HHS Public Access

Author manuscript

Clin Infect Dis. Author manuscript; available in PMC 2024 March 21.

Published in final edited form as:

Clin Infect Dis. 2024 March 20; 78(3): 651–654. doi:10.1093/cid/ciad482.

Low CD4 Count or Being Out of Care Increases the Risk for Mpox Hospitalization Among People With Human Immunodeficiency Virus and Mpox

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Abstract

Human immunodeficiency virus (HIV)–associated immunosuppression may increase the risk of hospitalization with mpox. Among persons diagnosed with mpox in the state of Georgia, we characterized the association between hospitalization with mpox and HIV status. People with HIV and a CD4 count <350 cells/mm^3 or who were not engaged in HIV care had an increased risk of hospitalization.

Keywords

Mpox; HIV; hospitalization; tecovirimat; HIV care

As of 1 February 2023, 30 123 cases of mpox had been reported in the United States, and up to 57% of reported cases occurred among people with human immunodeficiency virus (HIV; PWH) [1, 2]. Mpox is typically a self-limited infection; however, HIV-associated immunosuppression increases the risk of severe illness [3, 4]. In a case series from the United States of persons with severe mpox that required hospitalization, 82% were among PWH, 93% of whom had a CD4 count <200 cells/mm^3 and 91% were not on

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Potential conflicts of interest. The authors: No reported conflicts of interest. All authors have submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest.

Supplementary Data

Supplementary materials are available at *Clinical Infectious Diseases* online. Consisting of data provided by the authors to benefit the reader, the posted materials are not copyedited and are the sole responsibility of the authors, so questions or comments should be addressed to the corresponding author.

antiretroviral therapy [3]. However, the CD4 threshold or extent of engagement in HIV care associated with risk of mpox disease severe enough to require hospitalization has not been well characterized. Here, we characterize the relationship between HIV status and risk of hospitalization among persons diagnosed with mpox in Georgia, including variation in risk based on CD4 count, HIV viral load (VL), and engagement in HIV care.

METHODS

We studied mpox cases reported to the Georgia Department of Public Health during 31 May 2022–31 October 2022 using a retrospective cohort design [5]. We characterized the HIV status of persons diagnosed with mpox by linking to Georgia HIV surveillance data, and we characterized the mpox vaccination status by linking to the Georgia Immunization Registry. After an mpox case was reported, health department staff completed the standard case interview form, which included demographic data, diagnostic studies, hospitalization, and symptoms; additional information may have been obtained from healthcare providers [6]. HIV surveillance data include demographic data and longitudinal HIV laboratory studies (CD4 count, VL) [7]. Persons whose reported sex at birth differed from their gender or who reported being transgender were classified as transgender; persons with missing gender data who had a reported sex at birth from their mpox laboratory studies were categorized as cisgender men or women.

We extracted CD4 count and VL in the year prior to the mpox illness onset date or, if unavailable, mpox laboratory result or report date. We used LOESS regression smoothed plots to evaluate the relationship between risk of hospitalization and most recent CD4 count, VL, and age. Using the SAS's PROC GENMOD procedure, we estimated modified Poisson regression with robust variance estimates, a log-link and a repeated statement to account for clustering, to calculate relative risks (RRs) for hospitalization with mpox [8]. We fit a multivariable model including HIV status, age quartile, race/ethnicity, and current gender. HIV status was stratified by most recent CD4 count, most recent VL suppression status, and engagement in HIV care in the year prior to mpox disease. PWH without a CD4 count or VL reported in the year prior to mpox were classified as not engaged in care, consistent with evidence-based practice [9]. We examined loess plots and chose a CD4 count cutoff below which the risk of hospitalization was increased and defined HIV viral suppression as the most recent VL <200 copies/mL. We used the most recent CD4 count after 1 January 2020 if a PWH had a VL in the year prior to mpox but had no CD4 count. Analyses were completed in SAS version 9.4 (SAS Institute) and R version 4.2.2 (R Foundation).

RESULTS

Characteristics of Persons Diagnosed With Mpox in Georgia

Among 1921 mpox cases in Georgia, most were diagnosed among persons with male sex at birth (97.6%) and who were cisgender men (96.4%; Supplementary Table 1). Most mpox cases (76.3%) were diagnosed among Black or African-American, non-Hispanic persons, while 11.7% were diagnosed among White, non-Hispanic persons and 7.5% among Hispanic or Latino persons of any race. Thirty-eight persons (2.0%) had been vaccinated

with at least 1 dose of JYNNEOS vaccine ≥14 days prior to mpox symptom onset or, if this information was unknown, mpox diagnosis date.

More than half of cases (n = 1124, 58.5%) were among PWH; of these, 19.1% had a CD4 count <350 cells/mm^3, 16.6% had an unsuppressed VL in the year prior to mpox, and 12.2% were not engaged in HIV care. Five persons were concurrently diagnosed with HIV and mpox, defined as HIV diagnosis within 14 days of mpox diagnosis. Among 14 PWH not engaged in care for whom a CD4 count or VL was reported after mpox diagnosis, 50.0% had a CD4 count <350 cells/mm^3 and 50.0% had unsuppressed VL.

Characteristics of Hospitalized Persons

Among 123 persons reported as hospitalized with mpox, 86 (69.9%) were PWH, 39.5% of whom had a CD4 count <350 cells/mm^3, 30.2% had unsuppressed VL, and 17.4% were not engaged in HIV care. Fewer than 5 hospitalized persons were vaccinated with at least 1 dose of JYNNEOS vaccine ≥14 days prior to mpox; all of these vaccinated persons who were hospitalized were PWH with a CD4 count <350 cells/mm^3 or not engaged in HIV care. Among 101 persons who were hospitalized for whom data were available, the most common reasons for hospitalization included pain control (44.6%), breathing problems (15.8%), and treatment of secondary infection (12.9%). Among 79 persons with available data (Supplementary Figure 1), the median hospital length of stay (LOS) was 4 days (interquartile range [IQR], 2–6). PWH with a CD4 count <350 cells/mm^3 had a median LOS of 6 days (IQR, 4–8).

Characteristics Associated With Risk of Hospitalization With Mpox Among Persons With Mpox

Loess plots of continuous predictors (Figure 1) demonstrated that hospitalization risk began increasing when the CD4 count was approximately 350 cells/mm^3; this cutoff was selected for calculation of relative risk. In the multivariable model (Supplementary Table 2), PWH with a CD4 count <350 cells/mm^3 were more likely to be hospitalized both among persons with unsuppressed VL (RR, 3.6; 95% confidence interval [CI], 2.0–6.4) and suppressed VL (RR, 2.3; 95% CI, 1.2–4.4). PWH not engaged in HIV care were also more likely to be hospitalized (RR, 2.2; 95% CI, 1.2–4.2). Conversely, hospitalization risk among PWH with a CD4 count ≥350 cells/mm^3 and suppressed VL was similar to that for persons without HIV (RR, 0.9; 95% CI, .5–1.5), while those with a CD4 count ≥350 cells/mm^3 and an unsuppressed VL trended toward increased hospitalization risk (RR, 1.5; 95% CI, .6–3.5). Cisgender women (RR, 1.7; 95% CI, 1.1–2.6) had increased relative risk of hospitalization with mpox compared with cisgender men. Age quartile and race/ethnicity were not associated with hospitalization.

DISCUSSION

We are the first to characterize the risk for mpox illness severe enough to warrant hospitalization at a population level. PWH with a CD4 count <350 cells/mm^3 or who were not engaged in HIV care prior to mpox had increased risk of hospitalization compared with people without HIV, even among PWH with suppressed VL. This finding is consistent with

recent case series reporting severe mpox among people with advanced or untreated HIV [3, 4]. Conversely, studies among PWH with well-controlled HIV suggest that the clinical course of mpox in PWH with well-controlled HIV is similar to that in persons without HIV [10].

Due to risk for serious illness, PWH diagnosed with mpox who have a CD4 count <350 cells/mm^3 or who are not engaged in HIV care merit consideration for early initiation of mpox treatment with tecovirimat and adjunctive therapies such as cidofovir, potentially before mpox testing results or severe manifestations are observed [11]. Similarly, this heightened risk of hospitalization demonstrates the importance of vaccination against mpox in populations at risk for severe mpox who meet mpox pre-exposure or post-exposure prophylaxis criteria [12]. Likewise, our findings affirm the need to collect high-quality randomized clinical trial data on therapies for mpox disease such as the A5418 Study of Tecovirimat for Mpox (STOMP) trial evaluating tecovirimat in persons with risk factors for severe mpox disease [13]. The increased risk of hospitalization with mpox among PWH not engaged in HIV care also affirms the importance of engaging and retaining PWH in HIV care to prevent severe mpox disease.

Most mpox cases and hospitalizations observed in Georgia were among Black or African-American persons. Ensuring equitable access to resources for diagnosis, treatment, and prevention of HIV and mpox remains vital and requires addressing challenges including structural racism, discrimination, and barriers to accessing prevention and care services. Addressing these inequities will require a syndemic approach that incorporates interventions for multiple social and health conditions including social determinants of health, HIV, sexually transmitted infections, substance use, and viral hepatitis [14]. Likewise, 5 patients in our study were simultaneously diagnosed with HIV and mpox, reinforcing the need for a syndemic approach and for healthcare providers to test all sexually active patients with suspected mpox for HIV if they are not already known to be a PWH.

One finding that remains unclear is that cisgender women had increased risk of hospitalization compared with cisgender men. Cisgender women with mild illness might be less likely to be tested for mpox and thus reported cases might reflect only more severe illness.

Our study has at least 5 limitations. First, hospitalization status was obtained via case interview and provider notification; hospitalizations after interview may have been missed. Second, HIV surveillance data were only available for PWH living in Georgia; PWH who receive HIV care elsewhere may not have been identified. Third, the clinical course including complications such as need for mechanical ventilation was not assessed. Among PWH not engaged in care or with a lower CD4 count, higher rates of hospitalization may have been due to greater clinician concern in these patients instead of more severe illness. Fourth, use of outpatient mpox medical countermeasures (eg, tecovirimat) was not assessed, and such countermeasures may have been more frequently prescribed to PWH with low CD4 counts. This may have reduced hospitalizations among PWH with low CD4 counts, which would result in an underestimate of the relative risk of hospitalization. Finally, we were unable to estimate the relative risk of hospitalization with mpox among transgender men,

transgender women, and those indicating another gender identity because of small numbers of reported cases and hospitalizations in these groups.

Our study highlights the increased risk among PWH with mpox for hospitalization if they have advanced HIV or are not engaged in HIV care. PWH should continue to be prioritized for vaccination for mpox, and clinicians should prioritize persons with advanced HIV or who are not engaged in HIV care for early mpox treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments.

The authors thank Lauren Barrineau-Vejjajiva at the Georgia Department of Public Health for her assistance in preparing the data for analysis.

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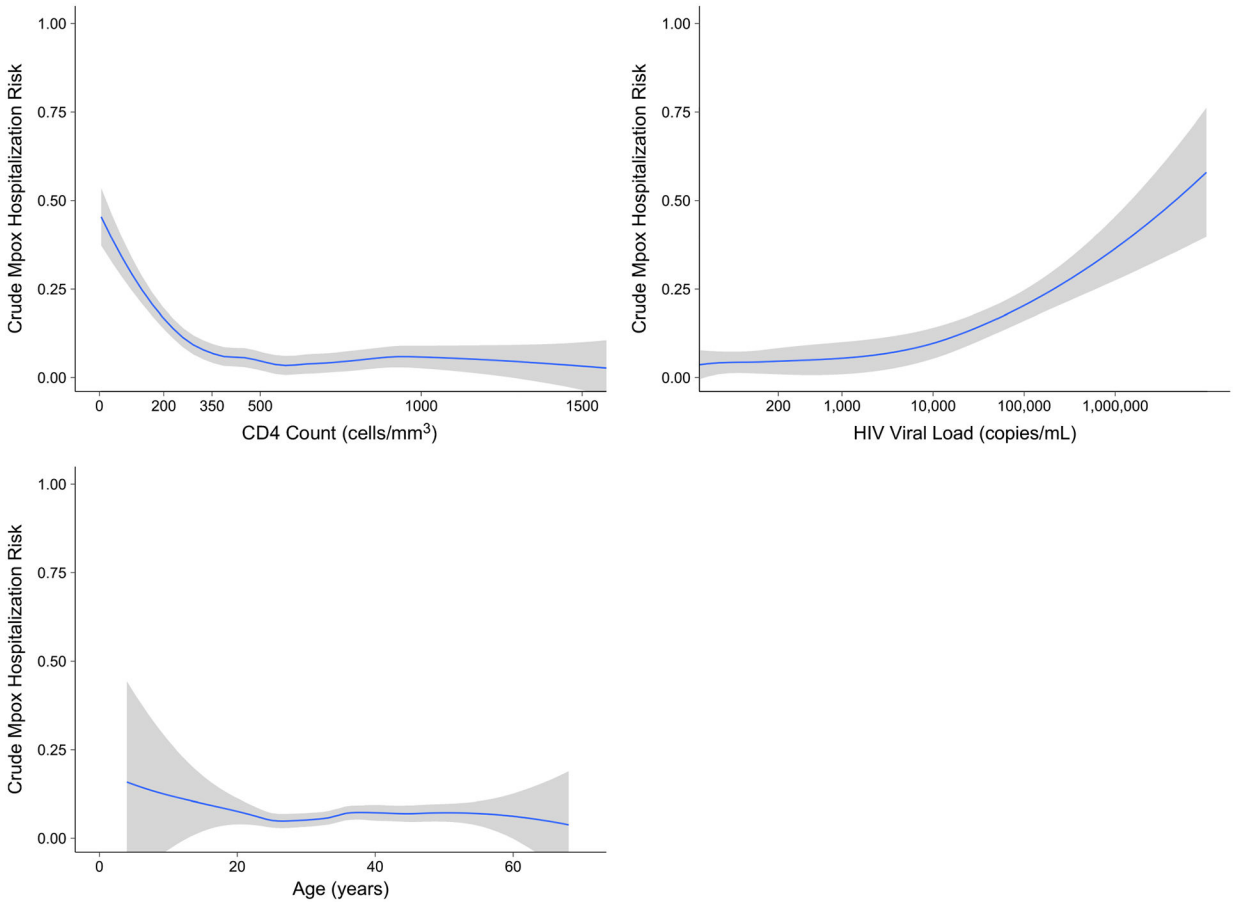

Figure 1.

Risk of hospitalization with mpox among persons with mpox in Georgia by HIV laboratory studies and age. Figure represents loess smoothed curve of risk of hospitalization with mpox by age in years or laboratory study among persons with HIV, shaded area is 95% confidence interval. Abbreviation: HIV, human immunodeficiency virus; Mpox, xxx.