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Title: Longitudinal mpox virus surface sampling in an outpatient setting.

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Summary

Weekly longitudinal surface sampling was conducted in a patient consultation room at a sexual health clinic throughout August 2022 during the mpox outbreak in the UK. Low-level mpox virus DNA contamination was identified in 3/32 samples. All three positive samples were from the floor of the consultation room; one sample was shown to contain infection-

21 competent virus. These data confirm that mpox virus contamination does occur in
22 outpatient healthcare settings and support the need for appropriate infection and control
23 measures.

24 **Running title:** Sexual health clinic mpox virus contamination.

25 **Key words:** Mpox; Mpox virus; Sampling Studies; Communicable Diseases, Imported;
26 Communicable Diseases, Emerging.

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28 **Letter**

29 Sir,

30 We read with interest the report from Melon *et al.* [1] regarding air sampling for mpox
31 (formerly monkeypox) virus (MPXV) in an outpatient setting and the need for additional
32 data to assess the risk to healthcare workers (HCWs). In August 2022, we performed
33 longitudinal surface sampling at a large sexual health clinic in London, UK, to investigate
34 environmental contamination of a typical outpatient setting where patients with mpox are
35 assessed. During the 4-week period of observation, a total of 85 patients were seen at the
36 clinic that were subsequently diagnosed with mpox based on samples collected during their
37 visit (number of patients confirmed positive seen in 7 days prior sampling: Week 1 = 31
38 cases, Week 2 = 26 cases, Week 3 = 22 cases, Week 4 = 6 cases). Weekly sampling was
39 performed in the same observation room using Copan UTM swabs with qPCR analysis
40 performed as previously described [2]. Samples were collected from the same eight
41 locations each week: HCW desk, HCW keyboard, patient chair armrest, floor beneath
42 patient chair, desk between patient and HCW, wall next to examination table
43 (approximately where the patient head will be facing during examination), floor beneath
44 examination table, and the door handle to exit the examination room.
45 qPCR analysis of the 32 samples collected (eight samples collected weekly for four weeks)
46 resulted in only three MPXV positive samples all with crossing threshold (Ct) values near the
47 limit of detection for the assay, indicating occasional low-level contamination of the
48 sampled environment. All three positive samples were collected from the floor of the
49 examination room (Figure); viral isolation using previously described methods [2] detected

replicating virus in one sample collected from the floor beneath the examination table (week 2) confirming the presence of infection-competent MPXV in this sample.

Two of the three positive samples were identified in the same location on consecutive weeks raising the possibility of duplicate identification. While our data cannot exclude this possibility, surfaces were thoroughly cleaned using disinfectant wipes (Spill Wipes, Clinell) and the floor cleaned with chlorine solution (Chlor-clean, Guest Medical) after each examination of a suspected mpox case, in addition to routine cleaning performed at the end of every working day.

Despite a significant potential for mpox transmission in healthcare settings, few cases of mpox have been reported in HCWs with just five cases recorded by WHO as occupational exposures in Europe through January 2023 [3]. Infection prevention and control (IPC) measures including the use of personal protective equipment (PPE) may explain, in part, the very small number of occupationally associated infections reported. The PPE recommended for typical UK outpatient consultations (gloves, fluid-repellent surgical mask, apron, and eye protection if splash risk) is simpler than the recommended PPE for UK HCWs caring for patients with mpox admitted to hospital (gloves, fit-tested FFP3 respirator, long-sleeved fluid-repellent gown, eye protection) [4]. However, the amount of environmental contamination and opportunities for exposure to virus are expected to be greater and more cumulative for inpatient settings [2,5] compared to outpatient settings [1,6]. The two previous studies in outpatient settings both focussed on air sampling and both studies identified positive qPCR samples, although neither identified infectious virus. Our data confirm that environmental contamination of surfaces occurs in outpatient settings and can contain infectious virus. This contamination may occur due to several mechanisms including from respiratory droplets or via dislodgement of viral particles on patient clothing which are

74 removed for patient examination. It is likely that the contact PPE recommended in
75 outpatient setting (in combination with frequent room cleaning) is proportionate to
76 mitigate the risk from fomite transmission within the environment; however, the detection
77 of MPXV in air samples from previous studies does raise concerns. At present, infectious
78 virus has not been detected in air samples and the risk of establishing human mpox
79 infection via the respiratory route is unknown. The absence of numerous cases in HCWs
80 working in outpatient settings suggests that either i) infectious virus in respiratory
81 secretions is rarely present at sufficient titre to establish infection, ii) respiratory
82 transmission of Clade IIb MPXV is not an optimal route of transmission, or iii) that
83 surgical/FFP2 masks are sufficient to mitigate the residual risks of i) and ii).

84 We have shown that surface contamination occurs in an outpatient setting and, while it was
85 minimal in the environment sampled, infection-competent MPXV could be detected. It is
86 likely that several factors contribute to the low level of contamination observed including
87 minimal time spent in this locality and the frequency of cleaning. Such focussed surface
88 deposition of virus would not be expected if there had been aerosolisation of virus. Thus in
89 future studies, and where feasible, combined surface- and air-sampling may provide
90 additional insights.

91 It is feasible that the contamination observed could present an infection risk in specific
92 situations; however, UK PPE recommendations combined with frequent standard cleaning
93 procedures appear sufficient to mitigate onward transmission risk in outpatient settings.

94 IPC recommendations should be kept under review as more data emerge regarding
95 infectious virus in respiratory secretions and the risk of respiratory transmission of MPXV.

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100

101 **Authors' contributions:**

102 Conceptualisation and methodology: BA, SG, TF, AMB, JD, DA, GW.

103 Investigation: BA, SP, GW.

104 Formal analysis: BA, AS, OO, JF, IN, and JG.

105 Writing – original draft: BA, AMB, JD and GW.

106 Writing – review and editing: All authors.

107

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124 and Social Care. The study protocol was subject to internal review by the Research Ethics
125 and Governance Group, which is the UKHSA Research Ethics Committee, and was granted
126 full approval.

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129 **Figure legend**

130 **Figure 1:** Photo identifying the eight locations sampled for MPXV DNA in a sexual health
131 clinic showing crossing threshold (Ct) qPCR values. The week 2 sample collected from area F
132 (floor by examination table) contained infection-competent mpox virus.

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Area Sampled		Ct value
A	HCW keyboard	ND
B	HCW desk	ND
C	Desk (near patient)	ND
D	Patient chair arm	ND
E	Floor (by patient chair)	36.9 (Week 3)
F	Floor (by examination table)	35.9 (Week 2)
		35.4 (Week 3)
G	Wall (near patient)	ND
H	Door handle	ND

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