum. The majority of cases are mild. Nevertheless, the disease may have long-term effects on the skin, the neurological system, and the eye. Vaccination against MPXV is available but meanwhile should be limited to those who are at high risk. Those vaccinated against smallpox (usually older than 40 years) might be immune against MPXV. Infectious diseases are without borders. If proper action is not taken, there is considerable risk that MPXV will be entrenched worldwide. Our world has a delicate balance between animals, environment, and humans reflecting the need for a "one globe, one health approach" to address this risk. Following the principles of disaster management and using the lessons we have learned from the COVID-19 pandemic will reduce the impact of the MPXV outbreak.

Keywords:

Emergency, human monkeypox, orthopoxvirus, pandemic, public health, transmission, vaccine

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