



Addressing mpox disparities among MSM in Los Angeles County

Introduction

In the ongoing mpox (monkeypox) outbreak of 2022, California is the state with the highest number of cases and Los Angeles County (LAC) has the highest number of reported cases in the state. As of December 9, 2022, 2,245 confirmed mpox cases have been reported in LAC (LAC Department of Public Health, 2022). Most were among gay, bisexual, and other men who have sex with men (MSM). People living with HIV (PLWH) have been disproportionately impacted, with over 40% of diagnosed mpox cases being among PLWH.

Early Response

The LAC Department of Public Health (DPH) has undertaken several strategic initiatives to curb the spread of mpox, including community education on symptoms and isolation, vaccination, and treatment. Despite early shortages of the JYNNEOS vaccine, as of December 9, 2022, 73,866 vaccine doses have been administered¹. Most of these doses went to those identified as male (84%) and those who identified as gay or bisexual (82%). Racial/ethnic disparities in those receiving the vaccination compared to those diagnosed with mpox were notable – Latinx residents represent 47% of mpox cases but only 32% of those who have been vaccinated; Black residents represent 13% of mpox cases but only 9% of those who have been vaccinated.

Mpox cases began to decline in mid-August, possibly due to vaccination efforts and reductions in sexual partnerships among MSM. The Centers for Disease Control and Prevention (CDC) published a Morbidity and Mortality Weekly Report (MMWR) on national data collected online in early August indicating that nearly half of the 2,999 respondents reported reducing their number of sex partners, reducing one-time sexual encounters, and reducing sex with partners met on dating apps or at sex venues (Delaney et al., 2022). In LAC, the DPH and many community-based organizations promoted harm reduction efforts for mpox prevention, which included such modifications to sexual practices.

HIV and mpox Syndemic

Mpox is of particular concern for PLWH. On September 9, 2022, the LAC DPH issued a letter to healthcare professionals across the county warning of severe mpox infection among PLWH who were not on antiretroviral treatment and/or had a weakened immune system (Los Angeles County Health Alert Network, 2022). A CDC MMWR also highlighted 57 patients hospitalized for mpox complications – most of whom were male, Black and had advanced HIV (Curran et al., 2022). In LAC, 51% of those who received Tecovirimat (TPOXX) – the investigational medication to treat mpox – were PLWH (O’Laughlin et al., 2022).

¹ This number accounts for first doses administered and data is available on the public facing dashboard. In total, LAC DPH has administered just over 115,000 doses - which includes both first and second doses.

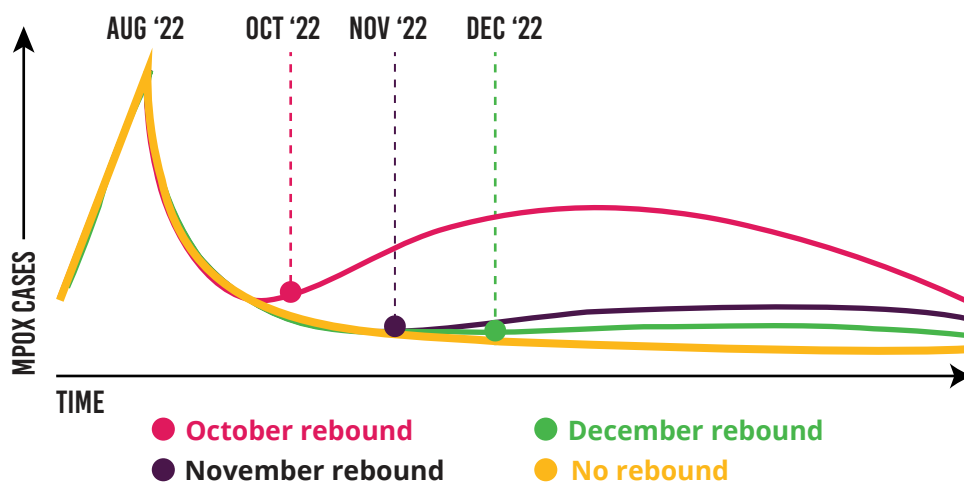
Findings

This report summarizes findings from a partnership between the Southern California HIV/AIDS Policy Research Center (SCHPRC) and the University of Southern California (USC) Viterbi School of Engineering with key input from LAC DPH. The goal of the project was to use microsimulation modeling to understand the trajectory of the mpox outbreak in LAC to inform ongoing public health efforts that focuses specifically on health equity.

Reduction in transmission is key to mpox control

Simulation results confirm that persistent reduction in transmission (possibly through reduction in the number of sexual contacts or other methods) is important to effective mpox infection control. Counterfactual scenarios examining what would have happened had transmission risen to levels seen in early summer after October 2, November 6, or December 4 indicate that case counts would have been substantially higher (see Figure 1). The figure shows that maintaining low partnership levels for longer results in better disease control. Efforts to limit transmission through effective public health messaging were likely critical to low levels of mpox cases observed in early December.

Figure 1: Incident cases over time under scenarios where partnership levels fully rebounded to levels seen in early summer on October 2, November 6, or December 4

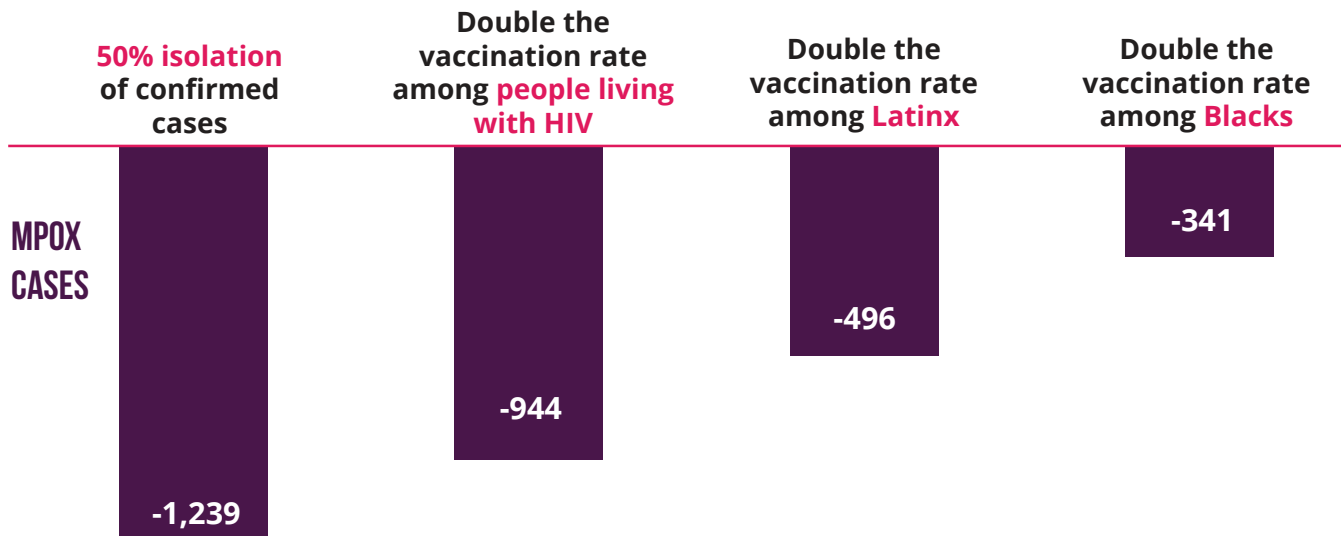


Effect of interventions if partnership levels rebounded in November

Understanding intervention effectiveness in counterfactual scenarios with higher case counts than currently observed can help us prepare to implement a rapid response if case counts rise in the future. In a counterfactual scenario where partnership levels rebounded in early November, we found that the most effective intervention for preventing mpox infection in the overall MSM population would be to ensure that at least 50% of those aware of their positive mpox status remain isolated for the duration of their illness (Figure 2).

Figure 2 also presents results for cumulative mpox cases averted among all MSM between December 2022 and July 2023 if we were to double vaccination rates among MSM living with HIV, Latinx MSM, and Black MSM. Our analysis suggests that targeted vaccination of PLWH would yield the highest number of cumulative cases averted, followed by targeted vaccination of Latinx and Black MSM. While targeting vaccination efforts to PLWH may be more effective than targeting vaccination efforts for MSM based on race/ethnicity, we found that all targeted vaccination interventions would reduce the number of mpox cases across all demographic groups due to sexual partnerships between MSM of different racial/ethnic groups.

Figure 2: Cumulative mpox cases averted by intervention among MSM in LAC



Programmatic Recommendations

Policy recommendations supported by this research will help curb the spread of mpox among MSM in LAC:

- Continue to disseminate evidence-based harm reduction messaging that educates and empowers MSM communities.
- Ensure that harm reduction and vaccine promotion materials are available in Spanish and culturally tailored to reach LAC's diverse Black and Latinx communities.
- Leverage existing public health infrastructure, including LAC's Medical Care Coordination (MCC) program, to bolster vaccination efforts for PLWH.
- Co-locate mpox vaccination efforts with HIV testing locations in order to ensure that those newly diagnosed have access to mpox vaccination.
- Stage specialized vaccine promotion efforts to address vaccine hesitancy and vaccine fatigue, including pop-up vaccine clinics in Black and Latinx communities.
- Advocate for financial assistance programs and safety net supports for those diagnosed with mpox, similar to those offered for COVID-19, to support isolation practices.

Discussion

This report summarizes findings from a microsimulation modeling study to understand the trajectory of the mpox outbreak in LAC to inform ongoing public health efforts with a focus on health equity. Findings from the project indicate the importance of maintaining partnership reduction among MSM while increasing targeted vaccination efforts for PLWH and Black and Latinx MSM, communities which to-date have had lower vaccination uptake relative to their share of mpox cases.

In August, Governor Newsom declared a state of emergency to support California's response to the mpox outbreak (Office of Governor Gavin Newsom, 2022), which was followed by \$41 million

allocation to combat mpox. Nearly 16 million of these funds are earmarked for local county public health departments and community-based organizations to bolster their mpox response efforts. Policy interventions outlined above including financial assistance to support isolation for those diagnosed with mpox should be considered.

Our microsimulation modeling indicates that targeted efforts like those outlined above will have meaningful impact in the continued reduction of mpox cases in LAC. While it is unlikely that mpox can be eradicated in LAC due to migration and clusters of community members who remain unvaccinated, mpox control can likely be achieved in advance of warm-weather, close-contact celebrations that initially promoted mpox transmission during the summer of 2022

Methods

Model overview

We converted a published HIV simulation for MSM developed in partnership with LAC DPH to model the ongoing mpox outbreak. Leveraging an existing, peer-reviewed model for this new adaptation means many of the underlying population dynamics, including sexual partnerships by age and race/ethnicity, are already simulated and validated in detail. After discussion with policy experts, clinicians, and epidemiologists, we restructured the simulation to capture mpox disease progression, vaccination, treatment, and recovery.

Model structure, dynamics, and inputs

Specifically, the model simulates health and treatment states at each week, points at which individuals can be susceptible, asymptomatic, symptomatic, or have recovered from mpox. All individuals may seek testing; susceptible and asymptomatic individuals may become vaccinated, which reduces the likelihood of becoming infected for susceptible individuals or hastens recovery for recently infected asymptomatic patients. Symptomatic individuals may receive treatment, which hastens recovery. The probabilities and rates of these transitions are informed by published literature, surveillance data from LAC DHSP, and discussions with public health experts.

The model is stratified by age, race/ethnicity and HIV status, which allows transition probabilities (and therefore infection, testing, vaccination, treatment, and recovery rates) to vary by these characteristics. Including these parameters in our model means we can capture differences observed in the empirical data between these groups; for instance, the model captures the higher burden of mpox among PLWH. We assume that infection is spread primarily through sexual contact, and we use age- and race/ethnicity-specific sexual partnership patterns as calculated from survey data on partnership demographics and frequency gathered by the Los Angeles LGBT Center (Drabo et al., 2022, Nguyen et al., 2022).

Because many model inputs were uncertain (e.g., the rate of test-seeking behavior by demographic group), we calibrated the model to match observed trends. Calibration parameters included the likelihood of infection given a discordant contact (force of infection), number of asymptomatic individuals at the beginning of the simulation, the relative risk of infection by age, race/ethnicity, and HIV status, the age-specific likelihood of seeking testing, and the relative risk of vaccination by age and race/ethnicity.

Of note is that the rate of sexual partnerships among MSM reportedly dropped sharply in mid-August, six weeks after the beginning of the simulation, due to increased awareness of mpox risk. This is suggested in empirical data by a reduction in the number of detected mpox cases and has been documented nationwide by the CDC (2022). The simulation accounts for this by using a time-varying force of infection that is reduced after the sixth week of the simulation.

Model scenarios and outcomes

We used the simulation to better understand the effect of sustaining harm reduction strategies to modify sexual practices (e.g., reducing the number of sex partners), increasing vaccination rates, and increasing isolation rates for patients diagnosed with mpox. Specifically, we used the simulation to evaluate a counterfactual scenario where partnership reduction returned to levels observed in the early summer, October, November, or December. We also evaluated scenarios where there was a partial rebound in the rate of sexual partnerships. In addition, we evaluated cases averted by simulating 50% isolation among those diagnosed with mpox and interventions where the likelihood of becoming vaccinated among those susceptible or asymptomatic was doubled for Black, Latinx, or PLWH MSM starting at the end of October. For each of these scenarios, we used the simulation to forecast the incident cases, cumulative cases, and percentage of cumulative cases by group (age, race/ethnicity, and HIV status) between December 2022 and June 2023. We also evaluate when, if ever, the scenarios result in less than 10 incident cases per week, as this was determined by public health experts to be a reasonable metric that the disease is under effective control.

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