

Rapid reconfiguration of sexual health services in response to UK autochthonous transmission of mpox (monkeypox)

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BACKGROUND

In 2015, the UN General Assembly announced its 2030 Sustainable Development Goals, including the WHO's aims to achieve a 90% decrease in STIs and to end the epidemic of neglected tropical diseases.¹ In 2022, reports emerged regarding the sexual transmission of one such neglected tropical disease, mpox (monkeypox). Within weeks, a global outbreak was confirmed.

First described in 1958 in a colony of research monkeys in a Copenhagen laboratory, the symptoms of this new 'mpox' orthopoxvirus were phenotypically similar to the variola virus disease, smallpox. By 1970, the first documented case of zoonotic transmission was recorded in a 9-month-old child in the formerly named Zaire, and thus reports of human mpox entered the medical literature. It is almost certain that mpox was circulating long before its European discovery, in endemic regions of West and Central Africa, and it was not until the global eradication campaign against smallpox that the two conditions were distinguished.

Since its discovery, two viral clades of mpox distinct in geography, genetics and symptom severity have resulted in multiple infections, predominantly on the outskirts of tropical forests. This has led to the hypothesis that while no animal reservoir has been identified, rodents hunted for bushmeat are the primary host.²

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Epidemiological studies in the region, including WHO surveillance programmes from 1970 to 1986, found 404 cases, predominantly in children.³ With the end of active surveillance in 1986, recorded cases dropped off to 13 over the next 10 years.^{2,4} Epidemiologists concluded that, given the low transmission rate, mpox was unlikely to sustain itself in the human population. Dwindling international support for epidemiological monitoring, in combination with a paucity of access to laboratory facilities and testing across the regions, meant that sporadic cases could not be proven, and further understanding of the virus, its symptomatic timeline, secondary attack rate and transmission vectors were curtailed. This knowledge gap is demonstrated in the 1996 DRC outbreak involving over 500 cases with low fatality rates and high secondary transmission, symptomatically and statistically more in keeping with an outbreak of varicella zoster virus than mpox.⁵

Beyond its endemic borders, outbreaks have been sporadic. The first occurrence outside of the African continent was in 2003, when mpox was identified as the cause of multiple cases of pox-like illness in the American Midwest, and a number of prairie dogs housed alongside imported Gambian pouched rats were thought to be the source.⁶ Two years later, a Médecins Sans Frontières team in South Sudan reported a suspected case, later confirmed by the Centers for Disease Control and Prevention, and a novel mpox virus genetically similar to the Central African clade was confirmed.⁷ Over a decade later, the largest recorded outbreak of mpox occurred in Nigeria. Now considered endemic for mpox and the origin of many international travel associated cases, Nigeria had no recorded cases of mpox

for almost 40 years between the 1970s and 2017 when an epidemic was identified across 17 states.⁸ Previously described as one of the largest outbreaks among humans, with a 6% fatality rate, primary zoonotic and secondary human-to-human transmission was suspected.

As clusters of mpox infection spread further beyond endemic regions, regional and international health bodies have been slow to react, and global health infrastructure has been inadequate in supporting the identification of cases and curtailing transmission. The lack of infrastructural support in endemic areas has led to a paucity of evidence regarding routes of transmission, secondary attack rates and postsymptomatic infectious time frames.

UK OUTBREAK

In May 2022, the first autochthonous transmission of mpox was identified in the UK, and within weeks, the number of patients with mpox had overtaken the total number of UK cases in the previous 52 years combined.⁹ Clusters were soon reported in multiple other countries, suggesting a previously unwitnessed global outbreak.

A biopsychosocial triad of (1) anogenital lesions; (2) clustering of cases within the community of gay, bisexual and other men who have sex with men (GBMSM); and (3) the trust this community has in local sexual health services (SHSs), in combination with signposting from allied health agencies, placed the outbreak firmly on the doorstep of SHSs. This was reinforced on 16 May 2022 when the UK Health Security Agency (UKHSA) advised symptomatic individuals to contact local SHSs for advice, assessment and testing.¹⁰ SHSs in England were instructed to acquire personal protective equipment (PPE) to establish communication channels with local infection prevention and control (IPC) teams and colleagues in infectious diseases, microbiology and virology, and to develop appropriate admission and treatment pathways.

Within the UK, a network of specialist infectious disease centres exists, overseen and directed by high consequence infectious disease (HCID) units in Newcastle, Sheffield, Liverpool and London.¹¹ A single network allows for a national response to epidemic and pandemic outbreaks and the coordination of resources to prevent single sites at the geographical epicentre becoming overwhelmed. Until July 2022, mpox was classified as an HCID, and as in 2018 and 2021, UK cases of mpox in the 2022 outbreak were reported to this

network. Unlike previous clusters—where all patients were admitted to HCID units—the majority of cases in 2022 remained in the community.

While HCID units are under the clinical supervision of infectious disease specialists, much of the 2022 outbreak has involved physicians in genitourinary medicine taking a national lead.

The majority of the early confirmed cases of mpox identified as GBMSM and had attended SHSs as their first point of contact with healthcare. A lack of published national and international guidance on the management of HCIDs in community settings meant staff in SHSs and national sexual health bodies were left to modify clinic infrastructure to facilitate the assessment and diagnosis of individuals with suspected mpox. Patient pathways were reconfigured to ensure clear referral processes and admission pathways for those requiring more intensive healthcare support were established. Workplace infection prevention measures to maintain staff health and well-being by reducing potential mpox exposure were instigated, and crucially, following the significant impact of COVID-19, there remained a need to continue the provision of routine sexual healthcare.

LOCAL APPROACH

Our Trust consists of five dedicated sexual health clinics (SHCs), four located within the community, geographically distant from the main hospital. In the absence of appropriate guidelines regarding the management of a category 3 pathogen in a community clinic, we created a local pathway to adjust to the demands of mpox management. All 'walk-in' activity ceased, and a triage system was instigated. Clinic redesign and staff redeployment were based on existing COVID-19 pandemic protocols and clinic sites potentially hosting patients with mpox were inspected by our IPC team. SHCs are designed with a dual purpose of accommodating large numbers of patients and also providing private rooms to ensure confidential consultations can occur. Patients in waiting rooms were socially distanced 1 m apart, and individual clinic rooms were adapted to allow for isolation of suspected cases. WHO and UKHSA PPE requirements for contact with individuals with suspected and confirmed mpox were instigated, and enhanced cleaning protocols were introduced to minimise potential fomite transmission. Diagnostic matrices created with the Rare Imported Pathogens Laboratory

(RIPL) were distributed among clinic and laboratory staff, and due to the Advisory Committee on Dangerous Pathogens classification of mpox, no on-site testing of sexual health samples was undertaken.¹²

A hub and spoke model was created within the sexual health directorate to reduce staff exposure to cases of mpox and ensure standardisation of testing. Referrals to the hub were originally restricted to our SHCs, the adjacent emergency department and a telephone triage system.

Triage questionnaires were developed to identify individuals with symptoms suggestive of mpox and those with recognised exposure risk factors. Call centre and reception staff underwent education and training sessions delivered by clinical staff on sensitive questioning techniques to identify mpox-associated risk factors including patient sexuality, recent travel history and a focused checklist of mpox-associated symptoms. Early cases of mpox in this outbreak reported skin lesions without a prodrome; thus, all patients reporting skin rashes were referred to a telephone and remote video/email triage service staffed by senior sexual health clinicians. Skin lesion symptoms are a common presenting complaint at SHCs, and it was expected that large volumes of patients would be triaged through this system, including patients with existing chronic conditions meeting other risk criteria. Phone, email and video triage were staffed by senior clinical staff to differentiate between skin lesions morphologically similar to mpox, including herpes simplex virus, varicella zoster virus, early syphilis, *Molluscum contagiosum* and the multiple conditions often described as a 'rash' by patients including tinea cruris, pubic lice, scabies, inflammatory conditions such as balanitis, and dermatoses such as lichen sclerosis, eczema and psoriasis. Patients were assigned to either hub or spoke clinic sites based on clinical findings.

An SHC adjacent to the acute care hospital site was chosen as the mpox testing hub. This site had the advantage of a separate access point, allowing a section of the clinic to be isolated for mpox case management, permitting the majority of the service to continue seeing sexual health patients unimpeded. Easy access to an acute hospital allowed for the transfer of individuals who were systemically unwell and required admission. All staff within the hub clinic underwent fit testing for FFP3 respiratory masks, along with training in donning and doffing PPE and decontamination protocols. Dedicated cleaning staff were present in the hub site and trained in enhanced cleaning protocols. Samples for

mpox were collected as per advice from RIPL, in addition to screening for other differentials including HSV, VZV, syphilis and bacterial skin infections. Testing, treatment, and prevention of STIs was also offered, including the commencement or continuation of HIV pre-exposure and postexposure prophylaxis.

All remaining community SHCs were classified as spoke sites. On the premise that not all cases would be identified through the triage system, protocols were established to identify potential people with mpox. Temperature checkpoints were reinstated at all clinic entrances and all patients were asked about the presence of skin lesions and asked to compare these to pictograms showing the morphological appearance of mpox lesions. Those patients meeting UKHSA case definitions of probable mpox were booked into our hub site and provided with advice on how to travel while posing minimal risk to others, including using private methods of transport or, if public transport was required, wearing a face mask and covering all skin lesions.

Once inside the spoke clinic, one-way systems were laid out to avoid repeated exposures and close contact between individuals. Social distancing was maintained in waiting areas and the wearing of fluid repellent surgical masks was mandated. Clinical staff maintained basic PPE consisting of a fluid-repellent surgical mask, and when reviewing an individual with suspected mpox, enhanced PPE was donned, including FFP3 mask, full length apron, gloves and eye protection.

Public health outbreak responses rely on clear and concise communication. Providing accurate and timely information ensures the public have a reliable source they can trust. Staff should also be kept up to date of all changes to working conditions, risk exposure management and alterations to clinical pathways. Within 48 hours of our first diagnosed cases of mpox, all staff within the sexual health directorate were contacted by email to inform them of the new appearance of mpox. Educational materials were distributed and senior clinicians provided interactive teaching and Q&A sessions to give staff the opportunity to ask questions and raise concerns.

Patients with existing or future booked sexual health appointments received text messages detailing the signs and symptoms of mpox and what to do if this was suspected. Further information was distributed through our social media pages including links to information from the gov.uk site, British Association for Sexual

Health and HIV, the British HIV Association, the Terrence Higgins Trust and our Trust website.^{13–15}

All individuals with suspected mpox infection received a text message with a link to a patient information sheet providing basic mpox information, isolation and advice on who to contact should their condition deteriorate.

Centralised testing at the RIPL meant that tests were batched and reported daily to referring centres originally via telephone call and, as cases increased, by secure email. As the outbreak continued, local laboratory sites developed accredited assays in conjunction with RIPL, distributing the burden of testing. Staff were rostered to contact individuals with positive results on the same day, with the phone call encompassing a clinical review including evolution of skin or mucosal lesions and systemic symptoms, plus travel, medical, drug and social histories. Advice regarding isolation, pets and healthcare was provided. During these calls, patients were classified into one of three categories, depending on severity of symptoms and ability to self-isolate, the outcomes of which were reported at the daily meeting of the HCID units. Clinically well individuals unable to self-isolate were discussed with local authority and public health teams to assist with housing and support. As numbers increased, clinical management was delegated to the diagnosing clinics, and national discussion of cases was reserved for severely unwell individuals and those requiring compassionate access to the national supply of tecovirimat.

All patients diagnosed at our sites remained under our clinical care while in the community. A virtual ward was established on our electronic patient record (EPR) system to track patient numbers and allow multiperson access to the ward at any one time. Data handling and security were key to maintain the anonymity of patients. The EPR systems allow for clear documentation of result disclosure and a log of individuals accessing patient notes. A shared file Microsoft Excel sheet was maintained to permit data collection on each case, and later, a data collection hub was created to allow mapping of cases, admission and the vaccine programme. Real-time updates and interpretation of data allowed us to intermittently adapt the organisational structures to the developing outbreak. Welfare phone calls were delivered by clinicians every 48 hours to all patients in our virtual clinic. The majority of these clinicians were isolating following early contact with mpox cases, and this

task was time and resource demanding. As this team returned to work, the demand of welfare calls alongside clinical duties was not feasible. We quickly realised that community patients needed significant advice, reassurance and prognostic information that were not available in the early stages of the outbreak. Scripts and proformae were developed to ensure the information being provided was consistent from all providers, and as the outbreak progressed, this was delegated, first to trained junior clinical staff with senior clinician support for complex cases, and then due to a lack of manpower, to a system of mass text messaging. Existing COVID-19 monitoring systems were later adapted to assist in community support.

Managing deteriorating patients in the community was an early complication of the outbreak. The requirement of patients to isolate and limit public travel, along with restricted access to other healthcare settings, including primary care, placed the responsibility of management on SHSs. At the outset, all patients requiring admission were discussed with the HCID network and transported to HCID units for assessment and admission, if needed. Transfer from the community and between hospital sites required the use of specialist hazardous area response teams, coordinated by the National Ambulance Resilience Unit.

Common reasons for deterioration included pain not controlled with basic analgesia available over the counter, proctitis-associated constipation, secondary bacterial infection, and isolation-associated or stigma-associated mental health crises. As our cohort and experience grew, we began to provide rescue packs of analgesia, laxatives and antibiotics as the point of mpox testing for people with a large burden of lesions in the anogenital region, early signs of erythema suggesting infection, immunocompromising conditions or by clinician decision. This allowed us to review patients virtually, including by video call or image sharing by email and commence higher-strength analgesia and/or oral antibiotics if needed. In August, mpox was declassified as an HCID, and patients could be admitted to a non-HCID hospital. Assessment and admission pathways were established with our emergency department to allow for any suspected or known cases of mpox to transit through the waiting area rapidly and isolate in a designated room.

Details of all positive cases were passed onto the local health protection teams for contact tracing and follow-up, along with offers of postexposure prophylaxis to

high-risk individuals in the form of vaccination. Those who could not be contacted by telephone received an email if available and then a registered letter informing them of their diagnosis.

Individuals testing negative received a text message detailing the result and advice on who to contact should they require further input.

Overall, approximately 3% (24/843) of our mpox cases have required admission to our hospital either due to complications of mpox infection, pain, secondary infection or inability to isolate. The majority have been admitted directly from clinic or the emergency department, the others following subsequent review at the point of positive result delivery or welfare check. Admission rates have fallen as we gained more experience in the management of mpox compared with the early weeks of the outbreak, with the limitation that patients may have attended other hospital sites for admission.¹⁶ We associate this with the early introduction of stronger analgesia and antimicrobials preventing progression of symptoms in the early stages of infection.

Sexual healthcare requires increased funding to meet the demands of a population with ever-increasing numbers of STIs. Epidemics of syphilis and gonorrhoea alongside rising antimicrobial resistance have continued for many years without the funding to reduce transmission. Significant and necessary changes have been made to SHCs across the UK, but with early signs of abatement of the outbreak, a return to functional services is possible. New pathways and protocols were rapidly instituted to cope with the influx and demands of the outbreak, resulting in the described focus on mpox attendances. This approach was successful for the management of a single condition but placed a huge strain on already limited resources and staff, severely restricting access for service users who required ongoing sexual and reproductive healthcare. These reconfigurations have implications for both current SHC staffing and for short-term and medium-term responses to wider sexual healthcare provision. While a dedicated mpox financial tariff has been developed it has not been formally approved, and in its absence, the impact of mpox care on SHS income and routine activity cannot be underestimated. The widespread reduction in tariffed activity in clinics will impact their survival and the services they can provide well beyond this outbreak, and it is imperative that healthcare providers and commissioners support SHSs as they adapt to manage the mpox outbreak.

By monitoring cases within our Trust, we have been able to instigate a return to routine services whereby staff see all patients in appropriate PPE regardless of presenting complaint. This reduces unexpected staff exposures and the need for isolation. Alongside a change in enhanced cleaning requirement, this has allowed mpox cases to be seen alongside general sexual health conditions. We have also identified some positive changes that will continue in the postoutbreak service provision, including remote consultations and online access to oral contraception, longer HIV pre-exposure prophylaxis (PrEP) prescriptions with reduced monitoring through clinic, increased use of home testing kits and the use of virtual monitoring of symptoms to reduce in-person repeat attendances.

As vaccine programmes are instigated across the UK and decreasing numbers of mpox are identified, it is vital that national healthcare bodies learn from this outbreak. Over 33 000 pre-exposure mpox vaccines have been administered nationally, with over 7000 through our trust's clinics alone, in a rapidly established campaign taking a targeted approach to those deemed most at risk. Staff have been redeployed from COVID-19 vaccination programmes to support this, and clinics have locally upskilled staff to administer intradermal rather than subcutaneous injections allowing a greater number of doses to be administered from a single vial. While an impressive early response, there has been widespread criticism about the public messaging from community patient groups with vaccine communication left to individual clinics to advertise via social media pages leading to disparity and inequity in awareness of and access to vaccines. Risk stratification matrices to identify those most vulnerable of mpox acquisition have also been criticised, with no national agreement on what individual or combination of features including recent diagnosis of an STI, sexual practices and PrEP use highlights the greatest risk. Furthermore, while London has remained the epicentre of the mpox outbreak in the

UK, vaccine availability outside the capital has been sparse despite regular nationwide travel and evidence of previous regional STI outbreaks associated with travel to London.

As with mpox, Zika and Ebola, we must prepare for other neglected diseases to adapt to sexual transmission and present in patients attending SHCs. Research into bodily fluids as vectors of infection, the risk of sexual transmissibility beyond the symptomatic period and perinatal transmission is urgently required. National governments and global healthcare bodies must prioritise funding for these sectors and include sexual health clinicians at the highest level of research and development, including outbreak planning if future epidemics are to be identified and controlled.

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