



# A protocol for testing monkeypox (mpox) preparedness in healthcare delivery systems

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## Introduction

The 2022 multi-country outbreak of monkeypox (mpox) beyond known endemic countries in Western and Central Africa challenged both overstretched public health and healthcare delivery systems' recovery from the acute phases of the coronavirus disease 2019 (COVID-19) pandemic and our understanding of endemicity in an interconnected world (1). Since May 2022, more than thousands of confirmed mpox cases have been reported in countries across the globe (2). The unique transmission pattern of the virus and spread beyond endemic countries created a challenge for outbreak management and control within healthcare delivery, specifically related to prompt identification and isolation of patients suspected to have mpox and coordination with public health authorities for case evaluation, specimen collection and testing, and clinical management during the first few months of the outbreak.

Mpox transmission between humans is generally thought to occur during prolonged person-to-person contact with exposure to respiratory droplets, direct contact with a rash or sores (i.e., perianal/vaginal regions) as well as through contact with contaminated clothing, bedding or other items used with a person infected with mpox (3). Symptoms

usually start within five days of exposure to the virus and may include fevers/chills, headache, muscle aches, back pain, fatigue, and lymphadenopathy. Skin lesions or rash may appear 1–3 days after initial symptoms, and may appear all over the body or certain body parts (i.e., face, inside of mouth, genital or anus). The skin lesions progress through four stages, macular, papular, vesicular, to pustular, before scabbing over. The medical moulage in our exercise simulated mpox papules on the palms (*Figure 1*).

Further clinical challenges of the 2022 mpox outbreak included (I) a lack of robust educational and clinical training due to historically rare cases in non-endemic countries (4); (II) atypical clinical presentation and epidemiological linkages, leading to an overlap in clinical presentation of sexually transmitted infections; (III) the need for specific screening criteria for initial patient assessment; and (IV) close coordination for public health partners for specimen collection and testing during the first two months of the outbreak before mpox testing was commercialized to other commercial reference laboratories. The mpox outbreak underscored how education and training on screening criteria, travel history and epidemiological linkages, identification of clinical characteristics, infection prevention and control measures, and waste management

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**Figure 1** Simulated mpox lesions using medical moulage and makeup. Mpox, monkeypox.

are crucial for healthcare personnel when facing an infrequently encountered infectious disease and to prevent staff exposures. To ensure healthcare systems are prepared, protocols and resources must be practically crafted, applied, and assessed to ensure operability. Exercises allow for real-time assessment of protocols and resources to showcase strengths and identify opportunities for logistical and operational improvements. Here, we present key planning strategies used by the New York City Health + Hospitals System-Wide Special Pathogens Program to coordinate a mpox functional exercise based on key strategies gleaned from emergency management, for increased infectious disease preparedness.

### Key steps to coordinate an mpox functional exercise

#### *Establish objectives*

Determine which existing guidance, protocols, or processes must be tested or practiced and decide if there is any new guidance, process/workflows, or facilities that should be exercised specifically for mpox.

#### Examples of core objectives

- ❖ Identify: assess a facilities' ability to identify a patient within "X" minutes from point of entry.
- ❖ Isolate: assess a facilities' ability to isolate a patient within "X" minutes from time of identification at point

of entry. Assess health care personnel's ability to follow appropriate infection prevention and control measures [i.e., placement into airborne isolation room, staff wearing appropriate personal protective equipment (PPE)].

- ❖ Inform: assess a facilities' ability to notify appropriate internal contacts (i.e., infection prevention and control, facility leadership, laboratory, environmental services). Assess a facilities' ability to coordinate with public health partners (i.e., local health department, public health laboratory) to ascertain risk and collect specimens.

#### Examples of protocols or guidance to test

- ❖ Waste management: assess handling, packaging, and storage of waste generated during patient care based on mpox virus clade.
- ❖ Occupational health services: assess healthcare worker monitoring guidance for health care personnel exposed to mpox.
- ❖ Laboratory support services: assess specimen collection, handling, packaging, and shipping protocols.

Detailed planning efforts and toolkits can be found on The National Emerging Special Pathogen Training and Education Center (NETEC) (5) and New York City Department of Health and Mental Hygiene (6) websites.

#### *Develop a scenario and simulate mpox lesions*

Develop a realistic scenario for the simulated patient actor which incorporates different elements of the mpox case definition including relevant travel history, symptom onset, and specific epidemiological factors. Fake patient demographics (name, age, date of birth, home address, phone number) should be used as well. Medical moulage and makeup can be used to simulate mpox papules or vesicles (Figure 1).

#### *Create an outline and collaborate with key stakeholders*

At minimum, a functional exercise involves a patient actor, exercise evaluators, and key personnel within specific departments, such as occupational health, infection prevention and control, and emergency management. Once the exercise begins, the patient actor notes details from waiting room layout to time from entrance and to triage and to isolation. Once isolated, the patient actor waits for the clinician to assess the case further, then ends

the exercise after the initial evaluation. An exercise may be terminated if real safety concerns arise or if wait times have a predetermined duration, which may be followed by a discussion of next steps if the exercise had continued.

### ***Organize a debrief meeting and create an after-action report***

The exercise must involve a discussion of drill outcomes with key stakeholders to identify strengths, weaknesses, opportunities for improvements, and threats to the healthcare system. Performance for each objective should be evaluated and included in an after-action report with corrective actions to address gaps or weaknesses (7).

## **Conclusions**

The 2022 mpox outbreak is the latest example of an infectious disease that has circulated beyond previously identified endemic countries and poses a new challenge for preparedness efforts. To this end, performing exercises provides a twofold benefit: (I) for staff to practice their own role in case management and (II) for the facility to test existing protocols, plans and processes including travel screening and PPE usage and to identify any gaps and challenges before a real-world event. While this protocol outlines objectives to test, there are limitations to how many and which objectives can be tested based on the structure and function of the health facilities at which they are tested. In addition, these exercises are only as valuable as the buy-in from healthcare providers and a healthcare system at large, where the realistic nature of the exercise is key to hone instincts around responding to potentially high-risk threats. Special consideration should also be given to support staff members involved in the exercise and providing mental and psychological support, as needed. In an increasingly interconnected world rife with emerging and re-emerging infectious diseases, novel threats and public health challenges, these exercises offer a way to bridge gaps between clinical and public health, strengthening healthcare systems and protecting patients, healthcare professionals, and our community.

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