



Global resurgence of monkeypox (mpox) virus: a review of current outbreaks and public health strategies

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Abstract

This mini-review provides a comprehensive analysis of the global resurgence of mpox, highlighting its significant impact as a zoonotic disease since the World Health Organization declared it a Public Health Emergency of International Concern in July 2022. As of mid-June 2024, approximately 98,000 cases and 200 deaths have been reported across 116 countries. The review details the transmission dynamics, regional impacts, and the disease's prevalence among high-risk groups, particularly men who have sex with men (MSM). It discusses the effectiveness of current containment strategies, including vaccination, surveillance, and public health interventions. The review emphasizes the need for targeted health policies, robust international cooperation, and sustained preventive measures to mitigate the ongoing global impact of mpox.

Keywords: Monkeypox; Mpox Clade; hMPXV; MSM; LGBTQ; MSM; Poxviridae; Global Trends

Introduction

Mpox, formerly known as monkeypox, has emerged as a significant global health concern, prompting the World Health Organization (WHO) to declare it a Public Health Emergency of International Concern in July 2022 [1]. Mpox is currently affecting men who have sex with men (MSM) outside its endemic regions in West and Central Africa [2]. While mpox can infect anyone, certain individuals are more susceptible to severe illness or complications. High-risk groups include people with weakened immune systems, such as those with untreated HIV, pregnant and breastfeeding women, children under 8, MSM, healthcare workers, and those with travel history to areas with ongoing mpox outbreaks [3]. As of May 31, 2024, about 98,000 cases and 200 deaths have been reported across 116 countries[4]. This mini-review provides a detailed global-regional analysis of the ongoing mpox outbreaks and the response measures in place.

Historical Context and Recent Outbreaks

The first human case of mpox was reported in 1970 in the Democratic Republic of the Congo (DRC). Although, Mpox was initially detected in 1958 when two outbreaks of a pox-like disease occurred in colonies of monkeys kept for research [4



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Evidence in Context

- WHO declared mpox a global health emergency in July 2022.
- By mid-June 2024, there were 98,000 cases and 200 deaths across 116 countries.
- The outbreak primarily affects men who have sex with men (MSM).
- Control strategies include vaccination and enhanced surveillance.
- There's a call for international cooperation to effectively manage the spread.

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]. Although mpox has close resemblance to smallpox, it is much less deadly. Following the eradication of smallpox and cessation of vaccination, mpox cases began to rise in Africa. In 2022-2023, a significant global outbreak occurred, predominantly affecting Gay, Bisexuals, and MSM communities [5]. This outbreak, attributed mainly to the Clade IIb strain, has spread to over 116 countries, with the United States, Brazil, and Spain being the most affected [6].

Current Trends and Regional Impact

The ongoing mpox outbreaks exhibit distinct patterns across the six WHO regions, reflecting varied transmission dynamics, public health responses, and healthcare infrastructure. In the African Region, where mpox originated, the disease remains a significant concern, particularly in countries like the Democratic Republic of the Congo, which continue to report high case numbers [7]. The Region of the Americas has seen the highest number of cases globally, with the United States and Brazil being the most affected, primarily among MSM communities [8]. The Eastern Mediterranean Region, despite reporting the fewest cases, maintains vigilant surveillance and early containment strategies to prevent spread. Southeast Asia has experienced notable outbreaks, particularly in Thailand, prompting increased public awareness and vaccination efforts [9]. The Western Pacific Region, led by China's substantial case count, has implemented rigorous public health measures, including vaccination and contact tracing, to manage the spread [10]. Europe has reported significant mpox activity, with Spain bearing the highest burden, necessitating targeted interventions and rapid testing to curb transmission [11]. These regional trends underscore the necessity for tailored public health strategies, robust surveillance, and international collaboration to effectively manage and mitigate the impact of mpox globally.

Age and Gender-wise Trends

The demographic profile of mpox cases reveals a pronounced skew towards specific age and gender groups. Data shows that over 96% of the documented cases are male, with a median age of 34 years, predominantly affecting males aged 18-44 who account for 80% of cases. Females represent around 4% of cases, with the majority reported in the Americas and Europe constituting 88% of burden. Transmission primarily occurs through sexual encounters, which is the most common route in 52% of cases with known transmission routes. Among the younger demographic, 1.3% of cases are children aged 0-17, with the majority also reported in the Americas. Notably, 55 cases involved individuals who were pregnant or recently pregnant, with a median age of 28 years. A significant proportion of cases among men who have sex with men and individuals living with HIV underscores the intersection of mpox with specific community health dynamics. Moreover, 1,305 health workers have been affected, highlighting the occupational risks associated with community exposures in the healthcare setting. The concentration of cases in party settings with sexual contacts further illustrates the social contexts significantly associated with transmission [12].

Regional Trends across WHO regions

The Africa

Africa, the continent of mpox's origin, continues to grapple with the disease. As of 2024, Africa has reported a total of 3,383 cases and 30 deaths. The Democratic Republic of the Congo (DRC), where the first human case was documented in 1970, remains heavily impacted, particularly in the Maniema province. The DRC alone has seen 2,197 cases and 8 deaths. The persistence of mpox in Africa underscores the need for robust public health interventions and international support to manage the disease's endemic presence and prevent further spread [12].

The Americas

The Americas have reported the highest number of mpox cases globally, with 62,564 cases and 141 deaths. The United States leads with 32,961 cases, followed by Brazil with 11,212 cases [13]. The outbreaks in these regions have predominantly affected MSM, highlighting the importance of targeted vaccination and public health campaigns. Despite the high case numbers, the mortality rate remains relatively low, indicating the effectiveness of supportive care and vaccination efforts. Continued vigilance and community engagement are crucial to curbing the spread [12].

Eastern Mediterranean

The Eastern Mediterranean region has reported the fewest cases, with a total of 95 cases and 1 death. The 2022 outbreak in Sudan, with 11 cases, marked a notable event for the region [14]. Despite the low numbers, the potential for spread remains, necessitating ongoing surveillance and preparedness. The region's response has focused on early detection and containment, leveraging existing public health infrastructure to manage the limited outbreaks effectively [12].

SEARO

Southeast Asia has seen a total of 914 cases and 11 deaths, with a significant spike in 2023. Thailand has reported the highest number of cases in the region, totaling 846. The outbreaks in SEARO underscore the need for improved surveillance and vaccination strategies. The region's response has included increased public awareness campaigns and the establishment of diagnostic facilities to facilitate early detection and treatment [12].

Western Pacific

The Western Pacific region has reported 3,360 cases and 10 deaths. China has been the most affected, with 2,002 cases. The region has implemented comprehensive public health measures, including vaccination and contact tracing, to manage the outbreaks. The focus on strengthening healthcare systems and community engagement has been pivotal in controlling the spread of mpox in the Western Pacific [15].

European region

Europe has experienced significant mpox activity, with 27,429 cases and 10 deaths reported. Spain has been the most affected country, with 8,030 cases. The outbreaks in Europe have predominantly affected MSM, necessitating targeted interventions such as vaccination and public education campaigns. The region's response has emphasized the importance of rapid testing and isolation of cases to prevent further transmission [11].

Understanding Monkeypox Strains: Clade I vs. Clade II

Mpox virus variants are categorized into Clade I (Central African) and Clade II (West African), with Clade II further divided into IIa and IIb. The World Health Organization reports that the ongoing global outbreak is mainly due to Clade IIb. Clade I, found in the Democratic Republic of the Congo, causes more severe disease and higher mortality than Clades IIa and IIb [16].

Clade I is considered more dangerous, causing more severe illness and historically leading to higher death rates (around 10% in previous outbreaks). It's primarily found in Central Africa [17]. On the contrary, Clade II strain is milder, with a very high survival rate (over 99.9%). It's the one responsible for the global outbreak that started in 2022 and is endemic to West Africa [18].

Transmission and Symptoms

Mpox mainly spreads through close interaction with people, animals, or materials that are infected. The transmission between humans can happen through direct contact with infectious sores, exposure to respiratory droplets during extended face-to-face contacts, or through contaminated objects like clothing and bedding. The exact natural reservoir for mpox is still unidentified, but it is speculated that certain African rodents and non-human primates (monkeys) might carry the virus and transmit it to humans [19].

The virus enters the body through broken skin, mucous membranes, or the respiratory tract. Symptoms typically manifest within 1 to 21 days post-exposure and include fever, headache, muscle aches, back pain, swollen lymph nodes, and a characteristic rash that progresses from macules to pustules and eventually scabs over a period of 2-4 weeks [20].

Mpox Transmission Among MSM: A Call for Tailored Public Health Strategies

Mpox poses a challenge for men who have sex with men (MSM) in the current outbreak. The virus spreads through close contact with the skin lesions of an infected person. In the current outbreak, it appears to be spreading most efficiently during intimate skin-to-skin contact, which can be more common among MSM. MSM communities may have social networks that involve more frequent close physical contact, potentially increasing the risk of transmission if someone is infected [21]. Historical stigma surrounding MSM and sexual health concerns might lead some

Individuals to delay seeking medical attention if they experience symptoms, potentially allowing for further transmission. The current global outbreak has primarily affected MSM, likely due to close skin-to-skin contact during sexual activity [22].

Diagnosis and Treatment

Accurate diagnosis of mpox is crucial for effective management and containment. Laboratory confirmation is achieved through polymerase chain reaction (PCR) testing of skin lesion samples. Differential diagnosis is essential as mpox can mimic other conditions such as chickenpox, measles, and sexually transmitted infections. Treatment primarily involves supportive care to manage symptoms. Antivirals like tecovirimat, originally developed for smallpox, are used in severe cases. Vaccination with smallpox vaccines has shown efficacy in preventing mpox and is recommended for high-risk groups [23].

Monkeypox Vaccination: Protection via Existing Options

While there's no current development of a specific monkeypox vaccine, JYNNEOS, a vaccine designed for smallpox, offers effective protection against monkeypox. Studies suggest smallpox vaccines like Dryvax and ACAM2000 can also be used, but JYNNEOS is generally preferred due to potentially milder side effects. Research on the efficacy of these vaccines shows promising results, with smallpox vaccines offering around 70-80% protection and JYNNEOS potentially reaching 66% effectiveness for full vaccination [24].

Preventive Measures and Global Response

Preventing mpox transmission involves avoiding contact with infected individuals, animals, and contaminated materials. During outbreaks, vaccination campaigns targeting high-risk populations, such as healthcare workers and MSM, are vital. The WHO declared mpox a Public Health Emergency of International Concern, underscoring the need for global surveillance, diagnostics, and community engagement. The international community is uniting to tackle the mpox outbreak, with prompt actions taken by governments exemplifying the necessity for comprehensive and coordinated measures [25]. High-income nations can play a critical role in controlling the spread of the virus in human populations in Africa, given that the animal reservoir of mpox likely resides there. A One Health Framework directed towards the African continent is essential [26]. Efforts should be channeled into educational campaigns centered around the disease, with a specific focus on promoting social distancing and effective contact tracing. Vaccination programs in newly affected countries should be a top priority, even though the primary focus has centered on MSM, given their elevated risk of contracting mpox [4].

Conclusion

The global resurgence of mpox highlights the complexities and challenges in managing zoonotic diseases. Each region's experience underscores the need for tailored public health responses, robust surveillance, and international collaboration. The ongoing outbreaks emphasize the importance of vaccination, public awareness, and strengthened healthcare infrastructure to mitigate the impact of mpox. As the world continues to confront this public health threat, coordinated efforts and sustained vigilance will be essential in controlling the disease and protecting global health. The recent outbreaks serve as a reminder of the vulnerabilities in global health systems and the necessity for sustained vigilance and preparedness against emerging infectious diseases. United efforts to enhance monitoring, develop testing facilities, and bolster treatment approaches are vital in mitigating the disease's impact and safeguarding global health. The latest outbreaks worldwide underscore the necessity for persistent and vigilant monitoring, coupled with the advancement of innovative preventive and therapeutic strategies.

Supporting information

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Ethical Considerations

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