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ORIGINAL RESEARCH

Chemsex and new HIV diagnosis in gay, bisexual and other men who have sex with men attending sexual health clinics

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Objectives

The aim of the study was to analyse associations between chemsex and new HIV and sexually transmitted infection (STI) diagnoses among gay, bisexual and other men who have sex with men (GBMSM) accessing sexual health clinics.

Methods

A retrospective case note review was carried out for all GBMSM attending two London sexual health clinics between 1 June 2014 and 31 July 2015.

Results

Chemsex status was documented for 1734 of 1840 patients. Overall, 27.1% (n = 463) disclosed current recreational drug use, of whom 286 (16.5%) disclosed chemsex participation and 74 of 409 (18.1%) injected drugs. GBMSM who were already HIV positive were more likely to disclose chemsex participation [adjusted odds ratio (AOR) 2.55; 95% confidence interval (CI) 1.89–3.44; $P < 0.001$]. Those disclosing chemsex participation had higher odds of being newly diagnosed with HIV infection (AOR 5.06; 95% CI 2.56–10.02; $P < 0.001$), acute bacterial STIs (AOR 3.94; 95% CI 3.00–5.17; $P < 0.001$), rectal STIs (AOR 4.45; 95% CI 3.37–6.06; $P < 0.001$) and hepatitis C (AOR 9.16; 95% CI 2.31–36.27; $P = 0.002$). HIV-negative chemsex participants were also more likely to have accessed post-exposure prophylaxis for HIV in the study period and to report sex with a discordant HIV- or hepatitis C virus-infected partner ($P < 0.001$).

Conclusions

Chemsex disclosure in sexual health settings is associated with higher rates of STI diagnoses, including HIV infection and hepatitis C. GBMSM attending sexual health services should therefore be assessed for chemsex participation and disclosure should prompt health promotion, harm minimization and wellbeing interventions.

Keywords: addiction, chemsex, gay men, hepatitis C, HIV, MSM, sexually transmitted infections, substance use

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Introduction

HIV infection remains an important public health priority for gay, bisexual and other men who have sex with men (GBMSM) and its incidence in this population remains high as a consequence of ongoing transmission [1]. Identifying factors linked to HIV susceptibility may enable more effective targeting of prevention measures such as pre-exposure prophylaxis (PrEP).

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Chemsex has emerged as a new phenomenon in the UK and Western Europe among GBMSM. It refers to the use of crystallized methamphetamine, mephedrone, γ-hydroxybutyrate (GHB) or γ-butyrolactone (GBL) and to a lesser extent cocaine and ketamine to facilitate sex [2]. Chemsex has been widely assumed to increase the risk of HIV infection; however, despite this postulated link, there remain to date no published data definitively linking it to increased HIV incidence.

Event-level drug and alcohol use has been associated with condomless anal sex with casual partners [3,4]. Chemsex sessions, which can last days, may involve prolonged mucosally traumatic sex with multiple partners

identified often through smartphone geospatial networking applications. The overlap and interrelationship between sexual health, mental health and substance use is more marked in GBMSM compared with heterosexual men [5] and this "syndemic" is thought to be an important driver of the health disparities observed in this population.

Published studies on chemsex to date have either largely focused on specific subpopulations, for example those attending designated drug services [6] or those who are HIV positive [7], or relied on online [8] or venue-based [3] surveys. Studies of GBMSM attending sexual health clinics have found higher rates of recreational drug use than in heterosexual men [9]. Most of these studies have collected data pertaining only to overall drug use in a defined time frame [10,11], rather than event-level use (evaluating specifically concomitant drug use with sex), which may be a better predictor of sexual risk [12].

In a previously published smaller study, we observed a positive association between chemsex and sexually transmitted infection (STI) and hepatitis C diagnoses in a sexual health clinic setting [13]. Although HIV infection was diagnosed more frequently in chemsex participants, this finding was not statistically significant because of the small number of HIV seroconversions in the short study period [13].

Sexualized methamphetamine use in GBMSM has previously been associated with increased HIV acquisition in North American settings [14]. There remain no published data demonstrating a link between the specific phenomenon of chemsex with its broader range of drugs used and HIV infection in a UK or European context. We hypothesized that a new HIV diagnosis is positively associated with chemsex participation and set out to test this hypothesis using a longer observational time frame than the previously published analysis [13].

Methods

We carried out a retrospective case note review of all GBMSM attending two South London sexual health clinics, St George's University Hospital and Kingston Hospital, over a 13-month period between 1 June 2014 and 31 July 2015. These were open-access sexual health clinics offering walk-in and booked appointments for STI screening with HIV clinics co-located on both sites. Patients generally accessed the clinic as and when they perceived the need for an STI screen. Patients attending for HIV care were routinely offered STI screening at clinic appointments. The clinics carried out an evaluation of mental health, substance use and chemsex using a designated clinical proforma (Supporting Information) in all patients. The proforma included questions about current recreational drug use, injecting drug use and chemsex participation.

Cases were identified from sexual orientation coding which was electronically coded in MILLCARE SOFTWARE SYSTEMS V2.1.8 (Mill Systems Ltd, Derbyshire, UK). Clinical and demographic parameters were extracted manually from patient records into a standardized proforma and data were analysed in MS EXCEL V15.0 (Microsoft Systems, Redmond, WA, USA) and STATA V14 (StataCorp, College Station, TX, USA). GBMSM accessing the sexual health clinic over the entire reporting period constituted a single episode for the purposes of our analysis, regardless of the number of attendances.

Gay, bisexual and other men who have sex with men documented as disclosing current chemsex participation at any visit were compared with those without any chemsex disclosure during the study period. A multivariable logistic model of chemsex participation was estimated to test for associations with patient demographics, namely age (three groups: aged < 30, 30–49, and ≥ 50 years), ethnicity (Asian, white British, other white, black and other) and country of birth (dummy for UK born), and HIV status (dummy for HIV-positive). These groupings were chosen on the basis of existing UK national surveillance data. This analysis identified potential confounding factors used for our primary analysis which consisted of a multivariable logistic regression of new HIV diagnosis with our variable of interest, chemsex participation. Further analyses carried out examined associations between chemsex participation and STI diagnoses and with 11 elicited sexual risk-taking behaviours.

To further understand the relationship between chemsex and new HIV diagnosis, we analysed a further logistic model of new HIV diagnosis with patient demographics (age, ethnicity and country of birth), STI diagnoses (acute bacterial and rectal), and chemsex participation. The model excluded patients with an existing HIV diagnosis. STI diagnoses were added as additional adjusting factors to analyse whether any observed chemsex effect was confounded by behavioural factors that correlated with STI diagnoses. All missing data were presumed to be missing at random.

Results

Baseline characteristics of participants

One thousand eight hundred and forty GBMSM attended a clinic during the study period, of whom 87.9% were gay and 12.0% bisexual. Median age at attendance was 34.0 years (range 14.4–82.9 years) and 68.3% were UK

born. Patients identified their ethnicity as white British in 61.5% of cases (n = 1130), white other in 18.6%, black in 7.8% and Asian in 7.7%. In total, 20.3% (n = 374) were already known to be HIV positive at first attendance. GBMSM (n = 1734) reported a median of two sexual partners in the preceding 3 months (range 0–90), and 21.9% reported five or more sexual partners within the past 3 months. Demographic data were complete for all patients (Table S1).

Prevalence of chemsex and drug use

Information on recreational drug use was documented for 1708 men (132; 7.2% missing data), of whom 27.1% (n = 463) reported current recreational drug use within the study period, with 74 disclosing injecting drug use (18.1% of 409 valid cases). Overall, 286 men (16.5% of 1734 valid cases) disclosed current chemsex participation. Drugs most commonly used for chemsex were mephedrone (78.6%; n = 198/252), GHB/GBL (61.8%; n = 152/246), crystal methamphetamine (50.2%; n = 126/251), cocaine (27.7%; n = 54/195), other amphetamines (20.5%; n = 36/176) and ketamine (12.6%; n = 22/175). Polydrug use was common and was reported by 78.3% of men (n = 90/115). In the multivariable analysis of chemsex participation, HIV-positive GBMSM were significantly more likely to participate in chemsex [odds ratio (OR) 2.55; 95% confidence interval (CI) 1.89–3.45; $P < 0.001$] than those who were HIV negative.

Chemsex and HIV diagnosis

The rate of new HIV diagnosis was significantly higher in chemsex participants than in nonparticipants (8.6% *vs.* 1.8%, respectively), as was the diagnosis of acute hepatitis C (2.8% *vs.* 0.2%, respectively). Chemsex participants had statistically significantly higher odds of a new HIV diagnosis (OR 5.06; 95% CI 2.56–10.02; $P < 0.001$) and STIs in general were also diagnosed more commonly in this group (Table 1; a full set of estimates is provided in Table S2). We carried out additional analyses adjusting for STI diagnoses (Table S3). New HIV diagnosis was statistically associated with rectal STI acquisition (OR 4.37; 95% CI 1.41–13.51; $P = 0.01$), but not acquisition of acute bacterial STIs (OR 0.61; 95% CI 0.21–1.81), nor the age, ethnicity or nationality dummies. The effect of chemsex on an HIV diagnosis reduced to 4.07 (95% CI 1.96–8.47; $P < 0.001$) in the adjusted analysis excluding STI diagnoses.

Chemsex and sexual behaviours

Comparing chemsex participants with GBMSM not disclosing chemsex participation, there was a significantly higher odds of sexual behaviours associated with HIV and hepatitis C virus acquisition, including transactional sex, injecting drug use, sharing sex toys, fisting, group sex and having a known serodiscordant HIV- or hepatitis C virus-positive partner (Table 2). After adjusting for age, ethnicity, alcohol consumption, HIV status and UK birth, these associations remained statistically significant (Tables 2 and S4). Chemsex participants also had higher odds of having five or more sexual partners in the past 3 months and higher odds for having accessed post-exposure prophylaxis (PEP) in the study period.

Discussion

This is the first published study to demonstrate a significant association between chemsex disclosure and new HIV diagnosis and the first UK study correlating HIV acquisition with event-level sexualized substance use. We observed a greater than 5-fold increase in the odds of HIV acquisition in GBMSM disclosing chemsex participation compared with nonparticipants. These findings have implications for public information and health promotion

Table 1 HIV, acute hepatitis C and new sexually transmitted infection (STI) diagnoses by chemsex participation

STI	No chemsex [% (n)]	Chemsex [% (n)]	Unadjusted odds ratio (95% CI)	Adjusted odds ratio (95% CI)*	P-value
HIV diagnosis†	1.8 (21/1202)	8.6 (16/187)	5.26 (2.69–10.28)	5.06 (2.56–10.02)	< 0.001
Acute bacterial STI‡	24.0 (347/1448)	57.0 (163/286)	4.20 (3.23–5.47)	3.94 (3.01–5.17)	< 0.001
Rectal STI	10.4 (150/1448)	36.4 (104/286)	4.94 (3.68–6.64)	4.45 (3.27–6.06)	< 0.001
Hepatitis C	0.2 (3/1448)	2.8 (8/286)	13.86 (3.65–52.57)	9.16 (2.31–36.27)	0.002
Any STI	39.9 (577/1448)	70.3 (201/286)	3.57 (2.71–4.70)	3.51 (2.65–4.65)	< 0.001

Estimates for the unadjusted and adjusted models are from a logistic regression of the STI diagnosis variable against chemsex participation.
CI, confidence interval.
*Adjusted models include age dummies [< 30, 30–49 and ≥ 50 years (base)], ethnicity dummies [Asian, black, other white, other/not stated, and white British (base)], HIV status, and UK birth.
†Model excludes patients with a pre-existing HIV-positive diagnosis and hence the HIV-positive dummy.
‡New chlamydia (including Lymphogranuloma venereum (LGV)), gonorrhoea and all nonlatent early syphilis diagnoses.

Table 2 Behavioural differences by chemsex participation

Risk behaviour	Chemsex [% (*n*)]	No chemsex [% (*n*)]	Unadjusted odds ratio (95% CI)	Adjusted odds ratio* (95% CI)	*P*-value
≥ 5 sexual partners in past 3 months	47.9 (137/268)	14.9 (215/1448)	5.27 (4.01–6.93)	5.52 (4.14–7.35)	< 0.001
PEP use[†]	26.6 (46/173)	9.8 (88/899)	3.34 (2.23–4.99)	3.44 (2.28–5.18)	< 0.001
Group sex	61.4 (129/210)	8.5 (80/940)	17.12 (11.94–24.54)	16.59 (11.43–24.08)	< 0.001
> 21 units of alcohol per week[‡]	20.9 (49/235)	8.6 (115/1334)	2.79 (1.93–4.04)	2.74 (1.87–4.02)	< 0.001
Sharing sex toys	17.0 (30/177)	1.7 (15/866)	11.58 (6.08–22.05)	12.98 (6.60–25.50)	< 0.001
Fisting	22.0 (41/186)	1.9 (17/877)	14.30 (7.91–25.86)	13.16 (7.05–24.59)	< 0.001
Transactional sex	9.6 (21/218)	2.8 (31/1117)	3.73 (2.10–6.63)	4.07 (2.23–7.46)	0.001
HIV-positive partner[†]	38.2 (65/170)	8.3 (80/966)	6.86 (4.67–10.07)	6.83 (4.59–10.15)	< 0.001
HCV/HBV-positive partner	12.9 (23/178)	1.3 (11/873)	11.63 (5.56–23.34)	10.77 (4.86–23.86)	< 0.001
"Bareback" app	22.0 (33/150)	2.5 (19/769)	11.13 (6.13–20.23)	9.06 (4.84–16.96)	< 0.001
Injecting drugs	27.9 (70/251)	0.3 (4/1411)	136.04 (49.08–377.03)	131.79 (46.56–373.02)	< 0.001

Estimates for the unadjusted and adjusted models are from a logistic regression of the behaviour variable against chemsex participation.
CI, confidence interval; HBV, hepatitis B virus; HCV, hepatitis C virus; PEP, post-exposure prophylaxis.
*Adjusted models include age dummies [< 30, 30–49 and ≥ 50 years (base)], ethnicity dummies [Asian, black, other white, other/not stated, and white British (base)], HIV status, > 21 units of alcohol per week, and UK birth.
[†]Model excludes patients with a pre-existing HIV-positive diagnosis and hence the HIV-positive dummy.
[‡]Model does not include > 21 units of alcohol per week adjustment.

materials targeted at GBMSM and will enable professionals and policy makers to better identify a population particularly vulnerable to HIV acquisition who could be targeted for evidence-based health promotion or prevention initiatives.

Sexualized drug (in particular amphetamine) and alcohol use has been associated with condomless anal sex and other behaviours predisposing to HIV transmission [3,14,15]. While it is not possible to conclude from our study that chemsex was implicated in HIV causality, the association with sexual behaviours correlated with higher risk of HIV transmission and its persistence after controlling for potential confounding lends support to this hypothesis. Chemsex may escalate following an HIV diagnosis [1,2]. It is possible that these patients, who may not be on suppressive treatment, are at higher risk of transmitting HIV. Chemsex has also been implicated in treatment breaks or suboptimal antiretroviral adherence [6,16] and this may render patients more infectious. Additionally, seroconverters with high viral burdens may be overrepresented as a result of higher rates of new HIV diagnoses in this population, further increasing transmission risk. Chemsex participants may therefore represent a core group for both STI and HIV transmission.

The sometimes prolonged and potentially traumatic nature of chemsex, and the disinhibitory and libido-enhancing effects of drugs used for chemsex [17,18], are likely to be further contributors to a plausible causal mechanism. The practice of intra-rectal drug administration, potentially resulting in local inflammation, and the presence of rectal and acute bacterial STIs observed at higher frequencies in chemsex participants may additionally facilitate HIV transmission.

HIV PEP was used more widely among chemsex participants and this may have attenuated the magnitude of the difference in seroconversion rate between the two groups. Although data on PrEP use were not routinely collected, the study period predates the publication of the Pre-exposure prophylaxis to prevent the acquisition of HIV-1 infection (PROUD) study and the widespread availability of generic PrEP in the UK, so this is unlikely to have had a major impact on our results [19]. Other limitations of our study include the retrospective study design, resulting in large amounts of missing data in certain fields. Data were collected face to face in the context of routine clinical care and it is possible that social desirability bias would have impacted the disclosure of potentially stigmatized behaviours such as injecting drugs and transactional sex. This may have also impacted chemsex disclosure, potentially reducing the extent of the association. Additionally, we did not predefine "current chemsex participation" in our clinic proforma to specify a time frame (e.g. within the last 3 months), which could have resulted in either over- or under-reporting of current chemsex. Our data may not represent a complete clinical picture of patient circumstances, as some could have attended other sexual health clinics in the study period.

The majority of GBMSM do not attend sexual health clinics [5] and thus our findings are not representative of GBMSM in the community. London differs from other areas of the country in terms of its sexual networks and patterns of drug use [10] and it may not be possible to extrapolate our findings to other geographical areas.

The high HIV seroconversion rate seen in chemsex participants despite engagement with sexual health services and free access to condoms and PEP is similar to that seen in other studies in high-risk GBMSM [6,19]. Sexual health services should therefore routinely assess GBMSM for chemsex participation during sexual history taking. Clinical pathways that integrate PrEP provision for those

at risk now need rapid implementation. Our data also suggest that those diagnosed with rectal STIs could be targeted for HIV prevention interventions.

Aside from HIV and STIs, other physical and psychosocial harms associated with chemsex may be less easy to measure. There is emerging concern about chemsex resulting in an increase in reported deaths by GHB/GBL overdose [20]. Harms from chronic use of methamphetamines are also well described and include adverse impacts on mental health, relationships, housing, employment and finance, and criminal justice consequences [21]. There is a need for further research into understanding vulnerabilities that result in chemsex becoming problematic and the full range of consequences that result. Alongside recognizing the HIV prevention and sexual health agenda in GBMSM, it is important to integrate this within a broader health and wellbeing strategy which will achieve more sustainable results [22].

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1. Proportion of missing data evident for each variable used in the analyses.
Table S2. Logistic regression of chemsex participation.
Table S3. Full set of estimates of HIV, Acute Hepatitis C and new STI diagnoses results.
Table S4. Logistic regression of HIV diagnosis.