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At the same time, six more MVD cases occurred in Frankfurt, Germany, after contact with the blood from infected monkeys; in this outbreak, the incubation period was narrowed down to 7–9 days.<sup>5</sup> This interval coincided with that of patients from Kenya, where the infection occurred in the hospital or at a funeral and patients had either skin contact with infected blood or got infected from highly contagious cases or corpses.<sup>6</sup> Based on the original outbreak and on information that has been gathered during subsequent outbreaks, the incubation period of MVD is believed to last for 5–10 days (range, 3–21), yet newer evidence from Angola and from the latest outbreak in Ghana shows that this range has been underestimated.<sup>7,8</sup>

One of the reasons for this might be that historic estimates ignore the route of transmission and the infecting viral load, which might influence the duration of the incubation period.<sup>1</sup> Two patients from Angola who were infected by human-to-human transmission had an incubation period of at least 23 and 26 days,<sup>7</sup> contradicting the previous upper limit of 21 days.

Observations from the latest outbreak in Ghana provide further evidence of a longer incubation period. The index patient of the Ghana outbreak developed MVD on June 24, 2022, two days after returning from travel to the western region of Ghana, where he had entered abandoned mines (such places had previously been associated with zoonotic MVD reservoirs).<sup>9</sup> His son and wife had contact with him from his return to their home on June 22, until his burial on June 27. After completing a 21-day quarantine period and daily monitoring, they developed symptoms on July 17 (for the son) and July 21 (for the wife), and were diagnosed with MVD.<sup>2,8,10</sup> Because the wife became symptomatic only 4 days after her son, it is highly unlikely that he infected her. Hence, the incubation period of the son was 21–24 days, and that of his mother was 25–28 days. These two secondary infections provide further evidence

for an extended incubation period after human-to-human transmission.

Together with the two documented patients infected by household transmission in Angola who had an incubation period of 21 or more days, the recent outbreak in Ghana shows that new estimates of the incubation period of MVD that account for the route of infection are urgently needed. A thorough study of the clinical records of all previous outbreaks, which is less biased towards the assumption of a short incubation period of 5–9 days, would be necessary to obtain adequate estimates and to inform public health policy.

We declare no competing interests.

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## Monkeypox outbreak in a piercing and tattoo establishment in Spain

Published Online  
 September 29, 2022  
[https://doi.org/10.1016/S1473-3099\(22\)00652-1](https://doi.org/10.1016/S1473-3099(22)00652-1)

On July 23, 2022, WHO declared that the 2022 monkeypox outbreak was a public health emergency of international concern.<sup>1</sup> To date, the most commonly described

mechanism of viral transmission in this outbreak is close contact in the context of high-risk sexual behaviour, mainly between men who have sex with men.<sup>2,3</sup>

The monkeypox virus belongs to the orthopoxvirus genus of the Poxviridae family, which is known to have long-lasting stability in the environment. Samples from individuals with monkeypox virus (eg, dermal crusts) and from contaminated fomites can remain infectious for an extended period of time.<sup>4,5</sup>

On July 19, 2022, a monkeypox outbreak linked to a piercing and tattoo establishment was reported to the Andalusian Epidemiological Surveillance System in Cádiz, Spain. Five individuals were diagnosed with monkeypox and all shared an epidemiological link. All five individuals had a history of ear piercing performed at the same facility, on July 6. Herein, we describe the clinical and epidemiological investigations of the first reported outbreak of monkeypox in a piercing and tattoo establishment in Europe, from July 19 to August 3.

Cases were notified to the Andalusian Epidemiological Surveillance System between July 19 and Aug 3, 2022. Vesicular lesion specimens were collected from each suspected case. Specific real-time PCR for monkeypox virus was performed and 20 individuals were identified to have the virus.

The piercing and tattoo establishment had only one worker, the owner. She did not present any epidemiological link or clinical picture related to the infection,<sup>6</sup> nor did her family, pets, and social contacts. However, she reported being in contact with a possible index case on July 6. This client had travelled to Madrid for a social function in the previous days and, when attending the establishment, had inflammation of the area where the piercing was placed and generalised skin lesions, which he thought to be an adverse effect of taking antibiotics. It could not be confirmed whether this client had monkeypox because the owner had no list of clients; therefore, it was not possible to identify this person during the investigation. July 6 was considered to be the date of outbreak onset, given that the probable index case and all individuals with confirmed infection attended the establishment from July 6 onwards (figure).

54 exposed individuals were identified and the attack rate was 37%. Among the 20 individuals with confirmed infection, 13 (65%) were women and seven (35%) were men. Median age was 26 years [IQR 16–40; range 13–45 years]. Eight (40%) individuals were younger than 18 years.

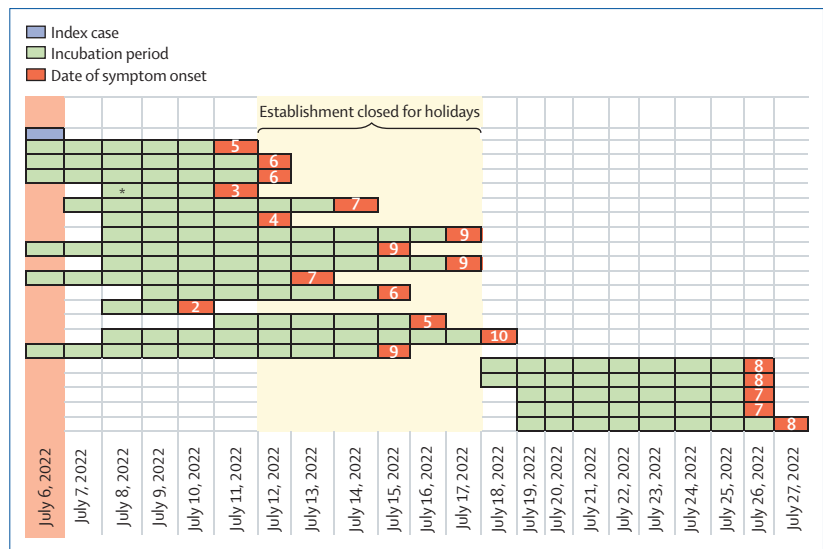


Figure: Timeline of the incubation period of monkeypox virus and dates of symptom onset from July 6 to July 27, 2022

\*Individual who had a tattoo done at the establishment.

The predominant clinical feature was rash, found in all 20 individuals in the area of piercing or tattoo, although it also affected other locations. The most frequent first clinical manifestation was piercing or tattoo rash (18 [90%] individuals). Lymphadenopathy was present in 11 (55%) individuals, and the cervical location was the most frequent location (five [45%]). Fever was present in eight (40%) individuals. In all individuals, clinical symptoms were mild and no one required hospitalisation.

19 (95%) individuals reported a history of piercing, of whom 18 (95%) had an ear piercing. One (5%) person had a tattoo done on their forearm. None of the individuals with confirmed infection reported vaccination against smallpox, immunodeficiencies, or concurrent diseases. All 20 individuals were unaware of or reported no contact with a known case of monkeypox. 96 close contacts were identified, with no secondary cases reported.

During the official inspection of the establishment, numerous sanitary irregularities were found, such as poor hygiene and aseptic conditions.<sup>7</sup> Surface sampling was performed on July 22, including three areas: the support work surfaces, the work tables and chairs, and sharps and other work instruments. All three samples were positive for monkeypox virus. A second sampling was performed on July 27, focusing on sharps and work tools. 15 (94%) of 16 samples were found to be positive

for the virus, with tweezers and scissors tips having the highest viral load according to cycle threshold values.

Together, these findings suggest that monkeypox virus can be transmitted through exposure to contaminated piercing or tattoo material and, potentially through contaminated hands, due to poor aseptic measures and handling of materials.<sup>8</sup>

The epidemiological curve and the finding of monkeypox virus DNA on fomites and surfaces—more than 2 weeks after the probable index case attended the establishment—suggest an extended infectivity period of the virus.<sup>9</sup> Of note, a rash first developed at the site of exposure, similar to what was observed for genital lesions in individuals with confirmed infection after sexual intercourse.<sup>10</sup>

To minimise the risk of further transmission, we continue to actively work with the community. This outbreak highlights that exposure to monkeypox virus during piercing and tattooing is a mechanism of viral transmission.

We declare no competing interests. This Comment would not have been possible without the contribution of many colleagues in the Andalusian health system. We thank the Hospital Universitario Puerta del Mar team and the Bahía de Cádiz-La Janda team, for their important work in the outbreak investigation and control. We also thank all of the members of the Andalusian Epidemiological Surveillance System who have participated in the outbreak surveillance and all of the health-care professionals who collaborated in the diagnosis and management of patients.

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## The WHO AWaRe Antibiotic Book: providing guidance on optimal use and informing policy

The 2022 G7 committed to “define national measurable targets” for human antibiotic use “including both volume and appropriateness when possible”.<sup>1</sup> The WHO 13<sup>th</sup> General Programme of Work defined a target that at least 60% of human antibiotic use at the country level should be Access antibiotics.<sup>2</sup> The WHO AWaRe system (Access/Watch/Reserve) provides a simple framework to group antibiotics into categories for stewardship.<sup>3</sup> The 2021 Model List of Essential Medicines (EML) includes 20 Access, 11 Watch and eight Reserve antibiotics. More than 250 antibiotics used for human treatment globally have now been categorised into Access, Watch, or

Reserve groups and these AWaRe categories could also be applied across One Health sectors.

The EML has provided guidance since 1977 on which medicines are essential for safe and effective care<sup>4</sup>, but not on how they should be used. In a new step, the WHO AWaRe Antibiotic Book provides detailed evidence-based guidance on how the 39 antibiotics listed on the EML and EML for children should be used in 34 common infections in primary health care and hospital settings for adults and children.<sup>5</sup> Recommendations are given for empiric prescribing, including the choice of antibiotic, dose, and duration. There is a strong emphasis on