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Protecting hospitals and the community from the current global monkeypox outbreak: Lessons from the COVID-19 pandemic

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Abstract

Monkeypox is a zoonotic disease caused by the monkeypox virus (MPXV), which produces lesions similar to smallpox among human beings. The MPXV outbreak (which is endemic to rainforest African countries) has emerged as a major global concern. In recent years, exposure to MPXV was reported among certain occupational groups, including veterinary staff, pet store employees, animal distributors, and healthcare workers (HCWs), particularly those who work in frontline positions. Hospitals provide a conducive environment for transmitting infectious diseases(e.g., COVID-19 transmission). This warrants the need to develop an effective infection control management plan. Therefore, the authors of this commentary sought to describe a framework for workplace risk assessment and prevention strategies for controlling infection transmission in occupational settings (e.g. hospitals). Occupational health programs, vaccination campaigns at work sites, and educational initiatives to increase knowledge and awareness about effective infection control measures among medical staff and the general public will be essential to prevent future outbreaks. A comprehensive strategy based on an enhanced and multidisciplinary activity coordinated by occupational health services and close collaboration between occupational and public health stakeholders will be warranted. National outbreak preparedness and global coordination efforts for improving the syndemic surveillance of the current global outbreaks in developing and developed countries, per the "One Health" approach, may tackle even the current MPXV outbreak and prevent the spread of the virus among HCWs and the community.

Take-home message: A comprehensive strategy by local and international stakeholders based on strict cooperation between occupational and public health stakeholders may prevent hospital monkeypox outbreaks.
Keywords: COVID-19; Hospital Infection; Hospital Preparedness; Monkeypox virus; Occupational health services.

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Monkeypox (as first identified in captive monkeys) is a rare zoonotic disease caused by the monkeypox virus (MPXV), which is a member of the *Poxviridae* family and orthopoxvirus genus, resulting in a smallpox-like disease in humans [1,2]. Some studies reported African rodents as the natural reservoir of Monkeypox, although infections have also been reported in non-human primates [1,2]. MPXV by virtue of belonging to the *Poxviridae* family, have an envelope made up of lipoprotein and have a linear double-stranded DNA [2,3].

Monkeypox (See Figure 1) was first detected among laboratory monkeys in 1958 [3,4]. In 1970, the first human case was reported among residents of remote Africa [3]. During 1981-1986, Monkeypox was largely prevalent in the Democratic Republic of Congo [DRC] (earlier known as Zaire) and was endemic to rural Africa, with some sporadic cases being reported in other countries as well [2–5]. A massive outbreak of Monkeypox occurred in February of 1996-1997 with 71 cases and six deaths in Zaire [6]. In March-May of 1997, the burden of Monkeypox cases increased to 170 cases, with a significant proportion of the cases resulting from secondary exposure [6]. Since Monkeypox in humans was initially diagnosed in 1970 in the DRC, it has spread to parts of Central and West Africa where the virus was endemic. Since May 2022, multiple cases have been identified in many non-endemic countries worldwide.

Some studies outlined the differences in the epidemiology of the outbreaks that happened during 1996-97, with one that occurred in 1970-1979 in Zaire [6]. The differences are described in Table 1.

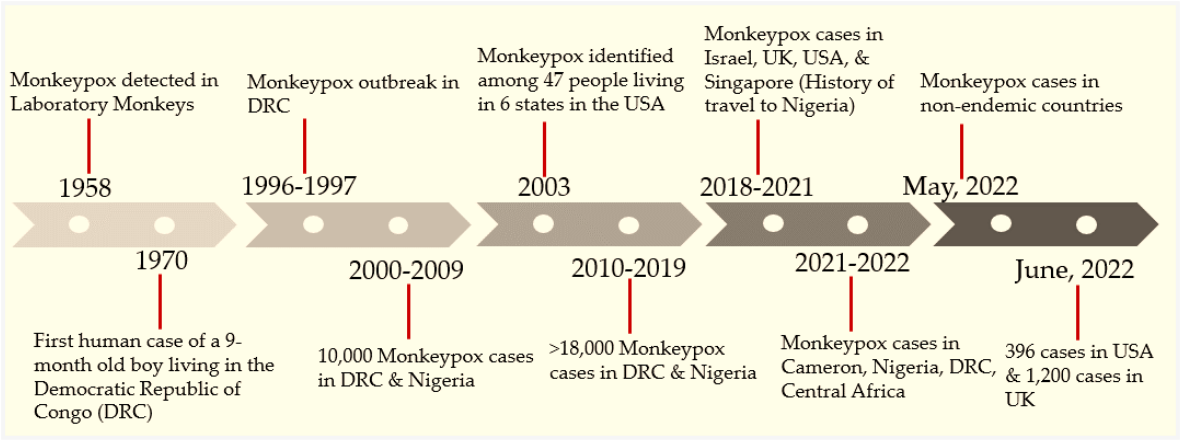

Figure 1. Timeline of Monkeypox.
Note: This image was created by the authors of this paper using statistics provided by the American Society of Microbiology [4].

Table 1. Comparing the epidemiology of the 1996-1997 Monkeypox outbreak with the earlier outbreak that happened in 1970-1979.

Epidemiological pattern	**1996-1997 Monkeypox Outbreak**	**1970-1979 Monkeypox Outbreak**
Prevalence of cases	Higher with larger clusters	Relatively lower
Age-specific burden	27.2% of cases among patients 15 years or above	7.5% of cases among patients 15 years or above

Secondary cases	The higher proportion of secondary cases (73.0%)	Relatively lower prevalence of secondary cases (nearly 30%)
Case fatality rate (CFR)	Lower at 3.3%	Higher at 9.8% (nearly thrice)

Even though MPXV symptoms are less severe than those of smallpox, its case fatality rate and potential for international spread have emerged as major concerns [1]. MPXV is transmitted from animals to humans via contacting or eating an infected animal, and direct contact with the host's blood and body fluids. Furthermore, human-to-human transmission is through contact with a patient's respiratory droplets, lesions, body fluids, and contaminated personal objects. Hospital-acquired transmission as well as sexual transmission from patients with genital MPXV lesions have also been reported [7,8]. As of the 7th of September, 2022, 30,000 Monkeypox cases have been reported in the Americas with the majority of cases that are concentrated in the United States, Brazil, Peru, and Canada, and primarily among men who have sex with men, although at least 145 cases have been reported in women and 54 among people under the age of 18 [9]. Black and Latinx communities have faced disproportionate harm from the COVID—19 pandemic, because of socioeconomic and racial, and ethnic disparities [10]. In the same way, MPXV is having a disproportionate impact on underserved communities, particularly Black, Latinx, and LGBTQIA communities, showing the relevance of social determinants of health in the context of climate change-related vulnerabilities to infections [11].

In recent years, occupationally transmitted infections have been reported among veterinary staff, pet store employees, and animal distributors [12]. Additionally, infections among healthcare workers (HCWs), especially frontline HCWS, employed in areas where this zoonosis is endemic, and working in resource-limited settings with inadequate infection control measures (e.g., a combination of standard, contact and droplet precautions), and lack of personal protective equipment or sanitary supplies, were reported [13]. The role of healthcare settings as amplifiers of infectious diseases, including multidrug-resistant bacteria, bloodborne viruses, and the recent SARS-CoV-2 has already been noted [14]. This underscores the need to protect HCWs and vulnerable patients, who may be disproportionately affected by infectious diseases outbreak, with one example being the current SARS-CoV-2 pandemic [14]. For this reason, Simpson et al. emphasized the importance of postexposure prophylaxis of healthcare workers (HCWs) to the Monkeypox virus in the context of the current global outbreak. Rapid notification of exposure, symptom monitoring, and a risk assessment and stratification procedure are some vital strategies [15]. According to the new recommendations by the Centers for Disease Control and Prevention published in August 2022 [CDC] [16], the type of monitoring and when to isolate patients were discussed. In addition, risk assessment of HCWs and recommendations to monitor HCWs, and criteria to apply work restrictions were indicated [16,17]. It was suggested that asymptomatic HCWs exposed to the monkeypox virus do not need to be excluded from work but should be monitored for 21 days after their last exposure. If rash or other symptoms occurs, they could be temporarily excluded from work with a short isolation period. However, most cases with the mild and self-limited disease may go undetected, and the infection may be spread from asymptomatic HCWs to vulnerable patients, leading to potentially hospital and community outbreaks. Furthermore, the CDC recommends additional infection control precautions for patients with suspected or confirmed monkeypox infection, who should be placed in a single-person room, whereas HCWs should use personal protective equipment, such as Filtering Face Piece-2 masks (FFP2), eye protection, gown and gloves in the patient's room. Environmental infection control strategies, including waste management practices, should also be implemented [16,17]. Treatment with antivirals (e.g., tecovirimat, brincidofovir, cidofovir) may be needed in severe disease, complicated lesions, and among immunocompromised patients [16,17]. Figure 2 displays some guidelines for MPX evaluation.

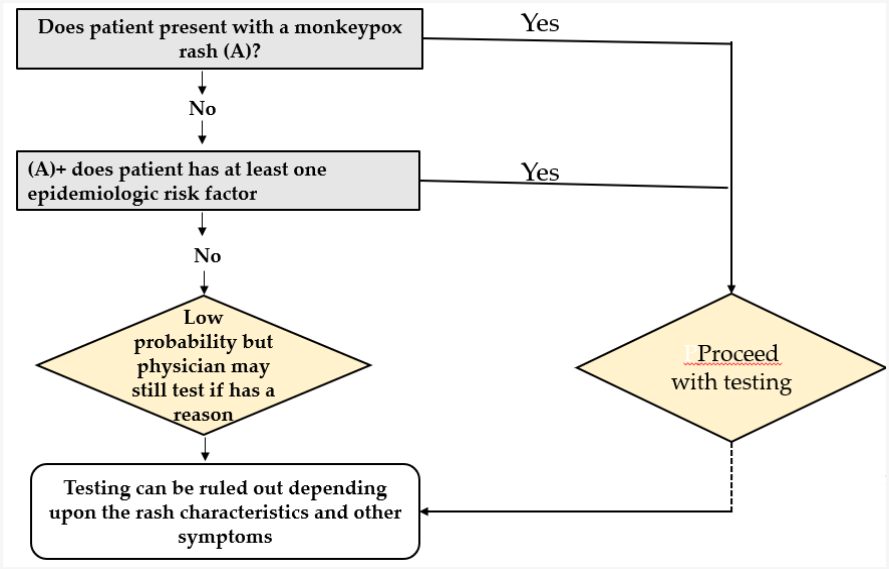

Figure 2. Guidance for MPX evaluation.
Note: Figure 2 was adapted from the population health division San Francisco Department of Public Health.

Comprehensive surveillance through a close collaboration between occupational and public health stakeholders is warranted. First, occupational health surveillance programs on HCWs should be implemented, before they are exposed to the virus to provide particular protection to "fragile" workers. Vaccination should be recommended to susceptible HCWs (e.g. research laboratory personnel, clinical laboratory personnel performing diagnostic testing for monkeypox virus, designated response team members, and HCWs who administer smallpox vaccines or care for patients infected with monkeypox virus) and to those being immunocompromised. Implementing biological safety measures in combination with information and training for employees, and emergency action plans should be planned in the workplace risk management process framework. The workplace risk management process is a method through which employers identify hazards (hazard identification), evaluate the probability of occurrence of injury or disease (risk analysis), and establish the most effective preventive and protective measures to eliminate risk and protect workers' health and safety (risk control). Workplace risk management should include hospital preparedness for epidemics, including Monkeypox virus outbreaks. Furthermore, when suspecting a case of monkeypox (eg, a patient with fever, skin lesions, and a history of visiting an endemic area or contact with patients), the patient should immediately be placed in a negative air pressure isolation room, or a private room if such facilities are unavailable [1,19–25]. One of the lessons we have learned from the COVID-19 pandemic is that protecting the health of workers, patients and visitors may be obtained through a comprehensive strategy based on an enhanced and multidisciplinary activity coordinated by occupational health services and close collaboration between occupational and public health stakeholders [26–28]. For this reason, local and international authorities' increasing knowledge, awareness, and medical education among HCWs and the general public are of central importance [1]. National outbreak preparedness and global coordination efforts for improving the syndemic surveillance of the current global outbreaks in developing and developed countries, per the "One Health" approach, may tackle even the current MPXV outbreak and prevent the spread of the virus among HCWs and the community. This is critical to support emotionally exhausted HCWs and our overwhelmed healthcare systems [29,30], to address a double burden of non-communicable diseases and communicable diseases, especially among low-income countries with fragile health systems.

As we learned from the COVID-19 pandemic, governments should develop national outbreak preparedness, address the shortfall in the global health workforce and build capacity for infection prevention and control measures [28,29]. These measures may be useful to address the global spread of infectious diseases driven by several interconnected factors, such as globalization, poverty and health inequities, climate change, and vaccine hesitancy [33-39].

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