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Current Evidence Demonstrates That Monkeypox Is a Sexually Transmitted Infection

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The rapidly developing global outbreak of monkeypox, declared a Public Health Emergency of International Concern by the World Health Organization,¹ has demonstrated transmission dynamics uncharacteristic of prior outbreaks. Historically, outbreaks of monkeypox have been short-lived, mostly limited to already endemic tropical rainforest regions, with infections transmitted through predominantly animal-to-human contact, as well as human-to-human transmission via close contact with an infected individual.² Over the past several months, however, the current outbreak of monkeypox has spread more rapidly and pervasively than any previous outbreak¹ and with mounting evidence that sexual contact is the most common mode of transmission.^{3–6} But whether monkeypox constitutes a sexually transmitted infection, or simply one that is transmissible via sex, and why that distinction is important are subject to ongoing debate.

WHAT CONSTITUTES A SEXUALLY TRANSMITTED INFECTION?

Sexually transmitted infections are typically defined as being caused by an infectious microorganism that can be transmitted from one person to another through bodily fluids (blood, semen, vaginal fluids, rectal fluid, or saliva) during oral, anal, or vaginal sex with an infected partner.⁷ Direct inoculation via skin-to-skin contact during sex is another mode of transmission common to other sexually transmitted infections such as herpes simplex virus type 2.⁸ Furthermore, the World Health Organization identifies 30 pathogens that are *transmissible* through sex but reserves the label of sexually transmitted infection for those that are predominantly transmitted through sex.⁹ But does monkeypox virus meet the aforementioned criteria for a sexually transmitted infection?

First, the evidence that monkeypox virus is transmissible during sexual activity is numerous. Monkeypox viral DNA has been identified in seminal fluid,^{4,10,11} rectal swab specimens,¹⁰ tests of

respiratory secretions,^{2,10,12} and blood.¹² Furthermore, a recent study isolated monkeypox virus from the semen of an infected individual and demonstrated infectiveness of that virus *in vitro*.¹¹ Thus, bodily fluids, in particular semen, may transmit monkeypox virus. In addition, direct inoculation by skin-to-skin contact during sex may explain the numerous reports documenting index lesions occurring at the genitalia, rectum, and oropharynx^{4–6,13,14} before subsequent clinical dissemination.

Whether or not sexual contact is the predominant mode of transmission is more challenging to establish. From reports during the current monkeypox outbreak, 84% to 100% of cases have endorsed sexual activity, often with a new sex partner, before the development of monkeypox, providing evidence of a temporal association between sexual contact and the disease.^{3–6,10,14–16} Furthermore, practices conferring elevated risk for other sexually transmitted infections are frequently reported among cases of monkeypox; such practices have included attending sex-on-site venues, group sex, multiple recent sex partners, and condomless receptive anal intercourse.^{3,4,6,10,15} In addition, there seems to be an anatomic association between sexual practices and the location of lesion development. One series reported that the risk of proctitis due to monkeypox was 5.5 times higher among those who recently engaged in receptive anal intercourse compared with those who did not engage in receptive anal intercourse, and that 95% of patients who presented with tonsilitis reported receptive oral sex in the preceding days.⁶ Finally, such transmission dynamics would further explain the vastly disproportionate burden of disease among gay, bisexual, and other men who have sex with men who constitute 92% to 100% of the currently reported monkeypox cases,^{3,4,6,14} as well as the high prevalence of concurrent sexually transmitted infections (17%–29%) among the patients with monkeypox.^{4,6,10}

Taken in context, the temporal and anatomic association with various sex practices, the high prevalence of sexual risk behavior among patients with monkeypox, and the *in vitro* infectiousness of monkeypox virus isolated from semen strongly suggest that monkeypox can be and is predominantly transmitted through sexual activities. Indeed, one report concluded that all secondary cases of monkeypox were likely due to sexual transmission—that conclusion was based on anogenital and perineal localization of the rash in 72% of cases, associated inguinal lymphadenopathy in 72% of cases, and frequent report of sexual activity including condomless anal intercourse and sex with multiple partners within the preceding 3 weeks among 84% of cases.¹⁵ Another report of more than 500 cases globally similarly noted that the clinicians seeing patients suspected sexual transmission in 95% of cases,⁴ although the specifics on how that determination was made were unavailable. Further supporting the nearly exclusive sexual spread of infection in the current outbreak is the infrequency of reported household transmission of monkeypox (1%–3%).^{4,6}

Worth highlighting; however, the recent findings are predominantly derived from the United States and Europe. The role of sexual transmission among cases in Africa is less clear. An unpublished report of cases of monkeypox presenting to a hospital in the Democratic Republic of the Congo between 2007 and 2011

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identified exposure to wild animals and handling of uncooked meat as the primary source of exposure for the majority of cases.¹⁷ Data from cases of monkeypox in Nigeria from 2017 to 2018 noted that the rash localized to the genitalia in 47% to 68% of cases.^{18–20} Sexual risk factors were not explored in those studies, but the authors speculated on the possibility of sexual transmission. Finally, a report from the current outbreak in peer review documented 6 linked cases of sexual transmission in Nigeria.¹⁶ The data on the transmission dynamics of monkeypox virus within Africa during the current outbreak, however, remain limited. Thus, the actual proportion of cases being transmitted globally via sexual contact is unknown.

WHY DOES IT MATTER?

The ramifications of classifying monkeypox as a sexually transmitted infection instead of an infection that is *transmissible* via sex are important to acknowledge. On the one hand, the stigma surrounding sexually transmitted infections limits health care seeking and partner-notification behaviors,^{21,22} directly subverting our primary means of outbreak control—namely, early identification and behavior change in infected individuals. Furthermore, such stigma can fuel homophobia, particularly in areas without human rights protections for individuals who engage in same-sex relationships.²³ Conversely, failure to appropriately identify and disseminate to the public the predominant mode of transmission will likely perpetuate behaviors that are driving transmission. Identifying high-risk subpopulations, in this case gay, bisexual or other men who have sex with men, who have multiple partners, or who participate in group sex will facilitate targeted awareness and education efforts, exposure reduction, and other disease intervention activities such as testing, treatment, and vaccination, which in turn may augment control efforts and prove to be cost effective. Such efforts are analogous to what was eventually implemented in combating the human immunodeficiency virus pandemic with notable success.²⁴

Furthermore, the current guidelines recommend isolation of individuals infected with monkeypox virus until complete resolution of symptoms and healing of the rash, which can last for up to 4 weeks.²⁵ We have already observed the numerous socioeconomic consequences of 14 days of isolation recommended during the SARS-CoV-2 pandemic in the form of lost productivity, missed school days, and disruptions in supply chain and agriculture production.²⁶ If monkeypox is in fact predominantly transmitted through sex, which the evidence suggests that it is, that prolonged duration of isolation and thus the consequent socioeconomic burdens may be unnecessary.

But monkeypox is not exclusively transmitted through sexual contact.² A related poxvirus, molluscum contagiosum, has similar transmission characteristics, which can be transmitted via skin-to-skin contact and sexual contact.²⁷ Human herpes simplex viruses similarly can be transmitted via close contact and through contact with bodily fluids during sex.⁸ Similarly, *Treponema pallidum*, the cause of syphilis, is predominantly transmitted through sexual contact,²⁸ yet historical reports before the routine use of protective gloves frequently noted syphilitic lesions on the fingers of physicians acquired via nonsexual skin-to-skin contact,^{29,30} and via human bites.³¹ Thus, universality of sexual transmission is not a requisite of sexually transmitted infections.

CONCLUSIONS

The transmission dynamics of monkeypox in the current outbreak are highly consistent with a sexually transmitted infection. We must therefore, incorporate a sexual health framework into our response to the current outbreak while destigmatizing both the disease and its route of transmission. Targeted screening among pop-

ulations with high risk for other sexually transmitted infections may be important strategies for case identification. Finally, further work should evaluate formally the transmissibility of monkeypox from different bodily fluids through experimental studies and careful epidemiologic analyses with particular attention to the possibility of differing transmission dynamics in different regions of the globe.

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