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Surveillance of mpox cases attending sexual health services in England (SOMASS): design, implementation, and initial findings from the SOMASS data collection tool, 2022

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Abstract (297)

Objectives

We aimed to design and implement a data collection tool to support the 2022 mpox outbreak, and to describe clinical and epidemiological data from individuals with mpox attending sexual health services (SHS) in England.

Methods

The UK Health Security Agency (UKHSA) and the British Association for Sexual Health and HIV (BASHH) established the Surveillance of Mpox Cases Attending Sexual Health Services in England (SOMASS) system.

Descriptive data were collected via a secure web-based data collection tool, completed by SHS clinicians following consultation with individuals with suspected mpox. Data were collected on patient demographics, clinical presentation and severity, exposures, and behavioural characteristics.

Results

As of 17th November 2022, 276 SOMASS responses were submitted from 31 SHSs in England.

Where recorded, most (245/261; 94%) individuals identified as gay, bisexual or men who have sex with men (GBMSM), of whom two thirds were HIV negative (170/257; 66%) and taking HIV pre-exposure prophylaxis (87/140; 62%), with a median age of 37 years [interquartile range: 30-43]. Thirty-nine percent (63/161) had a concurrent sexually transmitted infection at the time of their mpox diagnosis.

For 46% of individuals (127/276), dermatological lesions were the initial symptom. Lesions were mostly asymmetrical and polymorphic, predominately affecting the genital area and perianal areas.

Nine percent (24/276) of individuals were hospitalised. We report an association between receptive anal intercourse among GBMSM and proctitis (27/115; 24% vs. 7/130; 5%; p<0.0001), and the presence of perianal lesions as the primary lesion site (46/115; 40% vs. 25/130; 19%; p=0.0003).

Conclusions

We demonstrate multi-disciplinary and responsive working to develop a robust data collection tool, which improved surveillance and strengthened the knowledge base. The SOMASS tool will allow data collection if mpox resurges in England. The model for developing the tool can be adapted to facilitate the preparedness and response to future STI outbreaks.

What is already known on this topic?

Previous studies have highlighted that, in newly affected countries, the ongoing multi-country mpox outbreak has primarily affected gay, bisexual and other men who have sex with men (GBMSM), who present with atypical clinical presentations.

What this study adds

This study demonstrates multi-disciplinary, responsive and agile working between front-line sexual health services, clinical professional bodies and the national health protection agency, to design and implement a robust and adaptable data collection tool, to improve surveillance and strengthen the knowledge base.

How this study might affect research, practice or policy

The development of this data collection tool provided a detailed description of the clinical presentation of mpox in SHS, informing case definitions, and strengthened the evidence base for clinical assessment. This approach can facilitate the preparedness and response to future STI outbreaks.

Introduction

Mpox, previously monkeypox, is a zoonotic viral infection transmitted between humans by close contact (1). It can also be transmitted via respiratory droplets, or via contact with contaminated clothes, bedding or towels (2). Mpox is endemic in regions of Western and Central Africa, with historically only sporadic, travel-associated cases being identified outside

the region (3-7). In May 2022, an international outbreak of Clade IIb mpox virus, primarily affecting sexual networks of gay, bisexual and other men who have sex with men (GBMSM), was first identified in the United Kingdom (UK) (8), with over 86,000 cases spanning 110 countries globally (9). Emerging evidence on the outbreak epidemiology suggested mpox can be effectively transmitted during sexual contact (10-12).

Historical descriptions of the clinical presentation of mpox document a systemic prodromal stage including fever, lymphadenopathy, and headache, followed by the presence of dermatological lesions (2). In a small case series in England between August 2015 and September 2021, most cases had a prodromal stage and lymphadenopathy prior to evident dermatological lesions, and transmission was thought to be related to travel, with subsequent transmission within nosocomial and household settings (13). However, since 16th May 2022, a rapid increase of cases with no epidemiological link to Western or Central Africa has been detected in the UK. Emerging insights from clinicians managing cases suggested the clinical presentation within this outbreak was different from reports of cases from West and Central African countries, including the predominance of anogenital lesions, the presence of lesions prior to a systemic prodrome and presence of proctitis (11, 14). Findings from these reports were integrated into updated outbreak case definitions in multiple settings (15-17).

Detailed descriptions of clinical presentation and severity of cases within this novel outbreak were lacking. Furthermore, the NHS advised affected individuals to seek clinical care from sexual health services (SHSs) in the UK, rather than non-specialist primary care providers (18), where management of a high consequence infectious disease was unprecedented. This evidence was urgently needed to inform triage decisions, clinical assessment, and management within SHSs. To understand the clinical presentation, clinical severity, and epidemiology of those affected by mpox who were attending SHSs in England, the UK Health Security Agency (UKHSA) and the British Association for Sexual Health and HIV (BASHH), with input from the British Association of Dermatologists (BAD), designed and implemented the Surveillance of Mpox Cases Attending Sexual Health Services (SOMASS) system.

Methods

In this case series of individuals with mpox attending SHSs in England, experts from the UKHSA, BASHH and BAD formed a multi-disciplinary working group to co-design and implement a secure web-based data collection tool between May and June 2022, hosted on Snap 11 Professional (https://www.snapsurverys.com), accessible from 5th July 2022. The design of this tool involved standardisation of clinical, epidemiological and sociodemographic variables relevant to the outbreak and validation against emerging clinical reports and

descriptors and classifiers of similar dermatological and infectious diseases. Three iterations of the data collection tool were designed and tested internally by the multi-disciplinary group with a focus on the relevance of the variables collected, clarity of language used and data quality. The implementation of this tool involved a piloting phase where data were collected from several volunteering SHSs to assess data quality and completeness of responses. Pilot feedback suggested minor restructuring of the content and order of questions to improve the data entry process. The finalised data collection tool was advertised through BASHH dissemination channels including mailing lists, newsletters and webinars. Submissions to SOMASS were not mandatory but encouraged, and interim findings were reported during professional meetings to highlight the value of the tool.

SOMASS responses were completed by genitourinary medicine (GUM) clinicians following consultations with suspected cases of mpox, using information captured during the consultation and entered into clinical records. Prompts were disseminated alongside the data collection tool for clinicians to use as an aide-memoire while assessing suspected mpox cases, to improve completion of data items.

The data collection tool captured the following:

(1) sexual health service attended by the case, date of patient's assessment

(2) patient demographics (age , region of birth, ethnicity, gender identity, assigned sex at birth, sexual orientation),

(3) relevant sexual health medical history (HIV status and treatment, history of sexually transmitted infections (STIs) in the previous 12 months, concurrent STIs and mpox status),

(4) pathway of care (attendance at a non-sexual health service prior to SHS attendance),

(5) clinical presentation (onset dates of symptoms, including dermatological vs. non-dermatological, determination of initial symptom, detailed description of dermatological signs and symptoms, including the location and frequency of lesions, and lesion morphology),

(6) clinical severity (severity of illness at attendance assessed by the GUM clinician, hospital admission following mpox diagnosis),

(7) exposures and behavioural characteristics (known mpox contact; within the three weeks prior to SHS attendance: chemsex, use of HIV pre-exposure prophylaxis (PrEP), group sex, attendance at sex-on-premises venues, type of sexual contact; within the three weeks before symptom onset: number and gender identity of sexual partners, international travel; number of sexual partners in the past three months).

Chemsex was defined as use of drugs such as GHB (gamma-hydroxybutyrate), crystal methamphetamine, or mephedrone during sex. Group sex was defined as sexual activity with >1 person at a time. Sex-on-premises venues were defined as commercial venues where sexual activity occurs. A concurrent STI was defined as a laboratory-confirmed diagnosis of herpes simplex virus (HSV), syphilis, chlamydia or gonorrhoea from a specimen taken at the SHS attendance.

A skin lesion (dermatological presentation) was defined as a single circumscribed area, including macule, papule, nodule, pustule, and vesicle presentations. Proctitis was defined as rectal bleeding or rectal discharge. The buttocks, perineum, anorectal, and perianal areas were combined into a single "perianal" category. The groin, mons pubis, glans penis, intra-meatal, sub-prepuce, penile shaft, and scrotum were combined into a single "genital" category. Clinical severity was assessed as "mild illness" if the mpox infection caused the patient no disability; "moderate illness" if the infection led to the patient being unable to perform most physical activities but not requiring nursing care (support with daily activities such as washing and dressing); and "severe illness" if the patient was unable to perform most physical activities and required nursing care. GBMSM included individuals identifying as male and gay or bisexual or identifying as male and reporting at least one male sexual partner in the past three weeks.

Data were extracted on 17th November 2022 by an epidemiologist at the UKHSA; cleaning and analysis was conducted using Stata 15. Data were analysed using descriptive statistics: proportions, median and interquartile range [IQR]; associations between type of sexual exposure and clinical presentation were tested using two-proportion Z-tests or $\chi 2$ tests. Missing data for many variables resulted in different denominators; no imputation was undertaken for missing values.

Findings from SOMASS were compared to the characteristics of all mpox cases from England (19) to appraise generalisability.

Ethical considerations

This study was undertaken for health protection purposes under permissions granted to UKHSA to collect and process confidential patient data under Regulation 3 of The Health Service (Control of Patient Information) Regulations 2020 and Section 251 of the National Health Service Act 2006. Data was collected via a secure, web-based data collection form shared exclusively with SHSs in England. The data collected were pseudonymised and deidentified; only a clinic-specific patient identification code was captured.

Results

Demographic characteristics

As of 17th November 2022, 276 SOMASS responses were submitted from 31 SHSs from all nine UKHSA regions in England, representing 8% (95% CI 6.9% to 8.7%) of all confirmed mpox cases in England as of 14th November (20). The distribution of individuals within SOMASS by SHS attendance date is shown in Figure 1. Of these, 274 were subsequently laboratory-confirmed mpox positive; in two cases the laboratory result was unknown but assumed to be positive, and therefore these individuals were retained for analysis. Three clinics accounted for 78% of submissions: including two clinics in Greater London (n=174; 63%), and one in Brighton (n=40; 15%). The median time between attendance date and submission of the SOMASS response by the clinician was 73 days [IQR: 37-127].

Most individuals (268/276; 97%) identified as a cis-gender man. Sexual orientation or behaviour was recorded for 95% (261/276) of individuals; of those, 94% (245/261) identified as GBMSM (Table 1). The median age of individuals was 37 years [IQR: 30-43; range: 17-68 years]. Where ethnicity was known (188/276; 68%), the majority identified as White British (102/188; 54%) or other White ethnic background (33/188; 18%). Where region of birth was known (156/276; 57%), most individuals (109/156; 70%) were UK-born (Table 1).

Sexual history and lifestyle characteristics

Where HIV status was reported (257/276; 93%), 66% (170/257) of individuals were HIV negative, of whom and where known, 62% (87/140) reported taking PrEP in the previous three weeks. Of those living with HIV (87/257; 34%), the majority (81/87; 93%) were taking antiretroviral treatment.

Of those where STI testing at the SHS attendance was known (161/276; 58%), 39% (63/161) tested positive for a concurrent STI. Most of these concurrent STI diagnoses were gonorrhoea (30/63; 48%), followed by chlamydia (19/63; 30%), HSV (7/63; 11%) and syphilis (7/63; 11%), there were no new HIV diagnoses. The median number of sexual partners in the past three months was three [IQR: 1-5] and nearly half (87/179; 49%) of individuals, where this was known, reported being diagnosed with a STI in the previous year (Table 2).

Clinical presentation and severity

The clinical presentation of individuals was variable: 46% (127/276) described initial symptoms as dermatological, 34% (93/276) as non-dermatological and 20% (55/276) as both. Eighty percent (220/276) reported presenting with any non-dermatological symptom, 20% (54/276) reported presenting with dermatological symptoms only.

Of those reporting a dermatological presentation (268/276; 97%), the median number of body sites affected was two [IQR: 1-4]. We found that reporting a higher than median number of lesions was associated with presence of non-dermatological symptoms (P=0.006). Lesions were most frequently reported on the genital area (223/268; 83%), of which 47% (104/223) were on the penile shaft. Lesions were also reported on the perianal area (135/268; 50%), and face, head or neck (76/268; 28%). Lesions on the penile shaft, and face, head or neck were more likely to be polymorphic compared to monomorphic (23/35; 66% vs. 12/35; 34%; p=0.009 and 16/20; 80% vs. 4/20; 20%; p=0.0001, respectively). For most individuals with complete data, the distribution of lesions was asymmetrical (211/224; 94%).

Of those who reported any non-dermatological symptoms (n=220), the most frequently reported symptoms were related to fever (n=141), lymphadenopathy (n=133), fatigue (n=75), malaise (n=66) and proctitis (n=47).

In terms of clinical severity at attendance, the clinician assessed most cases to be mild (195/276; 71%), moderate for 23% of cases (63/276) and severe for 5% of cases (14/276); for four individuals (2%) this information was unknown. Twenty-four individuals (9%) were admitted to hospital for medical intervention immediately or shortly after their mpox diagnosis; of those, 14/24 (58%) were assessed at attendance to be clinically severe, 6/24 (25%) were moderate and 4/24 (17%) were mild. A further two individuals were hospitalised as they were unable to isolate at home.

Exposure characteristics

Most individuals (230/276; 83%) reported no known contact with someone with mpox. Where known, 96% (111/116) of individuals reported condomless anal intercourse, 22% (34/158) reported group sex and 20% (27/135) reported attending sex-on-premises venues in the previous three weeks (Table 3).

Where this was known (194/276; 70%), 83% (161/194) of individuals reported either one or two sexual partners in the three weeks before symptom onset, and where known (215/276;

78%), 94% reported that this sexual contact occurred in the UK. Notably, eight male cases reported having no sexual partners in that time (Table 3).

GBMSM reporting receptive anal intercourse (RAI) at least once in the past three weeks were more likely to present with proctitis (27/115; 24% vs. 7/130; 5%; p<0.0001) and describe a perianal lesion as their primary lesion (46/115; 40% vs. 25/130; 19%; p=0.0003), compared to those who did not report RAI. We found no evidence that RAI or insertive anal intercourse (IAI) was associated with reporting systemic symptoms prior to lesion development among GBMSM (p=0.14 and p=0.87, respectively). We found no evidence that reporting IAI, or giving oral sex, was associated with increased likelihood of penile or oral lesions, respectively, among GBMSM (p=0.16, p=0.45).

Pathway of care

Twenty-six percent (71/276) of individuals reported accessing another healthcare service before attending a SHS for their mpox concerns, such as Emergency Departments (41/71, 58%), General Practice (12/71, 17%), urgent care/walk-in centre (10/71, 14%) or NHS 111 telephone service (9/71, 13%).

Table 1: Demographic characteristics of individuals within SOMASS

		N (% including missing data)	N (% excluding missing data) *
Gender identity	cis-gender man	268 (97)	
	cis-gender woman	5 (2)	
	transgender man	1 (0.4)	
	transgender woman	1 (0.4)	
	Unknown	1 (0.4)	
Sexual orientation	GBMSM	245 (89)	245 (94)
	Heterosexual man	11 (4)	11 (4)
	Heterosexual woman	4 (1)	4 (2)
	Bisexual woman	1 (0.4)	1 (0.4)
	Unknown	15 (5)	
Age: median [IQR]		37 [30-43]	
Age: range		17-68	
Region of birth	UK	109 (40)	109 (70)
	Europe (not inc. UK)	17 (6)	17 (11)
	Latin America & Caribbean	10 (4)	10 (6)
	Oceania	5 (2)	5 (3)
	Africa	7 (3)	7 (5)

	Asia	5 (2)	5 (3)
	Northern America	3 (1)	3 (2)
	Unknown	120 (44)	
Ethnicity	White British	102 (37)	102 (54)
	White other background	33 (12)	33 (18)
	Black African	10 (4)	10 (5)
	Black other background	6 (2)	6 (3)
	White Irish	5 (2)	5 (3)
	Black Caribbean	7 (3)	7 (4)
	Indian	4 (1)	4 (2)
	Asian other background	5 (2)	5 (3)
	Mixed ethnic background	13 (5)	13 (7)
	Other ethnic background	3 (1)	3 (2)
	Unknown	88 (32)	

263 * Missing data were excluded from the percentages if greater than 5% of all cases

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265 **Table 2:** Characteristics of higher risk sexual networks among individuals within SOMASS

		N (% including missing data)	N (% excluding missing data) *
HIV status	Living with HIV	87 (32)	87 (34)
	Negative	170 (62)	170 (66)
	Unknown	19 (7)	
PrEP use in previous 3 weeks ǂ (among those HIV negative)	Yes	87 (51)	87 (62)
	No	53 (31)	53 (38)
	Unknown	30 (18)	
HIV treatment (among those living with HIV)	Yes	81 (93)	
	No	2 (2)	
	Unknown	4 (5)	
Concurrent STI	Yes	63 (23)	63 (39)
	No	98 (36)	98 (61)
	Unknown	115 (42)	
Median number of sexual partners in previous 3 months ǂ [IQR]		3 [1-5]	
STI diagnosis in previous year ǂ	Yes	87 (32)	87 (49)
	No	92 (33)	92 (51)
	Unknown	97 (35)	

266 * Missing data were excluded from the percentages if greater than 5% of all cases
267 ǂ "previous" refers to period prior to attendance date
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Table 3: Exposure characteristics among individuals within SOMASS

		N (% including missing data)	N (% excluding missing data) *
Known MPX contact	Yes	38 (14)	
	No	230 (83)	
	Unknown	8 (3)	
Group sex in previous 3 weeks ǂ	Yes	34 (12)	34 (22)
	No	124 (45)	124 (78)
	Unknown	118 (43)	
Sex-on-premises venue attendance in previous 3 weeks ǂ	Yes	27 (10)	27 (20)
	No	108 (39)	108 (80)
	Unknown	141 (51)	
Condomless anal intercourse in previous 3 weeks ǂ	Yes	111 (40)	111 (96)
	No	5 (2)	5 (4)
	Unknown	160 (58)	
Known no. of sexual contacts in the 3 weeks before symptom onset	0	8 (3)	8 (4)
	1	106 (38)	106 (55)
	2	55 (20)	55 (37)
	3	14 (5)	14 (5)
	4	2 (0.7)	2 (7)
	5	4 (1)	4 (2)
	6	1 (0.4)	1 (0.5)
	7	2 (0.7)	2 (2)
	10	2 (0.7)	2 (2)
	Unknown	82 (30)	
Gender identity of sexual contacts in 3 weeks before symptom onset	Male (including trans men)	204 (74)	204 (94)
	Female (including trans women)	12 (4)	12 (6)
	Unknown	60 (22)	
Country where sexual contact occurred in the 3 weeks before symptom onset	UK	202 (73)	202 (94)
	Spain	7 (3)	7 (3)
	USA	3 (1)	3 (1)
	Iceland	1 (0.4)	1 (0.5)
	Mexico	1 (0.4)	1 (0.5)
	Portugal	1 (0.4)	1 (0.5)
	Unknown	61 (22)	

* Missing data were excluded from the percentages if greater than 5% of all cases

ǂ "previous" refers to period prior to attendance date

Discussion

In this study, we report the design, implementation, and initial findings of a bespoke data collection tool to support the response to the 2022 mpox outbreak, which collected clinical and epidemiological data from 276 individuals with mpox attending SHSs in England.

Our study showcases the role and value of multi-disciplinary collaborations between front-line SHSs, clinical professional bodies and the UKHSA when responding to outbreaks of emerging infections that transmit in sexual networks and outlines the public health approach to design and implement this data collection tool. Our analytical findings identify associations between sexual behaviour during the incubation period and clinical presentation of mpox, adding to the existing body of evidence indicating that mpox is transmitted sexually.

SOMASS provides detailed information on clinical presentation and the assessment of lesion morphology and distribution, where we present the largely asymmetrical distribution of lesions and polymorphic morphology. In SOMASS, almost all individuals (97%) presented with dermatological lesions, which is comparable to 95% described by Thornhill et al. (11) and Patel et al. (21). Nearly half of individuals reported their first identified symptom as dermatological, and 20% did not report any systemic symptoms at all, which is comparable to findings presented by Girometti et al., where 18% of individuals had no prodromal symptoms (14). SOMASS responses were not submitted from any London-based clinics included in the studies by Thornhill et al., Girometti et al. or Patel et al., affirming no case overlap with SOMASS.

Lesions were most frequently reported on the genital area (particularly on the penile shaft), but also on the perianal area. We report an association between RAI and proctitis, which was also reported by recent studies from Spain and Germany, respectively (22) (23), and an association between RAI and the presence of perianal lesions. These findings suggest that sexual contact is likely the primary route of transmission in this outbreak and that mpox is a sexually transmissible infection. This should continue to inform the content and audience of public health messaging, as well as the offer of control interventions in SHSs where people at risk of STIs are already linked.

The majority of individuals in this study were assessed as clinically mild. Nevertheless, 28% of individuals were moderate or severe, and 9% were admitted to hospital for further medical intervention at the time of data collection, which is comparable with findings from other studies (14, 24). This highlights that mpox causes substantial morbidity, and that SHSs and infectious disease units need to be adequately resourced to respond to resurgences in transmission, including having established pathways for referral of severe cases to hospital for management of complications. Of note, our assessment on the clinical severity of cases is cross-sectional at the time of data collection, and may be an underestimation of the true severity, given the possibility of clinical deteriorated following SHS attendance.

Our findings suggest that among SHS attendees in England, mpox is circulating within high density sexual networks of GBMSM; 94% of individuals in this study identified as GBMSM, 32% were living with HIV, 49% had a history of STI diagnosis in the previous year, and a median of three sexual partners in the last three months. These are consistent with findings from a study by Girometti et al. (14), where all cases identified as GBMSM, 24% were living with HIV and reported a median of five sexual partners in the last three months. As with findings reported by Girometti et al. (14), nearly 25% of people with mpox attending SHSs were diagnosed with a concurrent STI, also reporting condomless anal intercourse, group sex and attendance at sex-on-premises venues, indicating high risk sexual behaviour among those individuals. Whilst sexual contact is the likely route of transmission for most cases, we found that eight individuals did not report any sexual partners in the three weeks before symptom onset, the majority of whom had not travelled internationally. These findings suggest that, in a minority of cases, other routes of transmission may be contributing to the outbreak.

Our finding that 74% of individuals attended a SHS in the first instance, rather than attending another type of healthcare service, is not unexpected, given the guidance from the NHS that people with symptoms compatible with mpox should seek care at these services (18). However, this provides tangible evidence of the considerable additional pressure and costs for already stretched services still recovering from the impacts of the COVID-19 pandemic (25). Given the increased workload for SHSs, as well as the need for personal protective equipment (PPE) and enhanced environmental cleaning, further work is needed to quantify this increased pressure on SHSs nationally. There is also a need to understand the displaced prevention, testing, diagnosis and treatment of other STIs, including HIV, as well as impacts on reproductive health services such as contraception.

This study has some limitations. First, 78% of responses were submitted by a small number of SHSs in England, which does not include a number of high-throughput clinics at the centre of the outbreak which were likely unable to contribute to this study due to limited capacity. Second, cases in people who are not GBMSM are likely underrepresented in this study, as public health messaging at the time was focussed towards reaching GBMSM with perianal lesions and/or proctitis, meaning others may have been less likely to seek care at SHSs and undergo mpox testing. This makes findings from this study unlikely to be representative of all mpox cases in England. However, a number of demographic and behavioural characteristics of individuals within SOMASS, including sexual orientation and HIV status, were comparable to all mpox cases in England (19). Third, case data upload was done both contemporaneously to the patient being seen at the SHS, but also retrospectively, relying on required information being documented in clinical notes, which may affect data quality. This resulted in missing data for several demographic, exposure and behavioural variables, especially those not

routinely captured as part of standard history taking, which limits the inferences we can draw from these analyses. However, we found no evidence of a significant difference between those will complete and incomplete data for these variables, suggesting the risk of a biased sample is low. Finally, the presence of concurrent STIs among SOMASS cases may have influenced the clinical presentation, making it difficult to fully attribute to mpox virus infection.

We demonstrate multi-disciplinary and agile working between front-line sexual health services, clinical professional bodies and the national health protection agency, to design, implement and report the initial findings of a responsive data collection tool, which improved surveillance and strengthened the knowledge base during the 2022 mpox outbreak. This tool can be adapted to support preparedness and response to future STI outbreaks.

Figure 1: Distribution of SOMASS responses by sexual health service attendance date

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Competing interests

NL is the Deputy Editor at BMJ *Sexually Transmitted Infections*

Author contributions

JM, SSo, LH, KB, VP, NL, SC, RJ, TB, CD, MP and DP contributed to design of the data collection tool, and subsequent data collection. HC, MP, KT, MH and SSu were involved in operationalising the data collection tool and data validation. The UKHSA Sexual Health Liaison Group provided subject-matter expertise. HC led the data management and analysis and drafted the manuscript. All co-authors contributed to interpretation of the findings and to revision of the manuscript.

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