



ORIGINAL ARTICLE

Sex, drugs and smart phone applications: findings from semistructured interviews with men who have sex with men diagnosed with *Shigella flexneri* 3a in England and Wales

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ABSTRACT

Objectives To inform control strategies undertaken as part of an outbreak of *Shigella flexneri* 3a among men who have sex with men (MSM).

Methods All men aged ≥ 18 years diagnosed with *S flexneri* 3a between October 2012 and May 2013 were invited to participate. Semistructured in-depth quantitative interviews were conducted to explore lifestyle and sexual behaviour factors.

Results Of 53 men diagnosed, 42 were interviewed of whom 34 were sexually active MSM. High numbers of sexual partners were reported (median=22) within the previous year; most were casual encounters met through social media networking sites (21/34). 63% (20/32) were HIV-positive and actively sought positive partners for condomless sex. 62% (21/34) of men had used chemsex drugs (mephedrone, crystal methamphetamine and γ -butyrolactone/ γ -hydroxybutyrate), which facilitate sexually disinhibiting behaviour during sexual encounters. 38% (8/21) reported injecting chemsex drugs. Where reported almost half (12/23) had attended or hosted sex parties. All reported oral-anal contact and fisting was common (16/34). Many had had gonorrhoea (23/34) and chlamydia (17/34). HIV-positive serostatus was associated with both insertive anal intercourse with a casual partner and receptive fisting (adjusted OR=15.0, $p=0.01$; adjusted OR=18.3, $p=0.03$) as was the use of web applications that promote and facilitate unprotected sex (adjusted OR=19.8, $p=0.02$).

Conclusions HIV-positive MSM infected with *S flexneri* 3a used social media to meet sexual partners for unprotected sex mainly at sex parties. The potential for the transmission of *S flexneri*, HIV and other infections is clear. MSM need to be aware of the effect that chemsex drugs have on their health.

INTRODUCTION

Shigella flexneri is one of the four species of Gram-negative bacterium of the genus *Shigella* that can cause severe bacillary dysentery in humans and several serotypes have been described. In the UK, most cases of *S flexneri* serotype 3a have been associated with travel to high incidence regions such as Indian subcontinent, North and East Africa and South America. Infection responds to antimicrobial therapy although there is evidence of increased resistance to ciprofloxacin.¹ Within the past decade occasional reports of UK-acquired cases have been

associated with sexual transmission, predominantly among men who have sex with men (MSM). Since sexual transmission of shigellosis was first described in 1971, outbreaks of *S flexneri* and *S sonnei* associated with sexual transmission between MSM have been reported in the UK, Germany, Australia, Canada and the USA.²⁻¹⁰ The *S sonnei* outbreak in Sydney (2001) consisted of 148 diagnoses made within a 6-month period of which 80% were seen in MSM who had attended one sex venue.⁶ In 2004, an outbreak of 17 cases of *S sonnei* among MSM in London coincided with a similar outbreak of 14 cases in Berlin.⁷⁻¹⁰ Phage typing indicated that transmission had occurred through sexual networks spanning both countries.¹⁰ Intervention strategies have been based on case-finding and awareness raising among MSM, venue owners and healthcare professionals by public health departments and voluntary organisations.

In September 2011, a national Outbreak Control Team (OCT) was established to investigate and respond to the emergence of *S flexneri* 3a.^{11 12} In men, diagnoses of *S flexneri* 3a increased substantially from 18 in 2008 to 83 in 2011. In 2013, the male-to-female diagnostic ratio was 10.3:1. Initial investigations using a lifestyle questionnaire indicated that most diagnoses were seen among MSM aged 30-50 years some of whom were HIV-positive.¹³ However, Health Protection and Environmental Health staff lacked the necessary training to administer the questionnaire and consequently few were completed effectively. Given this evidence gap the OCT commissioned a study undertaken by a trained sexual health researcher which explored the lifestyle and sexual behaviour of MSM diagnosed with *S flexneri*. Since the study's primary goal was to support the national outbreak response, it was not a specifically tailored qualitative investigation.

METHODS

S flexneri is a notifiable disease in the UK. Health protection and environmental health staff conduct telephone interviews to ascertain how all infected individuals may have acquired their infection and provide health advice to them and their contacts.¹⁴ Presumptive strains of *S flexneri* identified by local hospital laboratories were submitted to the Gastrointestinal Bacteria Reference Unit for



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confirmation and typing using standard biochemistry and serological tests.^{15 16} Between October 2012 and February 2013, consecutive men aged ≥ 18 years who had been diagnosed with *S flexneri* 3a were invited to take part in semistructured face-to-face interviews with a sexual health researcher after patient consent had been obtained by the patient's local Health Protection Unit (Public Health Office each of which covers a population of around 1–2 million) following their statutory telephone interview. Public Health England (PHE) provides guidance on the management of gastroenteric and sexually transmitted infections (STI) outbreaks and the questions used here were taken from these existing resources. This investigation was part of enhanced public health surveillance, designed to promptly identify risks associated with an outbreak of *S flexneri* 3a in MSM and therefore did not require ethical approval. To maintain confidentiality, no personal identifiers were recorded on the dataset, all participants were allocated a study number. Caldicott principles were followed with regard to the safekeeping of the interview schedule.

Although a quantitative format was used the semistructured element allowed the sexual health researcher to gain further insight into reported behaviours. Patients were interviewed alone at a location of their choice. The interviews, which were not recorded or transcribed, lasted around 90 min and explored the lifestyle and sexual behaviour of men diagnosed with *S flexneri* 3a and sought to understand associations with transmission. Most of the interview focused on the 2 weeks prior to the episode of *S flexneri* 3a as this was considered the most likely period within which they had acquired infection. Information on demographic and sexual behaviour were collected together with details of where they met sexual partners, their recreational drug use, engagement with health services, history of STI and HIV testing history. For HIV-positive men, most recent CD4 count and viral load results and current treatment regime were discussed.

The analyses were stratified by HIV serostatus because initial evaluation indicated that this covariate was a key influence within the dataset. Univariable logistical regression together with Fisher's exact and Mann–Whitney tests were used to explore variations in clinical presentation, demographic characteristics, drug use, history of STI and sexual behaviour. This strategy was adopted because of the small sample size, the sparsity of the data (reduced data density due to the large number of covariates collected) and collinearity between covariates. Some covariates that were significantly associated with the outcome variable in the univariate analysis were not significantly associated in the multivariate analysis. Backward stepwise regression was used to select variables to be included in the final multivariate model. STATA V.13.0 (StataCorp, College Station, Texas, USA) statistical software was used.

RESULTS

Of the 53 men diagnosed with *S flexneri* 3a during the study period, 42 (79%) were interviewed. The remainder either declined or could not be contacted despite several attempts. Six heterosexuals were excluded as were two MSM who had not been sexually active at least a year prior to their *S flexneri* 3a infection, which left 34 MSM for further analysis.

The median age of the men was 37.5 years (range 21 to 59), 91% (31/34) were of white ethnicity and 79% (27/34) were UK born. More than a half were from London (18/34), others from the South East (3) and East of England (5) and further cases were dispersed across England and Wales (5). Sixty-three per cent (20/32) of the men reported being HIV-positive, 25% (5/20) of whom had been diagnosed within the past 2 years.

Sixty-five per cent (13/20) of the men reported that they were on HIV treatment: 60% (12/20) reported an undetectable viral load and a quarter (5/20) reported a viral load of >1000 viral copies/mL. A fifth (4/20) had a CD4 count of <350 /mL. These results and the HIV-negative test results were not confirmed with their health provider. Almost all (94%, 32/34) of the men had ever attended genitourinary medicine (GUM) and/or HIV services at least once and 69% (22/34) had attended within the past 3 months for sexual health check-ups or as part of routine HIV case management. The men reported a history of STIs and blood borne infections within the past 5 years. Although three men had previously experienced shigella infection 88% (30/34) had never heard of the infection.

No difference was seen between the clinical presentation of HIV-positive and negative men. The median duration of symptoms prior to seeking medical attention was five days (range 1 to 12). The majority (19/34) attended their general practitioner (GP) for medical attention but for most the GP assumed they had food poisoning and advised the men that their symptoms would pass. Ten men attended local Accident and Emergency (A&E) services, eight of whom were admitted to hospital. Five men sought medical attention from HIV services.

Most men were not in a relationship and where present all relationships were 'open' (non-monogamous). Sexual partners were mostly met through social media and geospatial sexual networking applications. HIV-positive MSM specifically sought partners for condomless sex using dedicated sites which provided information about sex parties and sources of chemsex drugs. Chemsex is the intentional use of drugs that includes mephedrone, crystal methamphetamine (crystal meth), γ -butyrolactone and γ -hydroxybutyrate.¹⁷ These are taken before or during planned activity to sustain, enhance, disinhibit and/or facilitate sexual experience.¹⁷ Attending sex parties and group sex sessions was part of a desire to experience new sexual behaviours such as insertive fisting, receptive fisting and scat play. Of the 23 men who provided information on sex parties, almost half (12) had either attended or organised them through social networks. HIV-positive men, and some HIV-negative men, actively sought HIV-positive partners for bareback that is condomless sex. The parties consisted of about eight men and could last for several days during which men joined and left. Many men were not known to others at the party. Chemsex drugs were used at sex parties and 38% (8/21) of men reported injecting these drugs. Although many were regular recreational drug users, almost all men had injected (also known as slamming) chemsex drugs for the first time within the previous year. Injecting only took place at sex parties and most men were injected by others. Clean needles were used and then soaked in a shared solution to be reused later. Forty-three per cent (9/21) of men considered that chemsex drugs had adversely affected their sexual risk taking judgement, whereas others considered that chemsex drugs simply allowed them to do what they wanted to do and did not affect their judgement. They did not view their injecting as problematic and did not associate slamming with the negative stereotypical images of chaotic lifestyle associated with the use of heroin. The men seemed unaware of the risk of acquiring a blood-borne virus in these chaotic and potentially unhygienic conditions, and of the risk of hepatitis C infection. Most men were working, felt in control of their drug use whether injecting or not and did not believe it could become problematic. Knowledge of needle exchange programmes, sources of clean injecting equipment and safer injecting practice was very limited as was knowledge of drug support services. A minority of chemsex users (14%: 3/21) took Viagra

and Cialis to counteract erectile dysfunction caused by crystal meth.

Clinical symptoms included diarrhoea 97% (33/34), stomach cramps 97% (33/34), fever 85% (29/34), bloody stool 68% (23/34), rectal mucous 56% (19/34) and vomiting 35% (12/34).

Univariate analysis was used to explore possible predictors of HIV-positive serostatus (table 1). Some covariates that were not statistically significantly associated with the outcome variable in the univariate analysis were significant in the multivariate analysis. Variables included in the final multivariate model, use of social networking sites to meet partners, unprotected insertive anal intercourse and insertive fisting were selected using backward stepwise regression analysis. HIV-positive serostatus was associated with insertive anal intercourse with a casual partner and receptive fisting (OR=15.0, 95% CI 1.66 to ∞ , $p=0.01$ and OR=18.3, 95% CI 1.29 to ∞ , $p=0.03$, respectively) as was the use of specific web applications that facilitate unprotected sex (adjusted OR=19.8, 95% CI 1.65 to ∞ , $p=0.02$).

DISCUSSION

The general profile of patients was of highly sexually active, mostly white UK born MSM, many of whom reported being HIV-positive and involved dense sexual networks including high numbers of casual and regular partners. Factors key to the transmission of shigellosis were a low awareness to risk of infection, chemsex drugs use and meeting sex partners and locating sex parties through social media geospatial sexual networking applications. A key theme to emerge from the interviews was a willingness to push sexual boundaries such as fisting which is usually associated with older MSM but was reported here by younger men. Fisting may also be an alternative to insertive anal sex due to erectile dysfunction caused by crystal meth or a wish to reduce the risk of HIV transmission. Most HIV-positive men attempted to reduce HIV transmission risk by serosorting that is actively seeking HIV-positive partners for condomless sex. It was reported that some HIV-seronegative men also adopted seroadaptive behaviour, seeking unprotected sex with HIV-seropositive men, as unprotected sex with someone on

Table 1 Characteristics of the 34 men diagnosed with *Shigella flexneri* serotype 3a by HIV serostatus: unadjusted ORs and 95% CIs

Variable missing patient data (n)	HIV serostatus		OR	95% CI	p Value	
	Positive, n (%)	Negative, n (%)				
General characteristics						
Age (0)	Median	n=37.5	n=36	1.043	0.973 to 1.123	0.243
Ethnicity (0)	White: British	12 (60)	13 (93)	1		
	White: Other	6 (30)	0 (0)	7.853	0.996 to ∞	0.050
	Mixed	2 (10)	1 (7)	2.109	0.098 to 137.49	1.000
Relationship (0)	Co-Habiting	4 (20)	4 (29)	1		
	Not co-habiting	2 (10)	2 (14)	1.001	0.341 to 8.982	0.502
	Not in relationship	14 (70)	8 (57)	1.750	0.091 to 11.028	1.000
App: facilitate condomless sex (5)	Yes	9 (50)	0(0)	13.054	1.723 to ∞	0.010
App: geolocational (5)	Yes	11 (61)	7 (64)	0.898	0.190 to 4.237	0.892
Sexual behaviour						
Sexual partners in last year (0)	Median	n=45	n=13	0.999	0.991 to 1.001	0.816
Sexual partners in last 3 months (0)	Median	n=10	n=5	0.990	0.957 to 1.024	0.554
Sexual partners in last 2 weeks (0)	Median	n=4	n=2	1.076	0.888 to 1.332	0.448
Receptive fisting (0)	Yes	7 (35)	0 (0)	0.928	0.436 to 1.975	0.847
Insertive fisting (0)	Yes	14 (70)	2 (14)	0.500	0.188 to 1.332	0.166
Regular partners						
Insertive anal sex: unprotected (19)	Yes	4 (57)	5 (63)	0.800	0.101 to 6.347	0.833
Receptive anal sex: unprotected (17)	Yes	3 (33)	6 (75)	0.167	0.020 to 1.384	0.097
Casual partners						
Insertive anal sex: unprotected (15)	Yes	12 (86)	1 (20)	24.00	1.689 to 340.99	0.019
Receptive anal sex: unprotected (11)	Yes	14 (70)	2 (15)	2.045	0.477 to 8.774	0.335
Drug use						
Chemsex drugs (0)	Yes	17 (85)	4 (29)	2.267	0.419 to 12.265	0.342
History of sexually transmitted infections (≤ 5 years)						
Gonorrhoea (0)	Yes	13 (65)	3 (21)	0.147	0.030 to 0.708	0.017
Syphilis (0)	Yes	7 (35)	2 (14)	0.309	0.053 to 1.793	0.191
Chlamydia (0)	Yes	8 (40)	4 (29)	0.600	0.139 to 2.595	0.494
Lymphogranuloma venereum (0)	Yes	4 (20)	0 (0)	0.237	0.000 to 2.065	0.209
Signs and symptoms						
Fever (0)	Yes	16 (80)	13 (93)	0.308	0.305 to 3.101	0.317
Diarrhoea (0)	Yes	19 (95)	14 (100)	1.429	0.000 to 55.714	1.000
Vomiting (0)	Yes	6 (30)	6 (43)	0.571	0.137 to 2.380	0.442
Blood in stool (0)	Yes	12 (60)	11 (79)	0.409	0.086 to 1.944	0.261
Mucous in stool (0)	Yes	11 (55)	8 (57)	0.917	0.231 to 3.633	0.901

therapy with a low viral load was considered safer than with someone who thinks they are negative but are seroconverting.¹⁸ However, a number of HIV-positive men interviewed were not on treatment and reported viral loads over 1500 copies/mL. Consequently in this context seroadaptive behaviour may not reduce the risk of HIV transmission to HIV-seronegative men but provides an ideal environment for the acquisition of superinfection with HIV drug resistant strains and the transmission of sexually transmitted and sexually transmissible infections.

The study fulfilled its purpose of rapidly collecting intelligence to inform control strategies and although small scale gave a representative view of developments among highly sexually active MSM. Interpretation was however restricted because a qualitative methodology was not used. Consequently, the investigation could not search systematically for themes, explore context or document personal views, opinions and experience as would have been done in a formal qualitative study using statistical analysis of audio recordings. Although the HIV serostatus reported by the patient was used, the statistical analysis showed that the characteristics of the HIV seropositive and seronegative men were distinctly different which suggests that the reported HIV serostatus was correct.

The emergence of *S flexneri* 3a among MSM in 2009 coincided with increased diagnoses of gonorrhoea, lymphogranuloma venereum (LGV) and infectious syphilis in the same risk group. The profile of men with shigellosis was very similar to that seen in the UK epidemics of LGV and infectious syphilis suggesting that closely related, dense sexual networks were sustaining these overlapping epidemics.^{19–20} A variety of health-care settings may see MSM with symptoms of enteric pathogens such as *Shigella* and VTEC 0117:H7 that have been sexually acquired including general practice and healthcare professionals within these settings need to be familiar with the clinical presentations of these infections.²¹ To make every contact count, facilitate prompt diagnosis and appropriate management including partner notification, a patient's sexual orientation needs to be sensitively ascertained in settings outside sexual health such as general practice and PHE has initiated training for staff in Health Protection Units and Environmental Officers. Although most men interviewed regularly attended GUM and HIV services and appeared to be sexual health aware, they experienced high levels of sexually transmitted and transmissible infections. With the focus on HIV service delivery, it is possible that the sexual health needs of HIV-positive patients are being neglected. Sexual health clinicians may need to raise their awareness of *Shigella* and the associated risks their patients may be taking so that higher sexual risk takers can be offered additional support and guidance and referred to other services if necessary. Where indicated, drug use should also be discussed to raise awareness to the adverse effects that chemsex drugs can have on sexual health and well-being. In particular, the potential dangers of moving from snorting or smoking to injecting drugs such as crystal meth need to be highlighted.

Although social media has had a central influence on the development of the epidemic, it can also play a key role in interventions. Sex parties are generally held in private homes. Engaging sex party hosts through pop-up advertisements tailored to specific websites allows information on reducing the risk of infection and good hygiene practice to be provided within the context of a familiar user-driven communication environment. Proactive campaigns have also been undertaken by PHE and Terrence Higgins Trust (<http://www.tht.org.uk/shigella>) in raising awareness among MSM, alerting GPs and other health professionals to the infection

through Twitter, Facebook, adverts in the gay press, magazines, pop-up banners on internet sites and leaflets in health clinics.

Aside from the behavioural and network context highlighted by the interviews, the emergence of *S flexneri* 3a in predominantly HIV-positive MSM posed a number of additional problems to effective public health intervention. Infection can occur after ingestion of as few as 10 organisms and incubation lasts between 12 and 96 h. The infectious period is primarily during the diarrhoeal illness but cases maintain a low level of infectivity for as long as the organism is excreted in the stool.²² *Shigella* species may survive for up to 20 days in favourable environmental conditions which can lead to transmission through contact with contaminated fomites. Sexual transmission of shigellosis is likely to be fuelled by the low infectious dose and HIV-related immunodeficiency may increase the duration of infectiousness and the likelihood of asymptomatic presentation.¹⁶ All the isolates from the cases documented here were sensitive to ciprofloxacin.^{1–3} However, the evidence-base to support the use of antibiotics is unclear as while the pool of symptomatics would be reduced, the period of shedding and the asymptomatic pool could be increased.

The MSM interviewed were focused on reducing risk of HIV transmission but this preoccupation was allowing STIs and sexually transmissible infections to hide in plain sight in the shadow of HIV. HIV seropositive or negative MSM need to be aware of the adverse impact of chemsex drugs on decision-making processes and sexual health and be empowered to manage the risk of acquiring infections that could result in lasting damage to their health.

Key messages

- ▶ The outbreak was associated with sex parties organised through social media.
- ▶ Most men were HIV-positive seeking unprotected sex.
- ▶ Chemsex drugs use, including injecting, was common.
- ▶ Although men attended clinical services regularly, they experienced high levels of sexually transmitted infections.

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