Chemsex Among Men Who Have Sex With Men: a Sexualized Drug Use Survey Among Clients of the Sexually Transmitted Infection Outpatient Clinic and Users of a Gay Dating App in Amsterdam, the Netherlands

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**Objectives:** Chemsex (i.e., drug use during sex) is practiced by some men who have sex with men (MSM) and is associated with high-risk behavior. In a cross-sectional study at the sexually transmitted infection (STI) clinic of Amsterdam, we explored chemsex practices, risk behavior, and STI prevalence.

**Method:** A survey on chemsex (γ-hydroxybutyrate, crystal methamphetamine, and/or mephedrone) was offered to clinic clients during routine STI screening and to Amsterdam users of a gay online dating app. Associations were assessed using χ² test and multivariable regression.

**Results:** Chemsex in the past 6 months was practiced by 866 (17.6%) of 4925 MSM clients and by 159 (1.5%) of 10857 non-MSM clients. Among gay dating app users, the proportion that reported chemsex engagement was higher than among MSM visiting the STI clinic (29.3% [537/1832] vs. 17.6%; P < 0.001). Chemsex was a significant risk factor for bacterial STI in HIV-negative MSM visiting the STI clinic (adjusted odds ratio, 1.5; 95% confidence interval, 1.2–1.8), but not in HIV-positive MSM. A majority practiced chemsex once a month or less, and 87.0% reported sex without drug use in the past month.

**Conclusions:** In Amsterdam, chemsex is frequently practiced and significantly associated with bacterial STI in HIV-negative MSM but not in HIV-positive MSM. Future prevention strategies to reduce STI incidence should especially target HIV-negative MSM engaging in chemsex.

**Materials and Methods**

**Study Population**

The STI outpatient clinic in Amsterdam is the largest center for STI care in the Netherlands, with up to 40,000 consultations each year. We test and treat (free of charge) patients who are younger than 25 years, are commercial sex workers, are MSM, are notified of an STI by a sex partner, are of non-West African origin, are non-elderly, and have been referred for an STI diagnosis. We hypothesized that chemsex is a predictor for bacterial STI.
European or non-North American origin, have STI-related symptoms, or have a partner from an STI endemic region.

We retrieved anonymized data from the electronic patient files of all clients of the STI clinic between July 21, 2016, and December 31, 2016. A first visit of a client was included in the present study and repeated consultations in the same client were excluded. Because all data were anonymous and the clinical data were routinely collected, ethical approval was deemed unnecessary for this study.

**Dating App Online Survey:** In addition, users of an online dating app (Grindr) were offered a chemsex survey for 2 days during the period of the Europride festival in the summer of 2016 in Amsterdam. All users of the app in the area of Amsterdam during those 2 days received a push message on their app and were asked to fill in the survey.

**Demographics, Sexual Behavior, and Chemsex**

Besides routinely collected data from the electronic patient files of the STI clinic (age, ethnicity [ethnicity was defined according to Statistics Netherlands on the basis of country of birth, maternal and paternal country of birth], reason of visit, HIV status, sex of sex partner, condom use during anal sex, number of sex partners), health care workers collected data on the use of crystal methamphetamine, GHB, and/or mephedrone during sex in the past 6 months. Chemsex was defined as the use of at least one of the previously mentioned drugs during or before sex.7 Chemsex characteristics recorded were as follows: frequency of chemsex engagement; injecting drugs and, if so, if needles were shared; last time having sex without any of the previously mentioned drugs (sober sex), and condomless receptive and/or insertive anal sex after using one of the drugs.

The same questions regarding chemsex were asked in the chemsex survey to users of the online dating app. No questions regarding demographics, risk-taking behavior, or STI history were asked in this study population.

**Testing Procedure at the STI Clinic**

Clients were tested for *Chlamydia trachomatis* (Ct; including lymphogranuloma venereum [LGV] in case anorectal Ct was found), *Neisseria gonorrhoeae* (Ng), and syphilis. Urethral Gram stain analysis was performed only in male patients with urogenital signs or symptoms (discharge, painful and/or frequent urination). In those with more than 10 polymorph nucleated leucocytes per high-power field in a urethral Gram-stained smear and no infection with Ct and Ng, a definitive diagnosis of nonspecific urethritis (NSU) was made.19 All MSM who had not previously tested HIV positive were tested for HIV unless they actively opted out. Urine and pharyngeal and rectal specimens were tested for both Ct and Ng using the Aptima Combo 2 assay (Hologic, Marlborough, MA). In asymptomatic MSM, both urine and rectal specimens were self-collected, whereas in symptomatic MSM, medical staff collected rectal specimens. Medical staff collected pharyngeal specimens in all MSM. HIV antibodies were tested using a rapid HIV test (Alere Determine HIV-1/2 antibody test; Medical Co., Ltd.; Chiba, Japan) and the HIV Ab/Ag test (LIAISON XL; Diasorin, Saluggia, Italy), and syphilis serology was performed using the Treponema Screen (LIAISON XL; Diasorin). All bacterial STI diagnoses were based on laboratory outcomes of the STI consultation in which the chemsex questions were asked.

**Statistical Analysis**

Using the \( \chi^2 \) test for independence and the Fisher exact test, we compared the specified chemsex patterns between men at the STI clinic and men who filled in the online survey. Univariable logistic regression analysis was performed to examine associations with a bacterial STI. A bacterial STI was defined as diagnosis with Ct (both non-LGV and LGV) and/or Ng and/or infectious syphilis (NSU not included). The association with the following variables was assessed: age, ethnicity, condomless anal sex (CAS), number of partners in the preceding 6 months, HIV status, notification of STI exposure, STI-related symptoms, and chemsex engagement. Age and the number of sex partners were divided into 4 categories based on interquartile range (IQR). HIV status was divided into HIV-negative MSM, including MSM who refused an HIV test, and HIV-positive MSM. All variables were entered into a multivariable logistic regression model using backward selection. We checked for interactions between chemsex and all other variables.

In addition, univariable analyses were performed to examine the association of chemsex engagement with a diagnosis of chlamydia, gonorrhea, and syphilis individually.

Data analyses were performed using SPSS package v21.0 (SPSS, Chicago, IL) and STATA software (STATA Intercooled version 13.0, College Station, TX). In the present study, \( P < 0.05 \) was considered statistically significant.

**RESULTS**

**Characteristics of Study Population**

Between July 21, 2016, and December 31, 2016, 16,164 consultations in unique clients took place at the STI clinic of Amsterdam. Of those clients, 4925 (31.2%) were among unique MSM in whom chemsex engagement was asked (Fig. 1).

Because chemsex engagement in non-MSM clients was rare (1.5%; \( n = 159 \)) and only 6 clients (3.8%) used crystal methamphetamine and 7 clients (4.4%) used mephedrone, we did not further explore this group and confined further analyses on chemsex characteristics to MSM clients.

Of all MSM questioned about chemsex in this study period, 1049 (21.2%) used crystal methamphetamine and/or GHB and/or mephedrone in the previous 6 months, and 866 (17.6%) of all MSM reported the use of one of the drugs during sex (chemsex). In men who reported chemsex, most demographic variables differed significantly from those who did not report chemsex (Table 1).

Men who have sex with men who reported chemsex reported higher sexual risk behavior (more sex partners, more often CAS), reported more often STI-related symptoms and a notification of STI exposure, were more often on preexposure prophylaxis (PrEP) as participants of the Amsterdam PrEP research study20 (25.5% vs. 5.7%; \( P < 0.001 \)), and had more often a bacterial STI diagnosis (chlamydia, gonorrhea, LGV, and/or infectious syphilis; 31.1% vs. 20.7%; \( P < 0.001 \)). New HIV diagnosis (0.4% vs. 0.7%; \( P = 0.26 \)) did not differ significantly between both study groups.

**Associations With Bacterial STI Diagnosis**

In the univariable analyses, chemsex engagement was significantly associated with a diagnosis of chlamydia (odds ratio [OR] 1.6; 95% confidence interval [CI] 1.3–1.9), gonorrhea (OR 1.9; 95% CI 1.6–2.3), and syphilis (OR 1.6; 95% CI 1.1–2.4; results not shown in tables). In the univariable analysis using the global outcome variable bacterial STI, age, chemsex engagement in the past 6 months, HIV status, notification of STI exposure, STI-related symptoms, CAS, and the number of sex partners were significantly associated with a bacterial STI diagnosis (Table 2).
In the multivariable analyses, the interaction between HIV status and chemsex was significant. HIV-negative MSM who reported chemsex had a significantly higher risk of a bacterial STI than did HIV-negative MSM who did not report chemsex (adjusted OR, 1.5; 95% CI, 1.2–1.8). An additional analysis with the same multivariable model, using HIV-positive men not engaging in chemsex as a reference category, showed that there was no significant difference in HIV-positive men, irrespective of chemsex engagement.

Pattern of Chemsex

Of the 866 MSM who engaged in chemsex in the past 6 months, GHB was the most reported drug used (93.0%; Table 3). Crystal methamphetamine was used by 190 (22.1%) MSM, and mephedrone was used by 137 (16.0%) MSM. Regardless of the drug, most MSM reported the use of the drug once per month or less (GHB, 62.7%; crystal methamphetamine, 75.3%; mephedrone, 82.5%). Most of the men (74.7%) used only 1 of the 3 drugs in the past 6 months (GHB, 68.1%; crystal methamphetamine, 4.2%; and mephedrone, 2.4%). A smaller group, 19.4% of the men, used 2 of the 3 drugs and 5.8% reported the use of all 3 drugs.

Among MSM who reported chemsex, 52 (6.1%) disclosed injecting drugs in the past 6 months, of whom 1 person shared needles. Most MSM (87.0%) reported sober sex in the past months, whereas for the rest of the men (13.0%), it was longer than 3 months ago that they had sex without the use of 1 of the 3 drugs. Lastly, 69.8% of the MSM who reported chemsex disclosed CAS (active/passive) while using one of the drugs.

Of all men (n = 1832) who participated in the online survey, 29.3% (537) reported chemsex in the past 6 months. Chemsex engagement differed significantly between STI clinic clients and men who filled in the online survey (17.6% vs. 29.3%; P < 0.001). There was no significant difference regarding GHB and crystal methamphetamine use between STI clinic clients and online participants who engaged in chemsex. Mephedrone use was reported more often in the online survey group than at the STI clinic (28.3% vs. 16.0%; P < 0.001). Compared with the clinic population, less online participants had sober sex in the past month (87.0% vs. 76.8%; P < 0.001) and less condomless anal chemsex (69.8% vs. 62.4%; P = 0.005).

DISCUSSION

Here we show that 17.6% of all MSM visiting the STI clinic of Amsterdam had engaged in chemsex in the previous 6 months. Chemsex among this group was found to be significantly associated with a bacterial STI diagnosis. This association remains significant in the group of HIV-negative MSM after adjusting for demographics and high-risk sexual behavior. However, in HIV-positive men, after adjusting, there is no significant difference in the risk of a bacterial STI diagnosis between those engaging...
in chemsex and those not. The use of GHB during sex was most reported, with 93.0% in the past 6 months. Crystal methamphetamine use was reported by 22.1%. Moreover, 13.0% of the MSM who engaged in chemsex did not have sober sex in the last 3 months and 6.1% stated injecting drugs. Previous studies have shown that MSM who practiced chemsex exhibit high-risk behavior.\textsuperscript{4,11,16} In accordance with these findings, we found that MSM who engaged in chemsex show higher risk-taking behavior (more sex partners and more often CAS) compared with MSM who did not engage in chemsex. The sole use of GHB was reported by 68.1%, and both crystal methamphetamine and GHB was the combination most used (11.8%). Polydrug use as a predictor for risk behavior and STI has been previously reported.\textsuperscript{6} However, because we focused on our study only on the use of 3 drugs (crystal methamphetamine, GHB, and methedrone) during sex, we have no further knowledge about the participants’ additional drug use. This might be a potential confounder to our results, because drugs have diverse mechanisms of actions that might lead to different risk behavior.\textsuperscript{21}

Surprisingly, our findings revealed—irrespective of chemsex practices—a relative small number of newly diagnosed HIV cases (0.4% in chemsex group vs. 0.7%; \( P = 0.256 \)). On the basis of previous findings,\textsuperscript{6,8,11} we expected a higher prevalence of new HIV diagnoses in the chemsex group. However, possible explanations for our results might be the short study period and that 25.5% of all MSM engaging in chemsex were using PrEP. One of the strengths of our study is the routinely collected detailed epidemiologic and behavioral data of clients of the STI clinic.

| Variables | Chemsex, Yes (n = 866), n (%) | Chemsex, No (n = 4059), n (%) | \( P \) | All MSM (n = 4925), n (%) |
|-----------|-----------------------------|-------------------------------|------|-----------------------------|
| Median age (IQR), y | 37 (29–48) | 34 (26–45) | \(<0.001\) | 35 (27–46) |
| Age categories, y | | | | |
| \( \leq 27 \) | 167 (19.3) | 1212 (29.9) | \(<0.001\) | 1379 (28.0) |
| 28–35 | 210 (24.2) | 998 (24.6) | | 1208 (24.5) |
| 36–46 | 250 (28.9) | 957 (23.6) | | 1207 (24.5) |
| \( \geq 47 \) | 239 (27.6) | 892 (22.0) | | 1131 (23.0) |
| Ethnicity\* | | | | |
| Western | 600 (69.3) | 2644 (65.1) | 0.020 | 3244 (65.9) |
| Non-Western | 266 (30.7) | 1415 (34.9) | | 1681 (34.1) |
| HIV status† | | | | |
| HIV-positive | 298 (34.4) | 653 (16.1) | \(<0.001\) | 951 (19.3) |
| HIV-negative | 568 (65.6) | 3406 (83.9) | | 3974 (80.7) |
| Reason of consultation | | | | |
| Notification of STI exposure | 266 (30.7) | 878 (21.6) | \(<0.001\) | 1144 (23.2) |
| STI-related symptoms | 218 (25.2) | 869 (21.4) | 0.015 | 1087 (22.1) |
| Sexual behavior | | | | |
| Median number of sex partners in <6 mo (IQR)‡ | 15 (6.5–30) | 6 (3–10) | \(<0.001\) | 6 (4–15) |
| No. sex partners in <6 mo § | | | | |
| \( \leq 3 \) | 66 (7.6) | 1124 (27.7) | \(<0.001\) | 1190 (24.2) |
| 4–6 | 150 (17.3) | 1150 (28.4) | | 1300 (26.4) |
| 7–15 | 282 (32.6) | 1100 (27.1) | | 1382 (28.1) |
| \( \geq 16 \) | 367 (42.4) | 679 (16.8) | | 1046 (21.3) |
| CAS§ | 726 (84.3) | 2461 (61.1) | \(<0.001\) | 3187 (65.2) |
| STI diagnoses | | | | |
| Any bacterial STI¶ | 269 (31.1) | 839 (20.7) | \(<0.001\) | 1108 (22.5) |
| Chlamydia (non-LGV) | 110 (12.7) | 378 (9.3) | 0.002 | 488 (9.9) |
| Pharyngeal | 14 (1.6) | 45 (1.1) | 0.212 | 59 (1.2) |
| Rectal | 97 (11.2) | 290 (7.1) | \(<0.001\) | 387 (7.9) |
| Urethral | 42 (4.8) | 134 (3.3) | 0.026 | 176 (3.6) |
| LGV | 16 (1.8) | 20 (0.5) | \(<0.001\) | 36 (0.7) |
| Gonorrhea | 165 (19.1) | 445 (11.0) | \(<0.001\) | 610 (12.4) |
| Pharyngeal | 81 (9.4) | 248 (6.1) | 0.001 | 329 (6.7) |
| Rectal | 115 (13.3) | 267 (6.6) | \(<0.001\) | 382 (7.8) |
| Urethral | 42 (4.8) | 103 (2.5) | \(<0.001\) | 145 (2.9) |
| NSU|| | 27 (3.1) | 127 (3.1) | 0.986 | 154 (3.1) |
| Infectious syphilis | 37 (4.3) | 109 (2.7) | 0.012 | 146 (3.0) |
| New HIV diagnosis** | 2/570 (0.4) | 27/3432 (0.7) | 0.256 | 29/4002 (0.7) |
| On PrEP†† | 145/568 (25.5) | 195/3406 (5.7) | \(<0.001\) | 340/3974 (8.6) |

\*Ethnicity was defined according to Statistics Netherlands on the basis of country of birth, and maternal and paternal country of birth.\textsuperscript{18}

†HIV status also includes results of the current HIV test. MSM who refused an HIV test (n = 15) were added to the HIV-negative group.

‡Missing number of sex partners is n = 7.

§CAS: no or inconsistent condom use or condom failure during anal sex. Missing number of CAS is n = 35.

¶Bacterial STI: diagnosis with chlamydia, gonorrhea, LGV, and/or infectious syphilis.

||In those with more than 10 polymorph nucleated leucocytes per high-power field in a urethral Gram-stained smear and no infection with Ct and Ng, a definitive diagnosis of NSU was made.

**Only tested in MSM not previously tested HIV positive.

††HIV-negative participants who used PrEP as part of the Amsterdam PrEP research study.
We could only estimate associations between chemsex and STI diagnoses in clients of the STI clinic, who are explicitly seeking STI care. However, previous studies already have shown that chemsex engagement in different MSM populations was associated with high-risk behavior.8,11,12 Lastly, because we did not ask the dosage of the drugs they used during sex, we could not examine dose-response relations.

This study revealed that especially among HIV-negative MSM, chemsex engagement seems an attributable risk factor for a bacterial STI diagnosis. In contrast, among the total group of HIV-positive MSM, the risk on an STI diagnosis is increased, irrespective of chemsex engagement. Likewise, Bourne et al.8 described that the HIV-positive men in their study did not attribute sexual risk behavior to chemsex, in contrast to HIV-negative men who perceived that drug use directly influenced unintentional sexual risk behavior. Therefore, future STI prevention strategies and health promotion should especially target HIV-negative men engaging in chemsex besides HIV-positive men.

Future research should have a cohort design to monitor change in chemsex over time and study causal relations. Moreover, data on chemsex-related drug dependence, the perception

### TABLE 2. Univariable and Multivariable Analyses of Determinants Associated with a Bacterial STI Diagnosis Among 4925 MSM, Attending the STI Clinic, Public Health Service of Amsterdam, the Netherlands; July to December 2016

|                              | Total (n = 4925), Univariable, OR (95% CI) | P     | Multivariable*, aOR (95% CI) | P     |
|------------------------------|------------------------------------------|-------|-------------------------------|-------|
| Age, y                       |                                          | 0.012 | <0.001                        | 0.001 |
| ≤27                         | 330/1379 (23.9)                          |       | 1                             |       |
| 28–35                       | 283/1208 (23.4)                          | 1.0 (0.8–1.2) | 0.8 (0.7–1.0) |
| 36–46                       | 281/1207 (23.3)                          | 1.0 (0.8–1.2) | 0.7 (0.6–0.9) |
| ≥47                         | 214/1311 (18.9)                          | 0.7 (0.6–0.9) | 0.5 (0.4–0.6) |
| Ethnicity                    |                                          |       |                               |       |
| Western                      | 706/3244 (21.8)                          | 1.1 (1.0–1.3) | <0.001                        | <0.001|
| Non-Western                  | 402/1681 (23.9)                          |       | 1                             |       |
| Chemsex <6 mo                |                                          |       |                               |       |
| Not using chems during sex   | 839/4059 (20.7)                          | 1.7 (1.5–2.0) | <0.001                        | <0.001|
| Using chems during sex       | 269/866 (31.1)                           |       |                               |       |
| HIV status§                  |                                          |       |                               |       |
| HIV-negative                 | 794/3974 (20.0)                          | 2.0 (1.7–2.3) | <0.001                        | <0.001|
| HIV-positive                 | 314/951 (33.0)                           |       |                               |       |
| Reason of visit              |                                          |       |                               |       |
| Not notified of STI exposure | 742/3781 (19.6)                          | 2.0 (1.7–2.3) | <0.001                        | <0.001|
| Notification of STI exposure | 366/1144 (32.0)                          | 1.9 (1.7–2.2) | 2.0 (1.7–2.3) |
| No STI-related symptoms      | 686/3838 (17.9)                          | 1     | <0.001                        | <0.001|
| STI-related symptoms         | 422/1087 (38.8)                          | 2.9 (2.5–3.4) | 3.0 (2.5–3.4) |
| CAS <6 mo§                   |                                          |       |                               |       |
| No CAS                       | 287/1703 (16.9)                          | 1.7 (1.5–2.0) | <0.001                        | <0.001|
| CAS                          | 813/3187 (25.5)                          |       |                               |       |
| No. sex partners <6 mo||     |                                          |       |                               |       |
| ≤3                          | 218/1190 (18.3)                          | 1     |                               |       |
| 4–6                         | 274/1300 (21.1)                          | 1.2 (1.0–1.5) | 1.2 (1.0–1.5) |
| 7–15                        | 312/1382 (22.6)                          | 1.3 (1.1–1.6) | 1.3 (1.1–1.6) |
| ≥16                         | 302/1046 (28.9)                          | 1.8 (1.5–2.2) | 1.8 (1.5–2.3) |

*Bacterial STI: diagnosis with chlamydia, gonorrhea, LGV, and/or infectious syphilis.
†In multivariable model, 4883 MSM were included, of whom 1108 had a bacterial STI.
‡MSM who refused an HIV test were added to the HIV-negative group (n = 15).
§The interaction between chemsex and HIV status for any bacterial STI was included in the multivariable model as a dummy variable with 4 categories.
¶Missing number of CAS is n = 35. No CAS: always condom use during anal sex or no anal sex. CAS: no or inconsistent condom use or condom failure during anal sex.
||Missing number of sex partners is n = 7.
aOR indicates adjusted odds ratio.
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not forget that most men who engage in sex and drugs dependency might not be an issue. Those findings are in agreement with Holt,22 who commented in the Lancet HIV that we should not forget that most men who engage in sex and drugs “do not experience harm and are not a threat to others.” Conversely, Stuart et al.16 found that 70% of the MSM of their study population reported no chem-fae sex in the previous 6 months.

We are in the early stages of fully understanding the impact of the uprising phenomenon of chemsex, and it remains to be seen whether we are at a start of an emerging epidemic. Nonetheless, the present results show that there is a group of MSM in Amsterdam engaging in chemsex and that especially the HIV-negative men are at higher risk for STIs and potentially for HIV in the future. Therefore, the STI clinic of Amsterdam implemented a low threshold community-led counseling service for MSM who want to discuss chemsex and underlying motivations.7 If desired, referral to professional substance use and psychological care is possible.

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Our study revealed that 87.0% of all MSM engaging in chemsex reported sober sex in the past month, indicating that dependency might not be an issue. Those findings are in agreement with Holt,22 who commented in the Lancet HIV that we should not forget that most men who engage in sex and drugs “do not experience harm and are not a threat to others.” Conversely, Stuart et al.16 found that 70% of the MSM of their study population reported no chem-fae sex in the previous 6 months.

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We are in the early stages of fully understanding the impact of the uprising phenomenon of chemsex, and it remains to be seen whether we are at a start of an emerging epidemic. Nonetheless, the present results show that there is a group of MSM in Amsterdam engaging in chemsex and that especially the HIV-negative men are at higher risk for STIs and potentially for HIV in the future. Therefore, the STI clinic of Amsterdam implemented a low threshold community-led counseling service for MSM who want to discuss chemsex and underlying motivations.7 If desired, referral to professional substance use and psychological care is possible.

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