100 Days of Monkeypox: Evaluating the U.S. Response to the Emerging Global Outbreak

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INTRODUCTION

As Dr. Jay Varma, Director of the Cornell Center for Pandemic Prevention and Response, stated to John Oliver on August 8th, “...monkeypox was the perfect stress test.” The United States already had the tests, the vaccines, and the therapeutics to combat monkeypox because of its biodefense strategy to respond to a weaponized use of smallpox.¹ Yet, the early response has faced challenges.

August 15, 2022, marked the 100th day since the first case of monkeypox was reported in the United Kingdom, the first appearance of the disease’s spread in non-endemic areas. Since the first case was reported in the United Kingdom on May 7th, the virus has been confirmed in over 90 countries.² As of August 15th, there were 38,452 cases across the globe, with 12,636 in the United States alone.³ Simply put, the spread of the virus outpaced the public health messaging and activation of the medical countermeasures available.

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To understand how the virus has spread despite U.S. preparations, it is important to examine the key response efforts tailored to the monkeypox outbreak.

**EARLY DYNAMICS OF THE OUTBREAK**

As highlighted during the rise of COVID-19, effective public health messaging and community engagement efforts are important to gaining control over an emerging infectious disease outbreak. Early reports indicated that this outbreak of monkeypox was atypical. Initial indicators like fatigue were less common than is often the case for victims of this virus, and the lesions associated with monkeypox also presented in lower numbers and more discrete regions of victims’ bodies.⁴

These differences in how infections were driving symptoms meant that many individuals did not fall into the case definition for monkeypox and were either misdiagnosed or undiagnosed. After June 24th, the U.S. Centers for Disease Control and Prevention updated its guidance to clinicians to detail the new information and examples to compare similarly-presenting diseases.⁵

Prolonged skin-to-skin contact has emerged as the primary transmission route,⁶ and exposure to contaminated porous surfaces⁷ are ways monkeypox is spreading. These means of spread result in dense social and sexual networks being particularly vulnerable to viral exposure and spread.⁸

While the initial spread has disproportionately affected the community of gay and bisexual men who have sex with multiple partners⁹, the virus is affecting the entire population and its jump within another dense social network is only a matter of time.¹⁰,¹¹ However, the early messaging emphasis on the men who have sex with men has many in the LGBTQIA+ community concerned that the same bias-driven mistakes from the HIV/AIDS epidemic are being repeated.¹² Further, public health experts are already concerned that testing and treatment are not reaching at-risk and potentially positive individuals due to the outbreak’s stigmatization.¹³

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THE TESTING, VACCINATION, AND THERAPEUTIC ROLLOUT

Monkeypox is somewhat unique in U.S. preparedness for this virus, though the experience to date has made clear that putting that preparedness to use requires further improvements.

First, this case shows the importance of advance investments in research, development, acquisition, and stockpiling. Unlike other emerging infectious disease outbreaks, the United States had the toolkit to respond to the threat of monkeypox. As highlighted in CSR's previous piece on the initial response to the outbreak, biodefense strategies to combat smallpox led to the development of tests, vaccines, and therapeutics that are effective for monkeypox.

However, at the same time, several hurdles hampered the containment response during the first 100 days.

TESTING

From the onset of the outbreak, experts have warned that the rate of testing for monkeypox is insufficient. Back on June 23rd, the United States had 237 confirmed cases, but the CDC had only run 1,058 tests. By the end of July, testing capacity across public and private entities was up to 80,000 tests per day, yet many of the labs involved were receiving less than 100 samples to run per week.

One complication contributing to the low testing rate is the current testing protocol, requiring a swab of a patient's lesions for PCR testing. This strategy is limiting for multiple reasons, including the delay between infection and the presentation of the lesion, the presence of positive patients who do not exhibit lesions, and the multi-day lag from sample to result. Another factor is that monkeypox was not one of the state-mandated notifiable diseases until the CDC recently required it starting on August 1st. This means that some positive cases that could have better-indicated actual trends may not have been on the government's radar.
VACCINATION

At the onset of the outbreak, the majority of the vaccines in the Strategic National Stockpile (SNS) were the ACAM2000 vaccine, which has a higher risk of side effects compared to the JYNNEOS two-dose vaccine. In May, the SNS only had 2,400 doses of JYNNEOS on hand. On August 4th, Health and Human Services detailed the shipment of 602,000 JYNNEOS doses to states and jurisdictions. However, estimates on July 31st put the U.S. population eligible for the two-dose vaccine at 1.5 million.

One ongoing hurdle is the lack of data-sharing agreements between local health systems and the CDC. This is impacting the ability to track the testing at local levels, the logistics of doses administered, and monitoring the effectiveness of the current vaccination strategy.

Furthermore, the U.S. Food and Drug Administration’s Emergency Use Authorization on August 9th is aimed at tackling the disparity between the vaccine supply and demand by changing the injection to be released between the layers of the skin, using 20% of the dose compared to the standard vaccination into the muscle. This new vaccine administration strategy is intended to stretch the limited SNS JYNNEOS supply, a move that has resulted in a clash between the vaccine’s manufacturer and the Biden administration.

THERAPEUTICS

At the start of the outbreak, there were 1.7 million courses of TPOXX, an antiviral cleared for use against smallpox in 2018, available in the SNS. By July 22nd, when there were over 6,000 probable or confirmed cases in the United States, only 223 people were prescribed TPOXX courses.
The prescription of TPOXX under the CDC’s expanded access protocols is due to the drug’s initial study against smallpox, a virus belonging to the same family as monkeypox. This regulatory process involves intensive paperwork to obtain permission for treatment by the CDC, with additional internal reviews within healthcare systems due to the experimental use of the drug specifically for monkeypox.

**OUTLOOK AND ANALYSIS**

On August 4th the U.S. Health and Human Services Secretary Xavier Becerra declared the ongoing monkeypox outbreak a Public Health Emergency. The announcement came 12 days after the WHO designated monkeypox a public health emergency of international concern and 2 days after the Biden administration chose Robert Fenton, Jr. (of the Federal Emergency Management Agency) and Dr. Demetre Daskalakis (of the CDC) to coordinate the U.S. federal monkeypox response.

In addition to improving public health messaging and the opening of federal resources for testing and vaccination, the emergency declaration could expand efforts like wastewater surveillance, which already plays an important role in monitoring COVID-19.

Regarding TPOXX, the CDC took steps on August 8th to expedite its procurement. The goal is a streamlined process for clinician requests and reducing the turnaround time from several days to delivering the medication from the SNS within 24 hours.

In response to the novelty of the monkeypox outbreak, HHS launched several new studies. In early July, the CDC stated that it will explore testing saliva, blood samples, and throat swabs. International studies have found monkeypox in saliva, blood, urine, and rectal samples before the onset of lesions. Additionally, the National Institutes of Health is conducting several studies to understand TPOXX’s clinical efficacy on monkeypox in human populations, as well as understanding co-treatments with both vaccines.

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33 Ibid, 22.
37 “Information for Healthcare Providers on Obtaining and Using TPOXX (TECOVIRIMAT) for Treatment of Monkeypox.” Centers for Disease Control and Prevention, August 18, 2022.
40 Park, Alice. “What to Know About the Monkeypox Drug TPOXX—And Why It’s So Hard to Get.” Time, August 9, 2022.
The ongoing monkeypox outbreak is a considerable threat to the public health and national security of the United States. With K–12 schools and colleges resuming in-person sessions,\textsuperscript{41} it will be imperative to expedite messaging, testing, and vaccination efforts. Growing concern about the outbreak’s trajectory is that it may establish itself with an animal vector, most likely a rodent, within the United States and become endemic.\textsuperscript{42} With the decline in smallpox vaccination, models have indicated that a monkeypox outbreak fits the potential to become endemic.\textsuperscript{43}

As the virus has not been contained within the initial 100 days of the outbreak, the United States should take concrete steps across the entirety of the monkeypox response effort to get a firm handle on this infectious disease event. Detailed below are CSR’s recommendations for addressing the ongoing monkeypox Public Health Emergency.

- Public health experts need to build upon inclusive messaging regarding the spread and prevention of monkeypox\textsuperscript{44} while building a dialogue with the LGBTQIA+ community on what they are experiencing, how to help stop the spread, and how to find support.\textsuperscript{45}
- The CDC should expand its funding on wastewater surveillance to include monkeypox,\textsuperscript{46} to help provide new avenues of information on at-risk populations and viral load to get ahead of clinical testing-related lags.
- Strategic resources and authorities like data sharing agreements should be prioritized to ensure every opportunity for the CDC’s Center for Forecasting and Outbreak Analytics\textsuperscript{47} to be successful in contributing to the biosurveillance landscape.
- The National Institutes of Health should consider ramping up the RADx Initiative\textsuperscript{48} with the goal of developing rapid monkeypox tests, an important step toward increased community engagement and reducing barriers to care.
- With their recent elevation to an operational division,\textsuperscript{49} the Administration of Strategic Preparedness and Response in HHS is facing its first national emergency under this new structure.
An internal study of the outbreak's first 100 days should be conducted to determine what actions need to be taken in future outbreaks based on new authorities, including evaluating the SNS.

- The Department of Defense (DoD) must always be a key player in improving preparedness and responses. It had great success in the U.S. response to the 2014-2016 Ebola outbreak, being a critical member of Operation Warp Speed and the COVID-19 response, and expanding international partners’ biosurveillance capacities through the Biological Threat Reduction Program. DoD and national security needs helped drive the development of smallpox diagnostics, vaccines, and treatments. Its partnerships in Africa contributed to bolstering epidemiological tools and sequencing from previous monkeypox outbreaks, which provided insights relevant to the current monkeypox outbreak. Further, DoD has skills in international collaboration and emergency response contracting that may be used in the monkeypox outbreak.

- The combined U.S. response to COVID-19 and monkeypox will surpass $4.5 trillion in costs over a three-year span. It is critical to invest in our nation’s capabilities to better anticipate, detect, and respond to emerging infectious diseases of the future. To achieve this goal, CSR continues to recommend investing $10 billion per year for biodefense and $10 billion per year for health security, sustained over the next ten years.

The Biden administration has rightfully committed to action in preventing monkeypox from becoming endemic and stopping this outbreak. The ongoing responses to monkeypox and COVID-19 are yet another alarm bell that the United States must get far more serious about preventing and addressing biological threats.

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