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Monkeypox diagnostic and treatment capacity at epidemic onset: A VACCELERATE online survey

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ABSTRACT

We approached European tertiary care institutions to provide details regarding their management of the current human monkeypox outbreak. 73 out of 105 sites stated to have capacities to manage the outbreak adequately amid the ongoing coronavirus disease 2019 pandemic. There are effective protective measures to prevent nosocomial infections in place at nearly all institutions. Diagnostic and treatment capacities on the other hand have potential to be improved.

Introduction

Since May 2022 multiple cases of monkeypox have been reported outside of the endemic regions in West and Central Africa [1]. As the number of confirmed cases in Europe continues to rise, efforts are made to localise and contain the outbreak [2,3]. However, the healthcare system preparedness for this transmissible infection remains unclear. Hospitals and other medical facilities are not only important in treating affected patients, but also responsible for detecting and monitoring cases in close cooperation with Public Health institutions [4]. Aside from that, high standards of infection prevention and control must be in place to avoid health-care associated outbreaks [5]. The state of knowledge regarding this disease is extremely dynamic and a high level of alertness is required. Hence, we aimed to collect data about the preparedness of European tertiary care institutions for the current outbreak of monkeypox and the distribution of diagnostic and treatment capacities.

Diagnostic and treatment capacity

Between May 27th and June 7th, 2022 European tertiary care institutions were approached by different media (i.e., email and social media) in order to provide details regarding their monkeypox diagnostic and treatment capacity. The survey was online accessible at clinicalsurveys.net/uc/MonkeypoxCapacity/.

A total of 105 sites replied, mainly from Southern Europe (n = 51, 48.6 %) (Fig. 1). Of the analysed institutions, 48 (45.7 %) had managed at least one suspected case, of which 34 (70.8 %) reported at least one confirmed case. Among the institutions with confirmed cases, 19 (55.9 %) had to admit one patient each to their respective hospitals. Sites were approached regarding their current capacity to handle a potential outbreak of monkeypox, including the number of patients able to treat. Additionally, they were also requested to provide their personal opinion on the potential burden on top of COVID-19 that monkeypox would mean to their hospitals, as summarised in Table 1.

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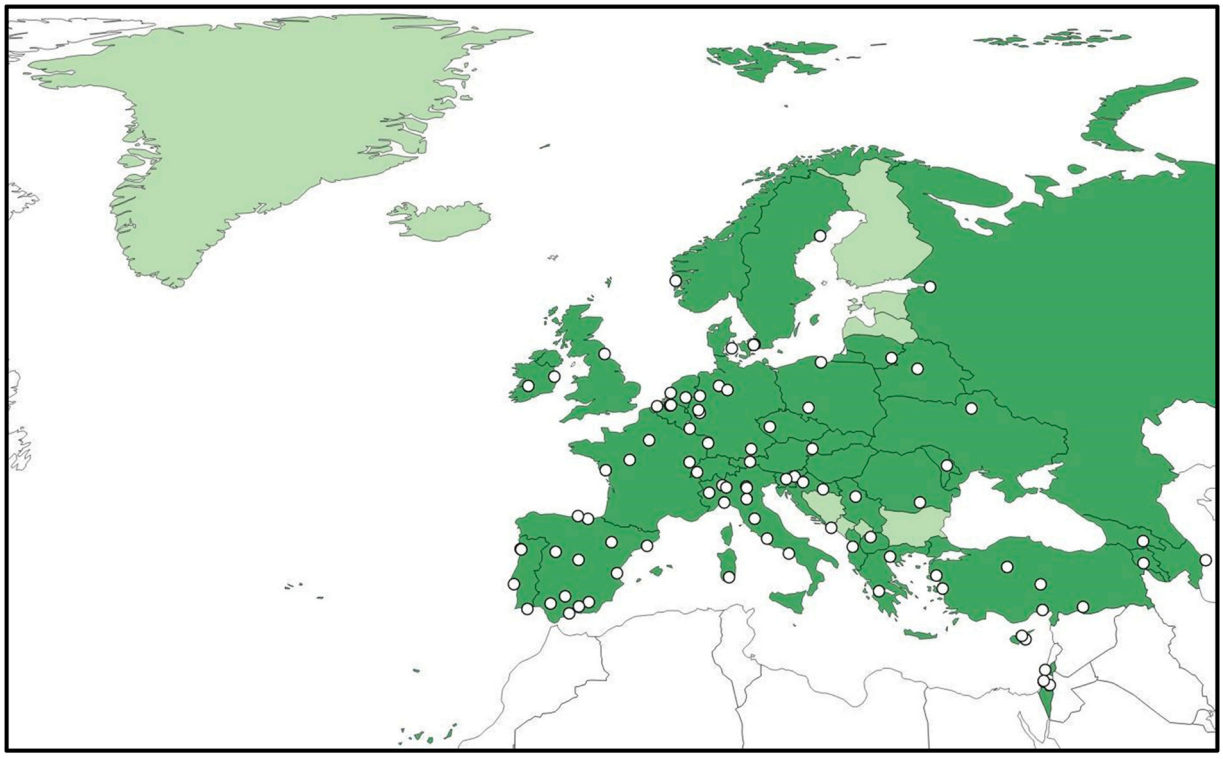

Fig. 1. Map of participating institutions per country. Countries with at least 1 participating institution are coloured in green. Countries with no participating institutions are coloured in pale green. Participating institutions are marked with an empty circle. Number of participating institutions per country: Spain (n = 17), Italy (n = 13), Germany (n = 8), Turkey (n = 6), France and Portugal (n = 5, each), Ireland and Israel (n = 4 each), Belgium, Croatia, Cyprus, Denmark and Greece (n = 3), Albania, Azerbaijan, Netherlands, Poland and Slovenia (n = 2, each), and Armenia, Austria, Belarus, Czech Republic, Georgia, Lithuania, Luxembourg, Moldova, North Macedonia, Norway, Romania, Russia, Serbia, Slovakia, Sweden, Switzerland, Ukraine, and United Kingdom (n = 1, each).

Most institutions (n = 93, 88.6 %) had access to an isolation room, of which 55 (59.1 %) are equipped with negative air pressure if needed. Only 48.6 % (n = 51) of the participating institutions had appointed a designated person for potential monkeypox case management. Two thirds (n = 68, 64.8 %) of the institutions had onsite access to a microbiology/virology laboratory, with only 3 (2.9 %) without specific tests for monkeypox.

Up to 50.5 % (n = 53) of the institutions had potential access to post-exposure vaccination, although only one (1.0 %) reported its use by the time of their participation in the survey. 18.1 % (n = 19) reported availability of drugs meant for specific treatment of confirmed monkeypox cases, mainly cidofovir (n = 10, 9.5 %).

Discussion

In this online survey we summarise the diagnostic and treatment capacity for monkeypox in European institutions at the time of initial outbreaks. With the collected variables we could observe how they have an acceptably good diagnostic capacity, although there is some room for improvement treatment-wise in several institutions. One third of sites reported proven cases of monkeypox. This may be related to the fact that many participating institutions were from Southern Europe, where major outbreaks in Italy, Portugal and Spain have already been reported [6,7]. The number of suspected cases was even higher, which indicates an increased awareness among physicians and groups with risk practices alike. Most proven cases were in outpatient treatment, as the current outbreak of monkeypox is caused by the less virulent and less fatal West African clade [8]. However, inpatients will undoubtedly need an isolation room ideally equipped with negative room pressure [9]. Overall, 69.5 % of participating institutions stated to have capacities to manage monkeypox outbreaks adequately amid the ongoing COVID-19 pandemic. The outbreak is not self-perceived as an additional burden in most sites although it remains dynamic and unpredictable. Established measures such as face masks and hand hygiene remain indispensable and provide similar protection in the care of patients with monkeypox [10].

A supply of smallpox vaccine for post-exposure prophylaxis is available or can be obtained at most participating institutions. The exact amount of vaccine doses ready to use remains unclear and certain countries have been reluctant to share them with the World Health Organization (WHO) in the past [11]. If administered within four days of exposure manifestation of infection may be prevented, whereas application within 14 days may reduce its severity [12]. In fact, little is known about the actual effectiveness of post-exposure prophylaxis. Successful implementation is also significantly dependent on a functioning contact-tracing and testing infrastructure [13]. The latter is only provided in about 62 % of the institutions responding to this survey and consists mainly of PCR testing. Another approach to disease control are national pre-exposure vaccination programmes aimed at potential risk groups such as men who have sex with men and lab personal handling infectious material [14].

Most cases of monkeypox have been treated symptomatically in this 2022 outbreak [15]. In immunocompromised patients and cases of severe monkeypox infection, several options are at the treating team disposal, even though no specific treatment has been approved for human monkeypox yet [12]. Our survey revealed that only a minority of hospitals have immune globulin and antiviral agents such as brincidofovir, cidofovir or tecovirimat in stock. Given the limited evidence and the mild course of most infections, extensive stockpiling of these drugs does not appear mandatory at his point. Treatment of critical patients should instead be limited to well-

Table 1
Baseline characteristic of participating institutions.

	n	%
Cases		
Institutions with suspected cases	48	45.7 %
Number of cases	2 (1-4) [1–48]	
Institutions with confirmed patients	34	32.4 %
Number of cases	1 (1-3) [1–27]	
Confirmed outpatients	30	28.6 %
Number of cases	1(1-3) [0–27]	
Confirmed inpatients	19	18.1 %
Number of cases	1 (1-1)	
Institutions with capacity to manage monkeypox outbreaks	73	69.5 %
Number of cases	16 (8–50) [1–2000]	
Monkeypox burden in addition to COVID-19		
Very weak	14	13.3 %
Weak	28	26.7 %
Neutral	33	31.4 %
Strongly agree	22	21.0 %
Very strong	8	7.6 %
ID ward onsite	82	78.1 %
Institutions with access to isolation rooms	93	88.6 %
With negative pressure	55	52.4 %
Designated person for monkeypox management	51	48.6 %
Ongoing protective measures against COVID-19	93	88.6 %
At least, surgical masks	59	56.2 %
At least FFP2/N95 masks	41	39.0 %
Other measures	8	7.6 %
Diagnostic criteria	93	88.6 %
Clinically	76	72.4 %
Epidemiologically	47	44.8 %
Laboratory based	65	61.9 %
Other	13	12.4 %
Laboratories onsite	68	64.8 %
Analysed samples		
Blood	38	36.2 %
Mouth swab	33	31.4 %
Urine	18	17.1 %
Lesion	54	51.4 %
Other	12	11.4 %
Sample storing	50	47.6 %
Onsite	30	28.6 %
Outsourced	20	19.0 %
Diagnostic methods	65	61.9 %
Antibody detection	7	6.7 %
PCR	50	47.6 %
Other	4	3.8 %
Institutions with access to post-exposure vaccine	53	50.5 %
Yes, but never used yet	7	6.7 %
Yes, already used	1	1.0 %
No, but with option to obtain it	45	42.9 %
Available treatments	19	18.1 %
Brincidofovir	6	5.7 %
Cidofovir	10	9.5 %
Tecovirimat	9	8.6 %
Vaccine immune globulin	6	5.7 %

COVID-19, coronavirus disease 2019; FFP2, filtering facepiece 2 filtering at least 94 % of airborne particles; IQR, interquartile range; N95, not resistant to oil filtering facepiece respirator filtering at least 95 % of airborne particles; PCR, polymerase chain reaction.

equipped institutions and university hospitals. Further research and time will tell which prophylactic, diagnostic and therapeutic measures will become best practice.

These results also have some limitations. To begin with, sites where suspected or confirmed infections have been observed are more likely to participate and thus, they might be more advanced in their diagnostic and treatment capacities. Second, the timing for replying to such online questionnaire has been reduced, only two weeks, hampering the participation of further institutions. However, we managed to collect answers from at least one institution from almost all the European countries. Finally, the capacity towards monkeypox might be jeopardised by its parallel appearance within the third year of COVID-19 pandemic, with many institutions exhausted and with intermittent diagnostic capacities based on the pandemic diagnostic needs.

Our study provides important insights into the ongoing outbreak of monkeypox in Europe. Data on diagnostic and treatment capacities may elucidate shortcomings and help in upcoming decisions regarding infection prevention and control (Fig. 1).

CRediT authorship contribution statement

JHG, OAC, and JSG contributed to study design and conceived the study idea. JSG collected and validated the data, did the statistical plan and analysis. JHG and JSG drafted the first version of the manuscript. All authors contributed to data interpretation, Writing – review & editing.

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Ethical statement

Not applicable.

Informed consent

Not applicable.

Conflict of interest statement

JHG reports no conflicts of interest.

OAC reports grants or contracts from Amplyx, Basilea, BMBF, Cidara, DZIF, EU-DG RTD (101037867), F2G, Gilead, Matinas, MedPace, MSD, Mundipharma, Octapharma, Pfizer, Scynexis; Consulting fees from Amplyx, Biocon, Biosys, Cidara, Da Volterra, Gilead, Matinas, MedPace, Menarini, Molecular Partners, MSG-ERC, Noxxon, Octapharma, PSI, Scynexis, Seres; Honoraria for lectures from Abbott, Al-Jazeera Pharmaceuticals, Astellas, Grupo Biotoscana/United Medical/Knight, Hikma, MedScape, MedUpdate, Merck/MSD, Mylan, Pfizer; Payment for expert testimony from Cidara; Participation on a Data Safety Monitoring Board or Advisory Board from Actelion, Allecra, Cidara, Entasis, IQVIA, Janssen, MedPace, Paratek, PSI, Shionogi; A patent at the German Patent and Trade Mark Office (DE 10 2021 113 007.7); Other interests from DGHO, DGI, ECMM, ISHAM, MSG-ERC, Wiley, outside of the submitted work.

JSG reports speaker honoraria from Gilead and Pfizer, outside of the submitted work.

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Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.jiph.2022.08.008.

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