Spread of Mpox

Empowering Future Generations: Cultivating Global Literacy and Enlightenment

Forum: WHO
Issue: The global spread of Mpox
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Introduction

Mpox, formerly known as Monkeypox, is a viral zoonotic disease primarily endemic to central and western Africa. However, in recent years, the disease has demonstrated an unprecedented global spread, prompting heightened concern among public health authorities. Mpox is caused by the monkeypox virus, a member of the Orthopoxvirus genus, and typically manifests with symptoms such as fever, lymphadenopathy, and a characteristic rash. Transmission occurs through close contact with infected individuals, animals, or contaminated materials.

The global spread of Mpox gained prominence in 2022, with outbreaks reported in non-endemic regions, including Europe, the Americas, and Asia. This marked a significant shift in the disease's epidemiology, highlighting factors such as increased human mobility, globalization, and potential gaps in health surveillance systems. Vulnerable populations, including those with compromised immune systems, are at greater risk of severe outcomes.

Efforts to control the spread focus on vaccination campaigns, public education, and robust surveillance. The smallpox vaccine, which offers cross-protection against Mpox, is a key tool in managing outbreaks. Nonetheless, the global spread underscores the need for stronger international collaboration to address emerging infectious diseases, enhance preparedness, and mitigate the impact of zoonoses in an interconnected world.

After what possibly can be called the biggest medical disaster of modern times, namely the global Covid-19 pandemic, nations have learnt the necessity of global cooperation in the field of healthcare. In the European Union for example, countries combined their medical research experts to aid the development of a vaccine to combat the virus. The sharing of international information regarding epidemics, such as Mpox, has been proven vital for combatting these diseases in the trying times of the global pandemic.

Definition of Key Terms

Mpox

A zoonotic disease formerly known as monkey pox spreading globally. Symptoms include rashes, fever, headaches, muscle aches and more.

Zoonosis

The transmission of diseases from animals to humans. commonly through biting, exchange of bodily fluids, or even consumption.

Clades

Genetic subgroups of the mpox virus, with Clade I and Clade II (and their subvariants a and b) showing differences in severity and geographic spread.

Polymerase Chain Reaction (PCR)

A laboratory technique used to confirm mpox diagnosis by detecting the virus's genetic material in samples collected from patients.

Smallpox Vaccine

A vaccine originally developed for smallpox that offers cross-protection against mpox due to the similarity between the two viruses.

One Health Approach

A collaborative framework linking human, animal, and environmental health to manage zoonotic diseases like mpox.

Endemic

Refers to a disease regularly found in a particular geographic region, such as mpox in Central and West Africa.

Public Health Emergency of International Concern (PHEIC)

A formal declaration by the WHO indicating that a disease outbreak constitutes a global health threat, as was the case with mpox in 2022.

Close-Contact Transmission

The spread of mpox through physical contact with infected individuals, contaminated materials, or respiratory droplets.

Immune System Compromise

A weakened immune system that increases vulnerability to severe disease or secondary infections when infected with mpox.

Global Vaccine Equity

The principle of ensuring fair access to vaccines for all populations, particularly in low-income and resource-limited settings.

Outbreak Surveillance

Monitoring and tracking disease cases to identify patterns, prevent spread, and allocate resources effectively.

Reservoir Host

Animals, such as rodents, that naturally harbor the mpox virus, facilitating its transmission to humans.

Cross-Protection

Immunity against one disease provided by a vaccine for another related disease, as seen with smallpox vaccines protecting against mpox.

Epidemiology

The study of disease distribution, patterns, and determinants in populations, critical for understanding and controlling mpox outbreaks.

General Overview

The Virus

Mpox is caused by two distinct viral clades: Clade I and Clade II, each further divided into subvariants (a and b). Clade II has been the primary driver of global outbreaks outside Africa, but the recent detection of Clade Ib in non-endemic regions as of August 2024 signals a concerning evolution in the virus's behavior. Transmission occurs through direct contact with an infected individual, exposure to contaminated materials such as bedding, or interaction with infected animals, particularly rodents. Though generally non-fatal, mpox can cause significant discomfort. Symptoms include fever, swollen lymph nodes, and a rash that progresses to painful lesions, lasting 2–4 weeks. While most patients recover fully, the disease poses a serious threat when combined with secondary infections. These co-infections, particularly bacterial or viral, can exploit the patient's weakened immune state, escalating the illness's severity and occasionally resulting in death.

Diagnosis, Treatment, and Vaccination

Diagnosing mpox based on symptoms alone is difficult due to its similarity to conditions such as chickenpox, certain STDs, and bacterial skin infections. Laboratory tests are crucial for confirmation, particularly polymerase chain reaction (PCR) tests, which analyze swabs from the characteristic rash. Treatment options are limited and focus on symptom management, such as pain relief, hydration, and treating secondary infections if present. While there are no mpox-specific antiviral treatments, Tecovirimat (TPOXX), initially developed for smallpox, is under evaluation for its efficacy. Vaccination is a critical tool in controlling mpox. Smallpox vaccines, such as JYNNEOS and ACAM2000, have demonstrated significant cross-protection against mpox, providing a vital line of defense during outbreaks.

Spread and History

Mpox was first identified in 1958 during outbreaks in laboratory monkeys used for research, which led to its name, "monkeypox." The first human case was reported in 1970 in the Democratic Republic of Congo (DRC), where the virus was linked to small mammals, particularly rodents, in rainforest regions. For decades, mpox remained endemic in rural African communities with limited healthcare access. Central African clades of the virus tended to cause more severe illness than their West African counterparts. The disease gained international attention in 2003 when the United States experienced an outbreak linked to imported African rodents. While sporadic cases in travelers from endemic regions continued in subsequent years, the situation drastically changed in 2022 when mpox caused widespread outbreaks in non-endemic regions. Over 87,000 cases were reported across 110 countries, marking the largest global mpox outbreak in history. Unlike previous zoonotic transmissions, these outbreaks spread primarily through close contact, often within networks of men who have sex with men. This shift in transmission prompted significant public health campaigns and the deployment of smallpox vaccines to affected populations.

Current Concerns

While the global peak of mpox cases in 2022 has subsided, the virus continues to pose significant risks, particularly in endemic regions of Africa. The recent detection of Clade Ib outside Africa raises concerns about the virus's evolving capacity to spread and adapt. Factors such as increased globalization, ecological changes, and zoonotic spillovers underscore the potential for resurgence in both endemic and non-endemic regions. Public health officials emphasize the need for sustained vigilance, enhanced global surveillance systems, and continued access to vaccinations. The mpox outbreak highlights broader challenges in combating zoonotic diseases and underscores the critical importance of international cooperation and preparedness to address emerging health threats effectively.

Major Parties Involved

World Health Organization (WHO):
Coordinated global responses, issued guidance on diagnosis, treatment, and vaccination, and declared mpox a Public Health Emergency of International Concern (PHEIC) in 2022.

Centers for Disease Control and Prevention (CDC):
Provided technical guidance on case management, testing protocols, and vaccination strategies in the United States and internationally.

UNICEF:
Promoted equitable vaccine access and distributed educational resources to vulnerable communities, particularly in low-income regions.

Gavi, the Vaccine Alliance:
Facilitated the distribution of smallpox vaccines, which are effective against mpox, especially in regions with limited healthcare resources.

United States (CDC and FDA):
Implemented vaccination campaigns, conducted research on mpox, and provided public health guidance.

UK Health Security Agency (UKHSA):
Monitored and managed outbreaks in the UK, conducted contact tracing, and deployed vaccines.

European Centre for Disease Prevention and Control (ECDC):
Supported European countries in their efforts to contain the mpox outbreak through research, guidelines, and data-sharing.

Democratic Republic of Congo (DRC) and Nigeria:
Managed endemic cases, improved outbreak reporting, and collaborated with international partners to control the spread.

Médecins Sans Frontières (Doctors Without Borders):
Delivered healthcare and outbreak response support in resource-limited and endemic regions.

Amref Health Africa:
Focused on community-based education and interventions to reduce zoonotic transmission in Africa.

Global Outbreak Alert and Response Network (GOARN):
Provided technical expertise and resources for outbreak containment globally.

National Institutes of Health (NIH):
Funded research into mpox virology, epidemiology, and treatments, and conducted clinical trials for antiviral medications like Tecovirimat (TPOXX).

Universities and Research Centers Worldwide:
Studied viral mutations, transmission patterns, and vaccine efficacy to better understand and control the epidemic.

Timeline of Events

1958: Mpox was first identified during outbreaks in laboratory monkeys used for research, leading to the name "monkeypox."

1970: The first human case of mpox was reported in the Democratic Republic of Congo (DRC), where it was linked to small mammals, particularly rodents.

1980s-1990s: Mpox remained endemic in Central and West Africa, with sporadic cases reported, particularly in rural rainforest regions. Central African clades were noted to cause more severe disease than West African clades.

2003: The first documented mpox outbreak outside Africa occurred in the United States, linked to imported African rodents. Dozens of human cases were reported, highlighting the risk of international spread through animal trade.

2017: Nigeria experienced a major mpox outbreak, marking the largest outbreak in the country since the 1970s, with hundreds of confirmed cases.

2019: Cases of mpox began appearing more frequently in travelers returning from endemic regions, raising concerns about global spread.

May 2022: The first clusters of mpox cases were reported in non-endemic countries, including the UK, Spain, and Canada, with no direct links to travel from Africa.

July 2022: WHO declared mpox a Public Health Emergency of International Concern (PHEIC), emphasizing the global threat posed by the outbreaks.

December 2022: Over 87,000 cases had been reported across 110 countries, marking the largest global mpox outbreak in recorded history. Smallpox vaccines were deployed widely to curb the spread.

2023: Efforts to contain mpox outbreaks intensified, with cases significantly declining due to vaccination campaigns and public health measures. However, the disease remained endemic in Central and West Africa.

August 2024: Cases of Clade Ib mpox, previously confined to Africa, were detected in non-endemic countries for the first time, raising concerns about the virus's evolving transmission dynamics.

Previous attempts to solve the issue

Vaccination Campaigns:

Deployment of smallpox vaccines (e.g., JYNNEOS and ACAM2000), which offer cross-protection against mpox, to at-risk populations. These campaigns were especially effective during the 2022 global outbreak, focusing on individuals in high-transmission networks, such as healthcare workers and men who have sex with men.

A global effort to provide vaccines to areas has already been attempted, under the name of the Global Vaccine Action Plan (GVAP). While proving to have been an effective effort in combating global diseases, the majority of the goals established by the organisation were not achieved. Some of the biggest problems were; the top-down distanced perspective of the organisation, the partial implementation with limited powers and unrealistic expectations with limited funding. The organisation did not take into account the vast cultural and political differences between the states it operated in, which hindered its effectiveness. On top of that, the limited funding made the organisation unable to take proper measures and establish enough vaccination centres to vaccinate the global population.

Public Health Awareness and Education:

Targeted education campaigns to inform the public about mpox symptoms, transmission routes, and prevention methods. In non-endemic regions, public health agencies used social media and community outreach to raise awareness and reduce stigma associated with the disease.

Enhanced Surveillance and Testing:

Implementation of rigorous surveillance systems in endemic and non-endemic areas to detect and track cases. Polymerase chain reaction (PCR) testing for rash samples became a standard diagnostic tool, ensuring accurate identification of mpox infections. This was coupled with contact tracing to limit the spread of the virus.

Possible solutions

Global Vaccine Equity Program

Establish a robust global vaccine equity initiative dedicated to distributing smallpox vaccines, which provide cross-protection against mpox, equitably across the world. This program would operate through a specially designated global fund managed by international health organizations, including Gavi, WHO, and UNICEF. The initiative would prioritize providing vaccines to both endemic regions, where mpox persists, and non-endemic regions experiencing outbreaks. To achieve this, regional vaccination hubs would be established in strategic locations to facilitate distribution to remote or underserved areas. Additionally, the program would subsidize costs for low- and middle-income countries to ensure financial barriers do not impede access. Comprehensive education campaigns would accompany vaccine deployment, promoting awareness of mpox prevention and the importance of vaccination. This initiative ensures a fair, coordinated international response, addressing global disparities in vaccine access. It strengthens global health infrastructure and builds trust by reducing inequities between wealthier and resource-limited countries.

This plan would need to take into account the lessons learnt from the GVAP and possibly build on the successes already achieved with this programme. A global effort with proper authority, expertise and funding could prove vital in combating not only Mpox, but even other diseases for which a proper vaccine has been developed.

Zoonotic Disease Mitigation Initiative

Adopt a "One Health" approach to minimize zoonotic spillovers, such as those that drive mpox outbreaks. This initiative would focus on educating communities in endemic regions about safe animal handling practices and hygiene. Governments would collaborate with conservation groups to enhance wildlife disease surveillance, enabling early detection of zoonotic pathogens. Regulatory measures would target the illegal wildlife trade and enforce restrictions to prevent high-risk interactions with animals. Financial grants would be provided to countries with rich ecosystems and high zoonotic risk, allowing them to develop tailored solutions, such as local education programs, habitat preservation efforts, and community-driven monitoring systems. By addressing the root causes of zoonotic transmission, this initiative reduces the likelihood of future outbreaks while respecting each nation's ecological and social context. Preventative measures are cost-effective and foster long-term resilience against not just mpox but other zoonotic diseases.

Global Real-Time Disease Tracking System

Develop an advanced global disease surveillance system designed specifically for monitoring mpox outbreaks in real time. The platform would utilize artificial intelligence (AI) and machine learning (ML) to analyze patterns, predict outbreak hotspots, and guide resource allocation. This system would integrate data from healthcare providers, laboratories, and

public health agencies worldwide, with secure channels for rapid sharing of case information. Technologically advanced nations would contribute by offering technical support and developing open-source tools to be freely adopted by other countries, ensuring inclusivity and widespread adoption. Training programs would accompany the system's rollout, building local capacities to use and maintain the technology. This database would be supported by periodic reviews to improve its functionality and adapt to emerging health challenges. A global tracking system enables swift, evidence-based decision-making and promotes international collaboration. Its predictive capabilities enhance preparedness, reducing the impact of outbreaks, while the inclusive model ensures all nations—regardless of resources—can benefit equally from cutting-edge technology.

Useful documents

International Health Regulations (IHR, 2005):

https://www.who.int/health-topics/international-health-regulations#tab=tab_1\

UN General Assembly Resolution A/RES/74/274 (2020):

https://documents.un.org/doc/undoc/gen/n20/101/42/pdf/n2010142.pdf?OpenElementm

Convention on Biological Diversity (CBD, 1992):

https://www.cbd.int/doc/legal/cbd-en.pdf

One Health Joint Plan of Action (2022–2026):

https://www.who.int/publications/i/item/9789240059139

WHO Strategic Preparedness and Response Plan for Mpox (2022):

https://www.who.int/publications/m/item/mpox-global-strategic-preparedness-and-response-plan

Global Vaccine Action Plan (GVAP, 2011–2020):

https://www.who.int/teams/immunization-vaccines-and-biologicals/strategies/global-vaccine-action-plan

CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora, 1973):

https://cites.org/eng/disc/text.php

UN Sustainable Development Goals (SDG 3, 2015):

https://sdgs.un.org/goals/goal3

Bibliography

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