



The dynamics of monkeypox transmission

Pre-exposure vaccination and vaccine equity are urgently needed worldwide

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Cite this as: *BMJ* 2022;379:o2504
<http://dx.doi.org/10.1136/bmj.o2504>

Published: 2 November 2022

After a surge of monkeypox infections starting in May 2022, with more than 70 000 cases globally—including 99% from countries without previous known endemic spread—by the end of August 2022, new infections started to trend downward.^{1,2} Whether this marks the end of the outbreak or whether intermittent surges will continue is not yet clear. Understanding the underlying transmission dynamics is key to shedding light on this, as well as informing future interventions.

In a linked paper, Ward and colleagues (doi:10.1136/bmj-2022-073153) used routine case questionnaires and contact tracing data to estimate two important characteristics of the monkeypox outbreak in the UK: the serial interval and incubation period.³ They found that shorter serial intervals are more common than shorter incubation periods. One explanation the authors provided is that considerable transmission is occurring before the appearance or detection of symptoms; otherwise, the serial interval should at a minimum equal the incubation period.

This study had a relatively large sample size and appropriate statistical adjustments to account for key biases in the data. The researchers used paired case-contact data to validate their model based conclusions. One limitation was the use of patient reported variables, with the potential for recall and response biases, which is particularly critical for the date of symptom onset. For example, people who have been contact traced or reached by public health messages will be more aware of potential symptoms and therefore likely more vigilant. If infected individuals notice symptoms sooner than those who infected them, the serial interval, and therefore the comparison with the incubation period, could be biased. Contact tracing, with individuals self-reporting exposure events, is used to link people who infect others and those who become infected and could also be a source of bias. For example, in the case of monkeypox infection after a superspreading event where the index case was not identified, the serial interval could be underestimated.⁴

Other studies have also hinted at pre-symptomatic transmission. Anal swabs collected from 213 asymptomatic men who have sex with other men were retrospectively screened for monkeypox virus; 13 tested positive on polymerase chain reaction (PCR) and two subsequently developed symptoms.⁵ Although a positive PCR test result does not necessarily indicate that an individual is infectious, this study raised questions about transmission being dependent on symptoms.

Evidence supporting pre-symptomatic transmission is not definitive, but if Ward and colleagues' findings

are supported by those of other studies, then pre-symptomatic transmission, or transmission before symptoms are detected, would have important implications for infection control globally. Specifically, postexposure or “ring” vaccination of contacts identified only through individuals with symptoms, could be inadequate.^{5,6} In the US and UK, vaccination campaigns have already shifted from exclusively postexposure prophylaxis to include pre-exposure prophylaxis for some high risk groups.^{7,8}

Vaccine equity

Equitable access to vaccines is critical to monkeypox control efforts globally, and lack of access is a serious concern, particularly if pre-symptomatic transmission is occurring. Currently, Jynneos (also known as Imvanex), which is in limited supply, is the primary vaccine in use for monkeypox in the US, Canada, Europe, and the UK^{9,10}; the older smallpox vaccine ACAM2000 is less commonly used and only in select patients.¹¹

From the patient perspective, monkeypox infection can be extremely painful and isolating, greatly affecting psychological wellbeing.^{12,13} High risk communities are keen to access vaccination, as evidenced by long vaccination queues.^{14,15} Ensuring that effective vaccines are available to all communities and individuals at risk should be a priority for health leaders in affected countries, and for global health leaders more broadly.

In the US, for example, black people account for 50% of monkeypox infections but received only 12% of the vaccines.^{16,17} In Nigeria, where monkeypox is endemic, vaccines are currently unavailable so no vaccination policy of any kind can be implemented, an inequity reminiscent of the covid-19 pandemic.^{18,19} This is also the case for many other African countries.

From a health system perspective, vaccination is likely to be more cost effective than managing the consequences of preventable infections, including hospital admissions, loss of income during isolation, and long term complications. These costs put extra pressure on health systems in low income countries that already have a high burden of infectious diseases.

Public health measures that have been critical during monkeypox outbreaks in high income countries, such as PCR testing and vaccination, remain unavailable in much of Africa.⁹ In their study, Ward and colleagues from the UK Health Security Agency relied on resource intensive contact tracing and case questionnaires—approaches important to a context specific public health response but under-supported

in low resource countries where monkeypox is endemic.

As the monkeypox outbreak declines in Europe and North America, we have a responsibility to deploy effective tools for viral control on a global level—not just in wealthy nations. These tools include research into understanding transmission dynamics in African settings and the inclusion of endemic countries in vaccine trials.

Competing interests: The BMJ has judged that there are no disqualifying financial ties to commercial companies. The authors declare the following other interests: EF, BK, and TO serve on the World Health Organization's monkeypox guideline development group.

Further details of The BMJ policy on financial interests is here: <https://www.bmj.com/sites/default/files/attachments/resources/2016/03/16-current-bmj-education-coi-form.pdf>.

Provenance and peer review: Commissioned; not externally peer reviewed.

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