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REVIEW ARTICLE

Preparedness of Countries in Preventing Monkeypox in Upcoming Mass Gathering Events: Status and Recommendations

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Abstract

a dangerous zoonotic illness called monkeypox (MPX) is endangering public health that is spreading globally. It is endemic to western and central Africa, particularly in the Democratic Republic of the Congo, where it was first reported in a human. Concern is raised by the recent increase of incidence across several continents in non-endemic nations. Thus, there were 86746 confirmed cases as of 31 March 2023. MPX cases are significantly rising, with males exhibiting the highest infection rates. Concise recommendations by World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC) should be considered towards mass gatherings events (MG) to reduce the spreading of this disease. Football leagues and other sport matches, which attract a large number of participants and audience, impose serious risks and public health consequences. Thus, with the beginning of vaccinations in July 2022, global healthcare policymakers must make a difficult choice about the monkeypox vaccine at this point in the disease's progression. Therefore, CDC recommends that healthcare practitioners establish clinical guidelines to help identify cases and give the appropriate monitoring, follow-up, and treatment updates. In the current global outbreak, gay, bisexual, and other men who have sex with men (MSM) are the most impacted demographic group. Therefore, it is essential to curb the spread of the monkeypox virus by increasing vaccine demand among local lesbian, gay, bisexual, transgender, queer, questioning, intersex, or asexual (LGBTQIA) community members and educating them about the value of immunization.

Keywords: Monkeypox, Mass-Gathering Events, Recommendation, LGBTQIA.

INTRODUCTION

A zoonotic illness called monkeypox (MPX) is endemic to western and central Africa, particularly in the Democratic Republic of the Congo [1]. In which it belongs to the Poxviridae family's orthopoxvirus genus. [2] It can be transmitted from animal to human by direct contact with the blood, bodily fluids, or cutaneous or mucosal lesions of infected animals [3] .Also, it can be transmitted by human-to-human transmission, which results from close contact with respiratory secretions, skin lesions of an infected person or recently contaminated objects or via droplet respiratory particles or from sexual contact [3, 4]. Thus, sexual interaction was reported as the main route of transmission MPX in recent studies [5, 6]. Additionally, MPX can transmit via the placenta from mother to fetus (which can lead to congenital monkeypox) or during close contact during and after birth. [3, 4].

MPX was first discovered in 1958 in confined monkeys, the illness has a well-known name [7]. The Democratic Republic of the Congo reported the discovery of the first MPX case in a human in 1970 [8]. Since 1986, there has been a dramatic rise in the prevalence of MPX [9]. There was a severe MPXV outbreak in Sankuru District, DRC, between 2003 and 2005, when 760 cases were reported [10]. The first MPX outbreak recorded outside of Africa occurred in the United States of America in 2003 [11]. Along with the substantial increase in cases in Africa, MPX was first identified in the USA in 2003 when a 3-year-old child from Central Wisconsin contracted the disease. When a total of 72 cases were confirmed in 6 Midwestern states, the disease was quickly declared to be on the rise. Indiana, Illinois, Kansas, Missouri, and Ohio were among the states that could have been exposed to MPXV, with Wisconsin reporting the majority of cases [5]. Although there were not many cases of monkeypox reported in Nigeria between 1971 and 1978. In 2017, the Nigeria Center for Disease Control (NCDC) reported an outbreak of the disease after discovering 276 suspected patients, 118 (43%) of which had MPXV stain confirmation, and 7 (3%) of whom had already died [12]. A few cases of monkeypox were also reported in Israel and the United Kingdom in September 2018 [13].

METHODS

Search Strategy

An electronic databases search, including PubMed, Embase, and Scopus, was conducted to identify relevant up to date articles by two independent reviewers. The search used a combination of keywords related to monkeypox, mass gathering events, and disease prevention. In addition, manual searches of reference lists of relevant articles and conference proceedings were conducted to identify additional relevant studies.

Inclusion and Exclusion Criteria

Studies were considered if they satisfied specific requirements. First, if they addressed the ability of nations to prevent monkeypox during mass gathering events; second, if they included original research or expert opinion articles; also, if they were published in English. If studies did not apply to the research topic, did not meet the inclusion criteria, or were not peer-reviewed, they were excluded.

Ethics

This study did not require ethics approval as it is a review article that uses publicly available data.

Recent Outbreak

The rise in Monkeypox cases is worrying, especially in non-endemic nations. As of

March 31, 2023, there were 86,746 confirmed cases worldwide. Most cases (85,301) were in non-endemic areas, while only 1,445 were in endemic regions [14]. Global deaths totaled 112, with 95 occurring in non-endemic areas and the rest in endemic regions [14]. The USA had the most cases (30,286) and 38 deaths, followed by Brazil (10,890 cases, 15 deaths) and Spain (7,546 cases, 3 deaths) [14]. In the Arab world, Lebanon had 27 cases, Sudan 18 with one death, United Arab Emirates 16, Saudi Arabia 8, Qatar 5, Morocco and Egypt 3 each, and Jordan and Bahrain 1 each [14]. Israel reported 262 cases with deaths [14]. Despite these outbreaks, a Monkeypox pandemic like COVID-19 is unlikely due to different transmission methods, available vaccines, and management techniques [5]. Reasons for the recent rise in cases include overcrowding, increased rodent populations in villages, declining smallpox vaccinations, and uncertainty about the exact Monkeypox reservoir [15]. Figures 1 and 2 summarize the frequency of cases worldwide and Arabic worlds.

Figure 1. Monkey Outbreak Global Map

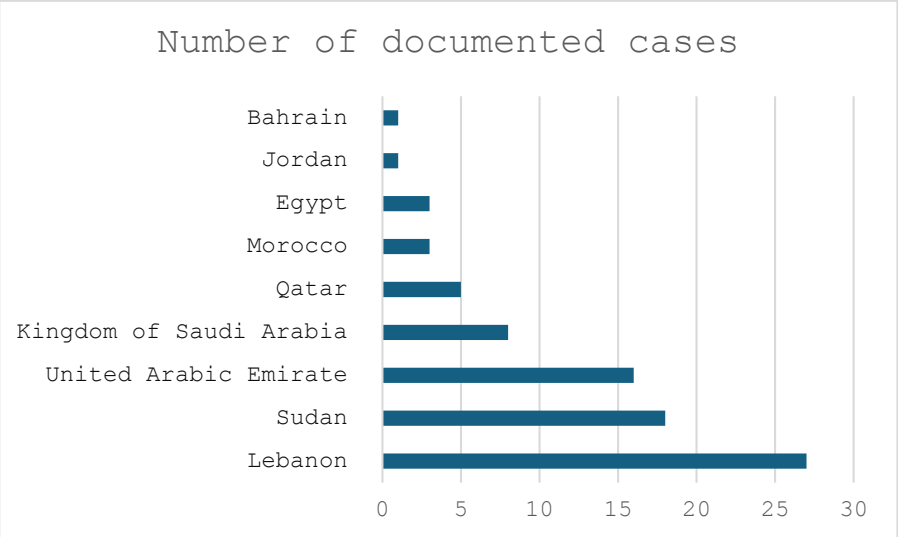


Figure 2. Distribution of reported cases among the Arabic world

Mass Gathering Events

The World Health Organization (WHO) defines mass gatherings as events that draw large crowds, potentially straining the capacity of the host location to handle health emergencies [16]. These gatherings can seriously risk both attendees' health and the healthcare system of the hosting region [17]. Outbreaks of respiratory infections are particularly concerning during these events. Over the past decade, annual mass gatherings were largely unaffected by outbreaks from Middle East Respiratory Syndrome coronavirus (MERS-CoV) or Severe Acute Respiratory Syndrome coronavirus-1 (SARS-CoV-1) [18]. However, the COVID-19 pandemic increased the risk of outbreaks at mass gatherings, impacting events like the 2020 Olympic Games and general sports matches [19, 20].

Status

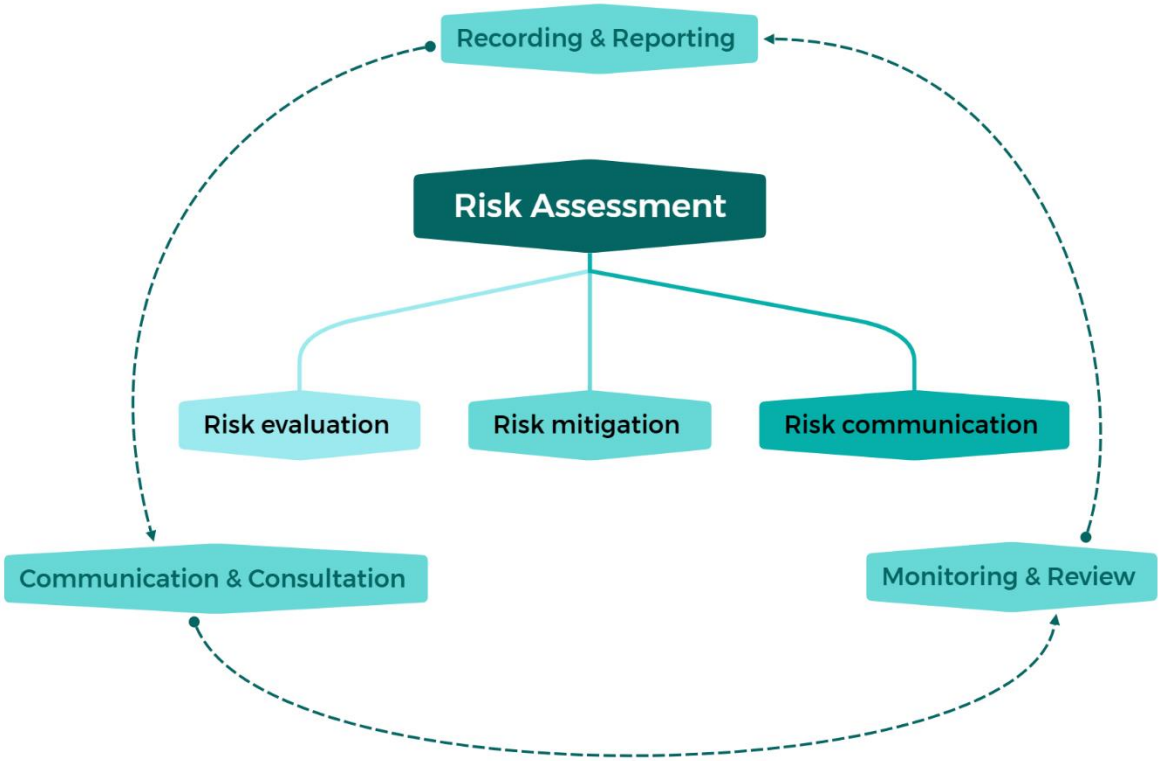
Sports events, such as the Boston Marathon with 500,000 fans and 36,000 participants, and football games with large audiences in stadiums and fan zones, are massive gatherings [21, 22]. Post-COVID-19, infectious diseases at these events are a major concern. The lack of infection control measures poses a serious threat to global health security [23–25]. It is crucial to control diseases at these events to prevent widespread transmission to the general population, especially during major tournaments like the World Cup or Olympics [26–28]. Football games and high-density sports events carry significant public health risks, potentially accelerating the spread of viruses like Monkeypox [29]. Monkeypox spreads through various routes common in mass gatherings, including respiratory droplets, infected objects, and direct contact, including sexual interaction [5, 6, 29]. Although mostly associated with men who have sex with men, anyone exposed can get infected, making large gatherings potential hubs for Monkeypox spread [29]. WHO recommends precautions to protect vulnerable groups like children, pregnant women, and those with weakened immune systems [29]. Collaboration between governments and WHO aims to safeguard these gatherings [3]. While no specific preventive actions have been publicly discussed for a potential Monkeypox outbreak, implementing strategies to reduce spread and enhance response readiness is crucial [3].

Recommendations for Mass Gathering events in the Region

Healthcare decision-makers face a tough call on the Monkeypox vaccine as hesitancy towards COVID-19 vaccines persists. Understanding public perception and acceptance, especially among vulnerable populations, is critical [30]. With uncertainties around vaccine efficacy against variants like Omicron, ensuring timely access to vaccines, especially for vulnerable groups, is paramount [30, 31]. Accurate information from scientists is vital during outbreaks, influencing health behaviors positively. Trustworthy sources like experts, physicians, and scientific publications play a crucial role [32]. The CDC advises healthcare practitioners to establish guidelines for identifying, monitoring, and treating cases while taking preventive measures for themselves and patients [33]. Strengthening surveillance, early reporting of cases with detailed information, and screening international travelers from endemic regions are recommended [33]. Event organizers and authorities should implement infection control measures during mass gatherings to minimize Monkeypox transmission, as suggested by the UK government and WHO's

resource toolkit for large events during outbreaks [34–36]. WHO's three-step risk assessment approach aims to limit disease spread at such gatherings [34, 35]. Figure3 shows three-step assessment approach.

Figure 3. The three-step WHO Risk Assessment approach during Mass Gatherings.



LGBTQIA Festivals

In the ongoing global Monkeypox outbreak, the LGBTQIA+ community, particularly men who have sex with men (MSM), is significantly affected [6,37]. Louisiana faced a Monkeypox outbreak, prompting efforts during events such as Southern Decadence to vaccinate at-risk populations [37]. Collaborating with the CDC, the Louisiana Department of Health (LDH) administered the JYNNEOS vaccine before the festival, conducting free vaccinations in diverse community settings [37, 38]. This targeted approach aimed to overcome barriers and reach marginalized groups while ensuring vaccine equity [38]. The LDH focused on providing vaccinations in locations comfortable for MSM, collecting demographic data in collaboration with the CDC to ensure compliance [38]. Prioritizing vaccine equality, especially for disproportionately impacted groups, was crucial in curbing Monkeypox spread [39]. Events like Southern Decadence presented opportunities to educate, increase vaccine demand, and offer stigma-free vaccination settings for the LGBTQIA+ community, emphasizing the importance of immunization [38]. Efforts before and during the festival aimed to increase accessibility and reach diverse demographics, showing higher vaccine uptake among racial and ethnic minorities at specific community settings [38]. This community-involved approach improved vaccine equity and reduced health disparities, highlighting the significance of

tailored messages and venue selection for immunization events [38].

CONCLUSION

Monkeypox poses a significant public health threat, emphasizing the need for global strategies and robust health systems to prevent large-scale outbreaks. Vaccinating high-risk groups remains essential in combating the disease's spread. Efforts at events like football matches and LGBTQIA+ festivals are crucial in curbing transmission and ensuring comprehensive plans to manage Monkeypox outbreaks globally [40].

Limitations

This study's fundamental limitation may include the possibility of publication bias and the probability that pertinent studies might have been overlooked due to the search technique or inclusion criteria. Also, the included studies' quality varied, limiting how broadly the results could be applied.

Authors' contributions

Ahmad Feras AlSamhori: Conceptualization, Investigation, Writing - Original Draft, Project administration, Writing - Review & Editing, and Supervision, **Jehad Feras AlSamhori:** Writing - Original Draft, and Supervision, **Ibraheem Alkhawaldeh:** Writing - Review & Editing**, Abdelrahman Feras AlSamhori**: Writing - Original Draft.

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استعداد الدول للوقاية من جدري القرود في فعاليات التجمع الجماهيري القادمة: الحالة الحالية والتوصيات

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الملخص

الخلفية والأهداف: يهدد مرض حيواني خطير يسمى جدري القرود (MPX)الصحة العامة من خلال انتشاره في جميع أنحاء العالم. وهو مستوطن في غرب ووسط أفريقيا، وخاصة في جمهورية الكونغو الديمقراطية، حيث تم الإبلاغ لأول مرة عن إصابته في الإنسان. ومما يثير القلق الزيادة الأخيرة في معدل الإصابة عبر عدة قارات في الدول غير الموبوءة.

منهجية الدراسة: هناك 86746 حالة مؤكدة حتى 31 مارس 2023. وترتفع حالات الإصابة بالـ MPX بشكل ملحوظ، حيث يشهد الذكور أعلى معدلات الإصابة. وينبغي النظر في التوصيات المختصرة الصادرة عن منظمة الصحة العالمية (WHO) ومراكز السيطرة على الأمراض والوقاية منها (CDC) بشأن أحداث التجمعات الجماهيرية (MG) للحد من انتشار هذا المرض. تشكل دوريات كرة القدم والمباريات الرياضية الأخرى، التي تجتذب عدداً كبيراً جداً من المشاركين والجمهور، مخاطر جسيمة وعواقب على الصحة العامة. وبالتالي، مع بداية التطعيمات في يوليو/تموز 2022، يجب على صناع سياسات الرعاية الصحية على مستوى العالم اتخاذ خيار صعب بشأن لقاح جدري القرود في هذه المرحلة من تطور المرض. منذ ذلك الحين، توصي مراكز مكافحة الأمراض والوقاية منها (CDC) ممارسي الرعاية الصحية بوضع إرشادات سريرية تساعدهم في التعرف على الحالات وتقديم تحديثات المراقبة والمتابعة والعلاج المناسبة. في الفاشية العالمية الحالية، يعد المثليون ومزدوجي التوجه الجنسي وغيرهم من الرجال الذين يمارسون الجنس مع الرجال (MSM) المجموعة السكانية الأكثر تأثراً.

الاستنتاجات: لذلك، من الضروري الحد من انتشار فيروس جدري القرود عن طريق زيادة الطلب على اللقاح بين أفراد المجتمع المحلي من المثليات والمثليين ومزدوجي التوجه الجنسي والمتحولين جنسيًا والمثليين والمتسائلين وثنائيي الجنس واللاجنسيين (LGBTQIA) وتثقيفهم حول قيمة التحصين.

الكلمات الدالة: جدري القرود، أحداث التجمعات الجماهيرية، التوصية، LGBTQIA.