

Lack of monkeypox virus (MPXV) transmission despite occupational exposure of a large number of health care workers

Dear Editor,

Mpox is an emerging disease caused by the monkeypox virus (MPXV).¹ Until recently, Mpox was mainly considered a zoonotic disease.² In May 2022, an international Mpox outbreak began that is still ongoing and predominantly (84–98%) affects men having sex with men.^{1,3,4} The majority of cases have been reported from Europe and the Americas.¹ Here, we report an initially unrecognized MPXV-infection in a patient treated at our intensive care unit (ICU) who had multiple, close contacts with over 50 health care workers (HCW). Despite numerous unprotected skin-to-skin and skin-to-respiratory secretion-contacts, none of the HCW was infected with MPXV. This indicates a low risk of occupational MPXV-transmission.

On June 4, 2022, a 31-year-old male patient was admitted to a primary care hospital after ingestion of 1.5 L ammoniumchloride-based disinfectant (in suicidal intent) that lead to severe alkali burns of his gastrointestinal tract, particularly the esophagus. Due to his deteriorating condition and the development of delirium, he was sedated, intubated, mechanically ventilated, and transferred to our tertiary care university hospital on June 8. No skin lesions were visible on admission. A naso-jejunal feeding tube was placed and primarily conservative treatment was initiated. On June 18, the patient developed a fever (39.0°C) and had an elevated leucocyte count. C-reactive protein increased 1 day later. Two days later, pustules were noticed in the gluteal region. PCR-analysis of a lesional swab showed herpes-simplex-virus type-1. Dissemination of the lesions to adjacent skin areas prompted further testing. Mpox was diagnosed by MPXV-PCR on June 22 (Figure 1). A total of more than 100 skin lesions spread all over the body in the following days. The fever continued until June 28 and the skin lesions began to heal in early July. After 27 days in our ICU, the patient was transferred back to the primary care hospital until he was discharged after full recovery.

After being diagnosed with Mpox, the patient was isolated and full personal protective equipment (PPE) was ordered for all HCW. Post-hoc PCR-testing of pharyngeal swabs that had been collected for SARS-coronavirus-2 surveillance revealed that MPXV was already detectable 8 days before Mpox diagnosis (Figure 1). Third-party anamnesis disclosed recent sexual

activities of the patient with several male partners. Phylogenetic analysis showed that the patient's strain clustered with MPXV-strains currently circulating in Europe (Supporting Information: Figure). A total of 58 HCW and one relative were identified who had had close contacts (skin-to-skin contacts during nursing or physiotherapeutic measures such as positioning, exposure to respiratory secretions) with the partially delirious patient during the phase of undiagnosed MPXV-infection. During the close contacts, the HCW and the relative only wore partial PPE (N95-mask and gloves; Table 1). In collaboration with local health authorities, it was decided not to quarantine the exposed HCW, but to allow continuation of work under close surveillance. All contact persons were offered postexposure vaccination, which was accepted by 26 HCW and the relative. Also, all HCW were offered regular pharyngeal swabbing for MPXV-DNA detection (Table 1). The patient's relative was quarantined for 21 days with daily temperature measurements and MPXV-PCR-testing from pharyngeal swabs biweekly. During surveillance, a nurse developed a blister on her wrist. She was immediately quarantined, MPXV was ruled out, but she tested positive for SARS-coronavirus-2 (Table 1). All other HCW and the relative remained asymptomatic and did not develop any signs and symptoms of Mpox. PCR-testing of pharyngeal swabs yielded only negative MPXV-results.

MPXV has been detected in various types of clinical samples, such as lesional skin, oral, rectal and nasopharyngeal swabs, saliva, blood, semen, urine, and feces, frequently with high viral loads.^{5,6} Furthermore, presymptomatic (1–4 days before symptom onset) viral shedding of replication-competent MPXV has been reported.⁷ In experimental settings, MPX-virions could be recovered from stainless steel for several days, but were efficiently inactivated by alcohol- or aldehyde-based surface disinfectants.⁸ In hospital settings, environmental surface contamination with high MPXV-loads and cultivatable virus was shown on surfaces of rooms occupied by Mpox patients.⁹ Nevertheless, occupational MPXV-transmission in health care settings is a rare event primarily associated with needlestick injuries or violation of hygiene rules, both of which did not occur in our

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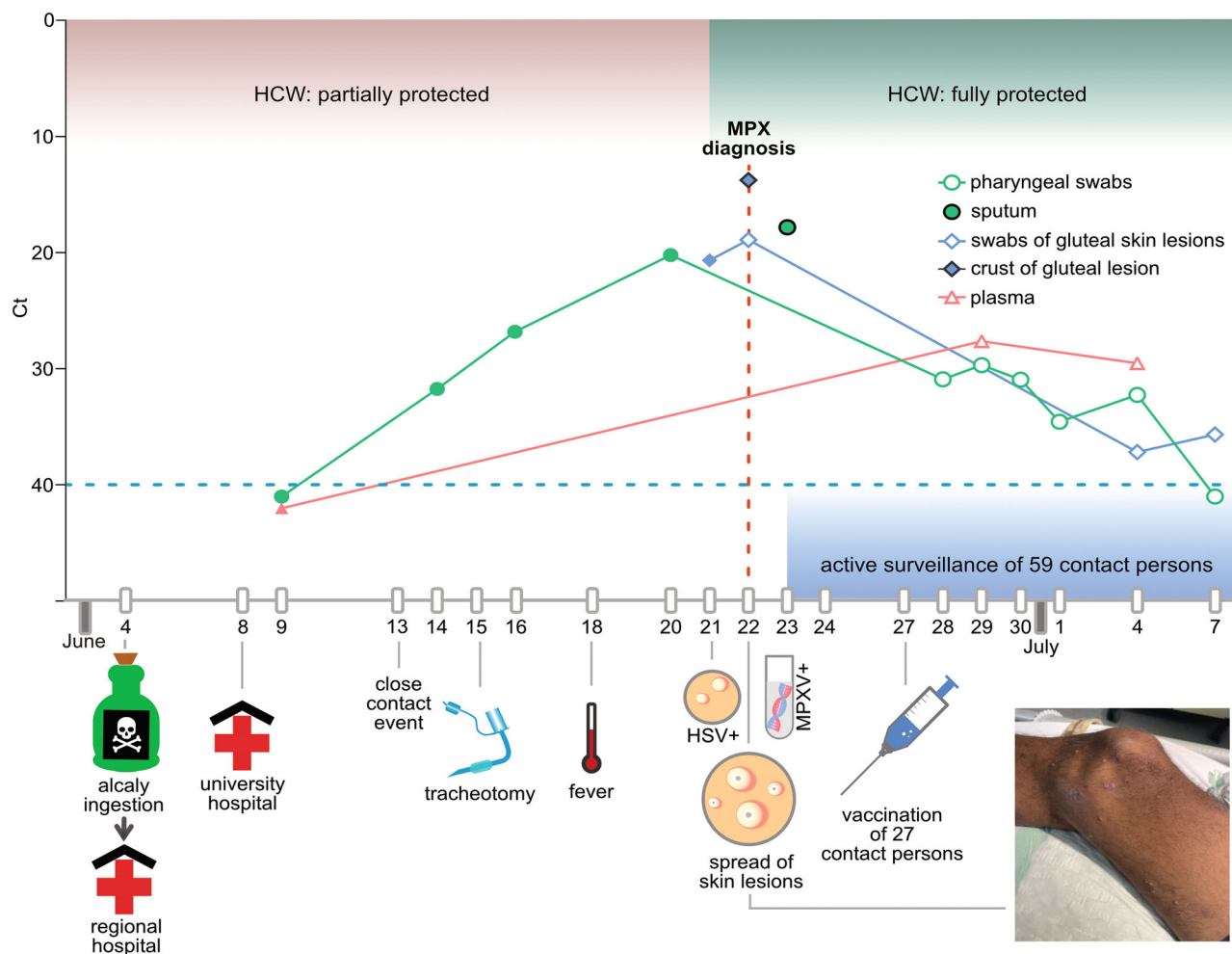


FIGURE 1 Timeline of the index patient's clinical course, MPXV-DNA testing results, and infection control measures, June 4 to July 7, 2022. Partially protected health care workers (HCW) (June 8 to June 21) wore gloves, a N95 respirator, and a surgical suit with a casaque with short sleeves. Fully protected HCW (June 22 to July 7) additionally wore eye protection and a liquid repellent protective gown with long-sleeves. Active surveillance included a daily symptom diary and temperature measurements for 21 days after the last partially protected exposure. MPXV-PCR (LightMix Modular Monkeypox Virus, Tib MolBiol) was performed from pharyngeal swabs (green circles, filled circles denote post-hoc PCR testing, empty circles ad-hoc testing), a sputum sample (green filled circle with black border, ad-hoc testing), skin swabs (blue diamonds, the filled diamond denotes post-hoc, empty diamonds ad-hoc testing), a crust from gluteal skin lesions (blue diamond with black border, ad-hoc testing), and plasma (red triangles, the filled triangle denotes post hoc, empty triangles ad-hoc testing). MPXV-real-time PCR cycle-threshold (C_t)-values can be read on the x-axis. Samples shown below the dotted cycle-threshold C_{t40} -line were MPXV-DNA negative. Pharyngeal swabs used for post-hoc (retrograde) MPXV testing (filled green circles) were initially collected for SARS-coronavirus-2 screening and the filled red triangle shows a plasma sample originally collected on June 9 to rule out an HIV-infection and Hepatitis B and C. The patient was HIV-, HBV-, and HCV-negative and stayed SARS-coronavirus-2 negative throughout his hospital stay.

setting.¹⁰⁻¹³ In the literature, only three nosocomial transmission events through fomite exposure have been reported during the large 2022 Mpox outbreak.¹⁰⁻¹³ Given the rarity of nosocomial transmission as reported in the literature,¹⁰⁻¹³ and the absence of transmission despite extensive exposure of a large number of HCW in our setting, it seems justified to dispense quarantine of HCW in case of non-percutaneous exposure and instead perform close active surveillance. Nevertheless, Mpox should be considered early in high-risk patients with vesicular lesions to implement infection

control measures and postexposure vaccination without delay to prevent further MPXV transmission.^{13,14}

AUTHOR CONTRIBUTIONS

Wolfgang Wetsch, Hendrik Drinhaus, Bernd Böttiger, Remco Overbeek, Clara Lehmann, Gerd Fätkenheuer, Norma Jung, and Julia Fischer were involved in the clinical management of the patient. Jens Kneifel and Janine Zweigner implemented hygienic measures after the Mpox diagnosis and performed

TABLE 1 Characteristics of contact persons, postexposure measures, and outcome of active surveillance.

	Contact persons (n = 59)
Age	
Median (IQR)	32 (28–41)
Mean (range)	35 (22–56)
Sex	
Female	43
Male	16
Medical profession	
Nurse	33
Physician	22
Radiology assistant	2
Physiotherapist	1
No medical profession (relative of the patient)	1
Risk category ^a	
3 (high risk)	5
2 (medium risk)	45
1 (low risk)	9
Type of contact	
Unprotected skin-to-skin contact	46 ^b
Exposure of unprotected intact skin to the patient's respiratory secretions	7 ^b
Exposure to potentially contaminated patient environment	59
Active surveillance for 21 days	
Daily symptom diary and temperature measurement ^c	59
Acceptance of the postexposure vaccination ^d offer	
No ^e	32
Yes	27
Number of contact persons vaccinated with 1 or 2 smallpox vaccine ^e doses	
1	8
2	19
Regular (twice per week) delivery of pharyngeal swabs for MPXV-PCR testing	
No	32
Yes ^f	27
Development of signs or symptoms compatible with Mpox within 21 days after exposure	

TABLE 1 (Continued)

	Contact persons (n = 59)
No	58
Yes ^g	1

^aRisk category according to the German national health authority (Robert Koch-Institute, Berlin, www.rki.de); 3, high risk (unprotected direct contact or indirect high risk contact; direct exposure of nonintact skin or mucous membranes to a symptomatic confirmed Mpox case, its body fluids, or potentially infectious material); 2, medium risk (unprotected contact with infectious material incl. respiratory droplets in the near-field area; not category 3, but contact only of intact skin with a symptomatic Mpox case, its body fluids, or potentially infectious material/contaminated fomites, OR without direct contact, but staying within 1 meter of a Mpox case); 1, low risk (protected physical contact or droplet exposure; not category 3 or 2, but contact with a confirmed Mpox case or contact with environment contaminated by an Mpox patient while using properly worn, intact PPE).

^bThree HCW had both unprotected skin-to-skin contact and exposition of unprotected intact skin to the patient's respiratory secretions.

^cThe symptom diary included general symptoms such as headache, sore throat, muscle and back pain, chills, fever, fatigue, swollen lymph nodes and the development of skin lesions.

^dImvanex (modified vaccinia virus Ankara), Bavarian Nordic A/S, Denmark; when two doses were given, they were administered 28 days apart.

^eFive of the HCW who rejected postexposure vaccination had received smallpox vaccination in the past.

^fMPXV-PCR testing of contact persons yielded only negative results.

^gOne contact person, a nurse, developed fever and skin lesions (vesicles) on her right wrist 9 days after the last unprotected exposure. MPXV as well as herpes simplex virus (HSV-1/2) and varicella zoster virus (VZV) were ruled out by PCR analyses of vesicle punctates. Further analysis revealed that she had COVID-19 as determined by SARS-coronavirus-2 PCR of a pharyngeal swab (that was MPXV-DNA negative, as well as three further pharyngeal swabs of her).

active surveillance. Eva Heger, Florian Klein, and Ulrike Wieland performed and supervised virologic analyses. Wolfgang Wetsch, Eva Heger and Ulrike Wieland wrote the manuscript. All authors read and approved the final version of the manuscript.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

The data are available on request from the authors.

ETHICS STATEMENT

The patient in this manuscript has given written informed consent to the publication of his case details.

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SUPPORTING INFORMATION

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