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Sexualized Drug Use (Chemsex) Is Associated with High-Risk Sexual Behaviors and Sexually Transmitted Infections in HIV-Positive Men Who Have Sex with Men: Data from the U-SEX GESIDA 9416 Study

Alicia González-Baeza, PhD,[1] Helen Dolengevich-Segal, MD,[2] Ignacio Pérez-Valero, MD, PhD,[1] Alfonso Cabello, MD,[3] María Jesús Téllez, MD, PhD,[4] José Sanz, MD, PhD,[5] Leire Pérez-Latorre, MD, PhD,[6] José Ignacio Bernardino, MD,[1] Jesús Troya, MD,[7] Sara De La Fuente, MD, PhD,[8] Otilia Bisbal, MD,[9] Ignacio Santos, MD, PhD,[10] Sari Arponen, MD, PhD,[11] Víctor Hontañon, MD,[1] José Luis Casado, MD, PhD,[12] and Pablo Ryan, MD, PhD,[7,13] on Behalf of the U-SEX GESIDA 9416 Study

Abstract

The magnitude of sexualized drug use (SDU), also known as chemsex, and its association with sexually transmitted infections (STI) has not been systematically explored in HIV-positive patients. This study aimed to calculate the prevalence of SDU and associated factors in a sample of HIV-positive men who have sex with men (MSM) in Spain. We calculated the frequency of SDU in a sample of HIV-positive MSM who responded to an anonymous online survey on sexual behavior and recreational drug use. We also analyzed differences between those who responded and those who did not (data taken from the physician's registry). The association between SDU, sexual risk behaviors, and STI was evaluated using a univariate and a multivariate analysis. Data were collected and managed using Research Electronic Data Capture (REDCap). The survey was completed by 742 HIV-positive MSM, of whom 60% had had unprotected anal intercourse (UAI), 62% had been diagnosed with a STI, and 216 (29.1%) reported recent SDU (slamsex in 16% of cases). In the multivariate analysis, patients who engaged in SDU were more likely to have had high-risk sexual behaviors and a diagnosis of STI than participants who did not engage in SDU. A diagnosis of hepatitis C was independently associated with slamsex (5.2 [95% confidence interval (CI), 2.06–13.13]; $p < 0.001$), chemsex (2.51 [95% CI, 1.28–4.91]; $p = 0.007$), and UAI (1.82 [95% CI, 0.90–3.70]; $p = 0.094$). The magnitude of SDU or chemsex in our sample is relatively high. We found a clear association between SDU, high-risk sexual behaviors, and STI including hepatitis C.

Keywords: human immunodeficiency virus, MSM, chemsex, high-risk sexual behaviors, sexually transmitted infections, sexualized drug use

[1]HIV Unit, La Paz University Hospital, IdiPAZ, Madrid, Spain.
[2]Dual Pathology Program, Henares University Hospital and Francisco de Vitoria University, Madrid, Spain.
[3]Infectious Diseases and HIV Unit, Fundación Jimenez Diaz, Madrid, Spain.
[4]Infectious Diseases and HIV Unit, Clínico San Carlos University Hospital, Madrid, Spain.
[5]Internal Medicine and HIV Unit, Alcala University Hospital, Madrid, Spain.
[6]Infectious Diseases and HIV Unit, Gregorio Marañón University Hospital, Madrid, Spain.
[7]Internal Medicine Service, Infanta Leonor University Hospital, Madrid, Spain.
[8]Internal Medicine Department, Puerta de Hierro Research Institute and University Hospital, Madrid, Spain.
[9]HIV Unit, 12 de Octubre University Hospital, Madrid, Spain.
[10]Infectious Diseases Unit, La Princesa University Hospital, Madrid, Spain.
[11]Internal Medicine, Torrejón Hospital, Madrid, Spain.
[12]Infectious Diseases and HIV Unit, Ramon y Cajal University Hospital, Madrid, Spain.
[13]Medicine Department, Universidad Complutense de Madrid, Madrid, Spain.

Introduction

THE PREVALENCE OF recreational drug use is greater in men who have sex with men (MSM) than in the general population. This trend has been reported in the United States, Asia, and several European countries.[1–5]

Drug use with the intention of enhancing sexual relations is known as sexualized drug use (SDU). This phenomenon has also been called chemsex, party and play, and intensive sex partying. It is usually engaged in by MSM for long periods of time and with multiple partners.[6,7] The drugs typically associated with this specific form of recreational drug use are mephedrone and crystal methamphetamine, which have the effect of increasing sexual arousal and stamina, along with γ-hydroxybutyrate (GHB)/γ-butyrolactone (GBL) and ketamine, which have disinhibiting properties. The practice of intravenous injection of drugs in this context is called slamming or slamsex.[8]

The HIV epidemic disproportionately affects MSM. Studies have shown that MSM who meet partners via the internet or geosocial networking mobile applications are more likely to have more sexual partners and a higher risk of HIV infection and sexually transmitted infections (STI).[9,10] A higher prevalence of SDU has been reported in HIV+ MSM.[11] SDU has been related to high-risk sexual practices such as unprotected anal intercourse (UAI) or sex with multiple partners, which may lead to STI including those caused by blood-borne viruses (HIV and hepatitis C).[11–13] Although parenteral transmission remains the principal route of transmission of hepatitis C virus (HCV), evidence for the role of sexual and mucosal transmission of HCV has been increasing in recent years.[14,15]

To our knowledge, the prevalence of SDU and the association between SDU and STI in the HIV+ population have only been investigated in a cohort of patients attended in the United Kinkdom.[11] The present analysis aimed to calculate the prevalence of SDU and to explore the association between STI, SDU, and high-risk sexual behaviors in a sample of HIV+ MSM in Madrid, Spain.

Methods

The U-SEX GESIDA 9416 study was conducted in 22 hospitals in the Madrid area from June 2016 to March 2017. Patients who met the inclusion criteria (MSM aged ≥18 years with documented HIV infection) were offered participation in the study by infectious diseases specialists in the HIV clinic of each participating hospital.

The physician explained the purpose of the study to the patient, invited him to participate, and handed him a card with a unique code and a link with access to an online survey. Cards were nontransferable. The study information was also printed out on the back of the card. The survey was self-completed outside the hospital.

To evaluate the rate of response and the representativeness of the sample, the physician entered a series of data into a local database, namely, the code, age, year of HIV diagnosis, level of education, and nationality of the patient.

The online survey evaluated various domains: general sociodemographic data, HIV infection status, sexual risk practices, diagnosis of STI, psychiatric disorders, and history of drug use. If the patient reported any kind of drug use, the questionnaire led the patient to the second part of the survey, which evaluated the types of drugs used, the context in which they are used, frequency, route of administration, and other aspects of SDU.

The study protocol was approved by the Ethics Committee of Hospital Universitario Gregorio Marañón (HUIL 1606 96/16) and the research committee of each participating hospital in accordance with the principles of the Declaration of Helsinki (2008). The survey was voluntary and anonymous, thus obviating the need for written informed consent.

Study data were collected and managed using Research Electronic Data Capture (REDCap) at ''Asociación Ideas for Health,''[16] a Spanish nonprofit organization focused on research and medical education.

Statistical analysis

SDU (chemsex) was defined as the intentional use of mephedrone or similar cathinones, 3,4-methylenedioxy-N-methylamphetamine (MDMA), methamphetamine, amphetamines, GHB/GBL, ketamine, or cocaine during sex in the previous year.

STI were categorized as present if patients had been diagnosed with syphilis, gonorrhoea, chlamydia, or HCV.

To explore the response rate and representativeness, we selected five common variables (code, age, year of diagnosis, education level, and nationality) from the two databases (physicians' registry and the patients' questionnaire responses) to compare them.

The sample was described using absolute and relative frequencies for categorical variables and median (interquartile range) for continuous variables.

In the univariate analysis, the baseline characteristics of participants who had engaged in SDU and those who had never engaged in SDU were compared using the chi-square test (categorical variables) and the *t* test (continuous variables). The same tests were used to compare patients who had been diagnosed with any of the above STI and those who had never been diagnosed with an STI.

We conducted multiple logistic regression analyses with SDU as the dependent variable to explore the association between SDU and variables related to high-risk sexual behaviors and STI. We also conducted multiple logistic regression analyses with STI and HCV as dependent variables. Independent variables were included if they were significantly associated with the dependent variable in the univariate analysis ($p < 0.05$). Age was forced into the regression analysis as a continuous variable owing to the influence of age on patterns of drug consumption. All analyses were conducted using IBM SPSS® Statistics 20.

Results

Patient characteristics

Between June 2016 and March 2017, a total of 2916 surveys were offered to HIV-positive MSM who attended any of the 22 participating HIV clinics in Madrid. At the end of the study period, 792 surveys had been completed. Once duplicate data and incomplete data had been removed, the sample comprised 742 people.

The survey response rate was 26.4%, and the characteristics of responders and nonresponders are shown in Appendix 1. There were no significant differences with respect to age or education level between those who responded and those who

did not respond to the questionnaire ($p > 0.05$). However, those who did not respond had been diagnosed with HIV earlier (2011 vs. 2010, $p = 0.01$) and were more frequently non–Spanish-born (26% vs. 31%, $p = 0.02$).

A total of 742 HIV-positive MSM were included in the present analysis. Patients were predominantly Spanish-born (74%) and highly educated (56% with university studies completed). The median year of HIV diagnosis was 2011 (2006–2014), and 677 (96%) patients were on antiretroviral therapy (ART). Of these, 66% were on a single-tablet regimen, and 78% had complete adherence to ART. In total, 185 patients (25%) reported having a diagnosis of depression, 175 (24%) an anxiety disorder, 57 (7.7%) a substance abuse disorder, and 9 (1.2%) a previous psychotic episode (Table 1).

Overall, 62% (465/742) had been diagnosed with an STI, as follows: chlamydia, 19.7%; syphilis, 46.1% (19% more than one episode); gonorrhoea, 30.9% (13% more than one episode); and hepatitis C, 11.1%.

In the previous 6 months, 60% (415) of the patients had engaged in UAI, 126 (17%) had had 20 or more sexual partners, and 125 (17%) had engaged in fisting.

During the previous year, 436 patients (59%) had used drugs. The most frequently used drugs were nitrites (72%), cocaine (52%), mephedrone, or other cathinones (44%), GHB (39%), and crystal methamphetamine (15%).

Following the criteria described in the methods section, 29.1% of patients ($n = 216$) had engaged in SDU during the previous year. The drugs used during sex by these patients were mainly cocaine (79%), GHB (72%), mephedrone (69%), MDMA (49%), ketamine (36%), and crystal methamphetamine (30%). Furthermore, 45.4% reported using three or more substances per session. A total of 34 patients had engaged in slamsex (15.7%), and 44 (20.4%) had used drugs intrarectally.

Of those patients who had engaged in SDU during the previous year, 189 (88%) used mobile apps for sexual encounters. Of these, 32% used social networks as the only method for sexual encounters and 6% used mobile apps to buy recreational drugs. Compared with patients who did not use mobile apps during the previous year, those who used mobile apps for sexual encounters were more frequently diagnosed with syphilis (50% vs. 69.3%; $p = 0.05$) and more frequently had multiple episodes of syphilis (19.2% vs. 45.5%; $p = 0.011$).

Factors associated with SDU

Table 1 shows the results of the univariate analysis conducted to compare baseline characteristics between participants who had engaged in SDU (216 [29.1%]) and those who had never engaged in SDU.

The multivariate analysis revealed that compared with patients who did not engage in SDU, those who did had more frequently had 20 or more sexual partners (odds ratio [OR], 4.23 [95% confidence interval (CI), 2.38–7.52]; $p < 0.001$), engaged in UAI (OR, 4.49 [95% CI, 2.57–7.83]; $p < 0.001$), engaged in fisting in the previous 6 months (OR, 7.44 [95% CI, 4.05–13.1]; $p < 0.001$), and had more frequently been diagnosed with an STI (OR, 2.29 [95% CI, 1.32–3.98]; $p = 0.003$).

Factors associated with STI

Patients who had been diagnosed with an STI and reported SDU were more likely to have had 20 or more sexual partners and have engaged in UAI that those who did not have an STI. The univariate and multivariate analysis of the factors associated with STI are shown in Table 2.

As for variables associated with HCV, multiple logistic regression revealed that patients diagnosed with HCV infection had more frequently engaged in slamsex (5.2 [95% CI, 2.06–13.13]; $p < 0.001$), chemsex (2.51 [95% CI, 1.28–4.91]; $p = 0.007$), and UAI (1.82 [95% CI, 0.90–3.70]; $p = 0.094$) than those who had never been diagnosed with HCV.

Discussion

This analysis provides novel findings on the magnitude and characteristics of SDU (chemsex) and associated factors in a

Table 1. Characteristics of the Patients Included in the Analysis Stratified By Sexualized Drug Use

	Entire sample (n = *742*)	*No SDU* (n = *526*)	*SDU* (n = *216*)	p
Age, median (IQR)	38 (32–45)	38 (32–46)	38 (33–44)	—
Spanish-born, *n* (%)	545 (74)	391 (75)	154 (71)	—
University level studies, *n* (%)	438 (56)	300 (58)	138 (64)	—
Salary >1000 euros/month, *n* (%)	478 (66)	325 (63)	153 (73)	0.01
Years from HIV diagnosis, median (IQR)	5 (2–10)	5 (2–10)	5 (2–11)	—
On ART, *n* (%)	677 (96)	480 (95)	197 (97)	—
Incomplete adherence to ART, *n* (%)[a]	145 (22)	79 (17)	66 (34)	0.000
Stable partner, *n* (%)[b]	363 (49)	272 (52)	91 (42)	0.019
Diagnosis of depression, *n* (%)	185 (25)	113 (21)	72 (33)	0.001
Diagnosis of anxiety, *n* (%)	175 (24)	117 (22)	58 (27)	—
≥ 20 sexual partners, *n* (%)[b]	126 (19)	40 (8)	86 (44)	0.000
Unprotected anal intercourse, *n* (%)[b]	415 (60)	226 (43)	189 (87)	0.000
Fisting, *n* (%)[b]	125 (17)	30 (6)	95 (44)	0.000
Any STI, *n* (%)[c]	465 (62)	282 (53)	183 (85)	0.000
Syphilis, *n* (%)	342 (46)	198 (38)	144 (67)	0.000
Gonorrhoea, *n* (%)	229 (31)	129 (24)	100 (46)	0.000
Chlamydia, *n* (%)	146 (20)	65 (12)	81 (37)	0.000
Hepatitis C, *n* (%)	82 (11)	28 (5)	54 (25)	0.000

[a]In the last month.
[b]In the last 6 months.
[c]Includes syphilis, gonorrhoea, chlamydia, and hepatitis C.
ART, antiretroviral therapy; IQR, interquartile range; SDU, sexualized drug use; STI, sexually transmitted infections.

Table 2. Univariate and Multivariate Analysis of Patients with a Diagnosis of Sexually Transmitted Infections (Syphilis, Gonorrhoea, Chlamydia, and Hepatitis C)

	Univariate analysis			*Multivariate logistic regression*		
Variable	*OR*	*95% CI for OR*	p	*OR*	*95% CI for OR*	p
Age, median (IQR)	1.00	0.98–1.02	0.601			
Spanish-born, *n* (%)	**0.69**	**0.48–0.98**	**0.040**	0.75	0.75–0.49	0.182
University level education, *n* (%)	1.19	0.88–1.62	0.240			
Salary >€1000/month, *n* (%)	**1.37**	**1.00–1.87**	**0.049**	1.44	0.98–2.09	0.057
Years from HIV diagnosis, median (IQR)	1.02	1.00–1.04	0.053			
On ART, *n* (%)	0.67	0.32–1.40	0.291			
Incomplete adherence to ART, *n* (%)[a]	**1.74**	**1.16–2.60**	**0.007**	1.16	0.72–1.87	0.520
Stable partner, *n* (%)[b]	1.27	0.94–1.72	0.108			
Diagnosis of depression, *n* (%)	1.20	0.85–1.71	0.288			
≥20 sexual partners, *n* (%)[b]	**4.04**	**2.43–6.71**	**0.001**	**1.93**	**1.02–3.63**	**0.041**
Unprotected anal intercourse, *n* (%)[b]	**3.27**	**2.40–4.46**	**0.001**	**2.43**	**1.66–3.56**	**0.000**
Fisting, *n* (%)[b]	**3.29**	**2.02–5.36**	**0.001**	1.04	0.54–2.00	0.900
Chemsex, *n* (%)[c]	**4.79**	**3.19–7.21**	**0.001**	**2.05**	**1.19–3.52**	**0.009**
Slamsex, *n* (%)[c]	**10.1**	**2.40–42.7**	**0.002**	4.45	0.56–35.1	0.157

[a]In the last month.
[b]In the last 6 months.
[c]In the last year.
CI, confidence interval; IQR, interquartile range; OR, odds ratio.

sample of HIV+ MSM. SDU in the previous year was frequent among HIV-positive MSM (29.1%). Most of those patients who engaged in SDU frequently used mobile apps for sexual encounters and, in some cases, for obtaining drugs for chemsex. Respondents had also engaged in high-risk sexual practices and had a high prevalence of STI. More specifically, a high proportion of the participants had engaged in UAI (60%) and had had 20 or more sexual partners (17%) in the previous 6 months. In patients engaged in SDU, polydrug and intravenous drug use were also frequent.

Patients who practiced chemsex were more likely to engage in high-risk sexual behaviors and were more frequently diagnosed with an STI than those who had not engaged in SDU. Patients who had been diagnosed with an STI were more likely to have engaged in SDU, have a higher number of sexual partners, and have more frequently engaged in UAI. Patients with intravenous SDU were five times more likely to have been diagnosed with an HCV infection.

To our knowledge, this is the first systematic multi-center study to explore the prevalence of SDU in Spain. This is also the first report of an association between diagnosis of STI, high-risk sexual behaviors, and SDU in a sample of HIV+ MSM in Spain. Only one published study provides a systematic, in-depth analysis of the chemsex phenomenon in large samples of HIV+ MSM.[11]

Our study is comparable with the Positive Voice Study, which explored the prevalence of chemsex during the previous year in a sample of 392 HIV+ MSM.[11] Both studies found a 29% prevalence of chemsex. In contrast to our study, Pufall et al only included sexually active HIV+ MSM. It therefore seems reasonable to expect that chemsex rates would be higher in the Positive Voice Study than in our study. However, recruitment in the Positive Voice Study was in 2014, when this phenomenon was not so widespread as in recent years.[17] In addition, a broader definition of chemsex, which in 2014 only included the use of mephedrone, crystal methamphetamine, and GHB, would have generated higher rates of chemsex in the Positive Voice study.

The authors of the ASTRA Study also reported data on chemsex in a sample of HIV+ MSM in the United Kinkdom,[12,18] although they did not estimate the prevalence of chemsex. Compared with the ASTRA study, we found higher rates of mephedrone use (21% vs. 7%) and GHB use (23% vs. 10%) and similar rates of crystal methamphetamine use (9% vs. 8%) and ketamine use (12% vs. 13%). However, these percentages may have varied, because the ASTRA Study was conducted in 2011–2012 and the authors did not ask the patients whether they had used these drugs during sex. Moreover, cocaine was used frequently during sex in our sample (30% of the total and 79% of those engaged in SDU). Direct comparisons with other studies are not possible, because the authors did not ask if patients used cocaine during sex.

However, in the ASTRA study, 20% of the sample of HIV+ MSM had used cocaine,[12] and Hegazi et al.[19] found that 16% of MSM who were engaged in chemsex had used cocaine. Our findings lead us to believe that cocaine use during sex might be more frequent in Spain than in other countries. Slamsex rates were significantly higher in the sample of people who engaged in chemsex in the Positive Voice Study than in our study (33.3% vs. 15.7%). We believe that the frequency of chemsex is similar between countries but that regional differences should be explored to establish specific intervention programs.[20]

We also confirmed the increased odds of being engaged in SDU and having high-risk sexual behaviors or being diagnosed with an STI, as previously reported in HIV+ MSM in the United Kinkdom.[11] To our knowledge, this association is common in all published studies.[3,8,11–13,19,21]

We found an independent association between HCV infection and slamsex, chemsex, and being engaged in UAI. A strong association between HCV infection and slamsex was previously reported in the Positive Voice Study.[11] In our study, intravenous drug use was the main factor contributing to HCV infection, but not the only one. Most participants diagnosed with HCV did not report injecting drug use (74%), and of these, a significant number reported UAI (75%), fisting

(31%), SDU (54%), and rectal administration of drugs (14%). Therefore, HCV infection may be related not only to unsafe slamsex (sharing needles and drug paraphernalia), but also to sexual transmission and other risk practices during SDU.

Our results are consistent with those of previous studies, which found an association between HCV infection and slamsex in a sample of HIV+ MSM[11] and an increased risk of HCV infection through sexual transmission.[22,23] In our opinion, practices that lead to the transmission of HCV infection in MSM are not completely clarified in general or in the context of SDU.

As mentioned above, chemsex is the term given to the intentional use of psychoactive drugs to maintain sexual relations between MSM, usually for long periods of time and with multiple partners.[8,24] We believe this definition should also include other fundamental aspects, such as the use of geosocial networking applications, the particularities of the sexual behaviors engaged in, and the relationship with transmission of STI. Some studies have reported a higher frequency of STI and the highest probability of having casual sex partners in MSM who use mobile apps to locate potential partners or participate in chemsex parties.[9,25]

We recorded a high proportion of mobile app use in our sample, and our analysis revealed higher frequencies of syphilis in patients who used mobile apps for sexual encounters. Other authors have also described the role of risky sexual behavior (e.g., unprotected oral sex) in the chemsex phenomenon and in transmission of STI.[26] We found that a high percentage of patients who had engaged in SDU used intrarectal drugs (20%). The role of these and other new factors in the phenomenon should be investigated.

Our study is subject to the limitations inherent to cross-sectional survey studies, especially response bias. Although we used limited time periods in questions that depended on memory, recall bias could distort the accuracy of the results. Furthermore, we were unable to confirm causality because of the cross-sectional nature of the study. Further longitudinal studies should be performed to confirm our results and the results of others, which suggest that SDU may be contributing to the increased frequency of STI diagnosed among HIV+ MSM in recent years.

In this study, one out of four patients who met the inclusion criteria and were invited to participate in the survey completed the questionnaire. Despite the fact that we collected sociodemographic and clinical variables of the people who did not respond to the survey and there were no major differences between those who responded and those who did not, we cannot rule out a potential nonresponse bias. The response rate, which was lower than expected, limits our conclusions to the sample of patients who responded to the survey. However, 742 HIV+ MSM responded to the survey, that is, $\sim$10% of the HIV+ MSM attended in our region.[27] The Positive Voice Study also found a low response rate (39%), although it was higher than ours.[11] We believe that our response rate may have been low because of the online nature of the survey, which did not require questionnaires to be completed during the interview with a healthcare worker. While online surveys can enhance the sincerity of the responses of the participants, they might reduce the response rate.

Furthermore, given that most of the studies did not systematically collect the rate of response between respondents and nonrespondents, we believe that collecting this variable is a strength of our study.

In conclusion, the magnitude of chemsex in HIV+ MSM in Madrid appears to be relatively high and similar to that reported in other European cities. However, the type of drug used might differ between regions. The use of mobile apps for sexual encounters among HIV+ MSM is common. In our opinion, SDU, a high number of sexual partners, and UAI should be closely monitored in HIV+ MSM, because these variables might be predictors of STI. HIV+ patients should be counseled and informed that SDU can increase the risk of other infections, including HCV. Furthermore, patients engaging in SDU should be included in preventive and educational programs to reduce the frequency of high-risk sexual practices and STI.

Contributors

The members of the U-SEX GESIDA 9416 Study Group are listed by center below: P. Ryan, J. Troya, G. Cuevas, J. Solís, Hospital Universitario Infanta Leonor, Madrid, Spain; J. González-García, J.I. Bernardino, V. Hontañón, I. Pérez-Valero, A. Gonzalez, Hospital Universitario La Paz, Madrid, Spain; S. Moreno, M.J. Pérez, J.L. Casado, A. Moreno, M. Sanchez-Conde, M.J. Vivancos, C. Gómez, S. Serrano, Hospital Universitario Ramón y Cajal, Madrid, Spain; J. Berenguer, A. Carrero, L. Perez-Latorre, T. Aldamiz, Hospital Universitario Gregorio Marañón, Madrid, Spain; A. Cabello, Hospital Fundacion Jimenez Diaz, Madrid, Spain; M. Cervero, Hospital Universitario Severo-Ochoa, Madrid, Spain; S. Arponen, A. Gimeno, C. Montero Hospital de Torrejón, Madrid, Spain; S. Nistal, Hospital Rey Juan Carlos, Madrid, Spain; J. Valencia, J.Gutiérrez, A. Morro, Madrid Positivo, Madrid, Spain; I. Suarez, E. Malmierca, Hospital Universitario Infanta Sofía, Madrid, Spain; J. Sanz, Hospital Universitario de Alcalá, Madrid, Spain; I. Terrancle, R. Monsalvo, Hospital Universitario del Tajo, Madrid, Spain; O. Bisbal, M. Matarranz, M. La Torre, R. Rubio, L. Dominguez, Hospital Universitario 12 de Octubre, Madrid, Spain; R. Serrano, P. Sanz, H. Dolengevich, Hospital Universitario de Henares, Madrid, Spain; A. Diaz, S. de la Fuente, A. Moreno, Hospital Universitario Puerta de Hierro, Madrid, Spain; J.A. Melero, Hospital Universitario Infanta Cristina, Madrid, Spain; M.J. Tellez, V. Estrada, Hospital Universitario Clinico San Carlos, Madrid, Spain; M. Estebanez, Hospital Universitario Gomez-Ulla, Madrid, Spain; A. Gomez, I. Santos, L. García-Fraile, J. Sanz-Sanz, C. Sarriá, A. Salas, C. Sáez, Á. Gutiérrez-Liarte, Hospital Universitario La Princesa, Madrid, Spain; T. García-Benayas, T. Fernandez, R. Peñalver, Hospital Universitario del Sureste (Arganda), Madrid, Spain; J.E. Losa, Hospital Universitario Fundacion Alcorcon, Madrid, Spain; H. Esteban, M. Yllescas, Fundación SEIMC-GESIDA, Madrid, Spain.

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Address correspondence to:
Pablo Ryan, MD, PhD
Internal Medicine Service
Infanta Leonor University Hospital
Av. Gran Via del Este 80
Madrid 28031
Spain

E-mail: pabloryan@gmail.com

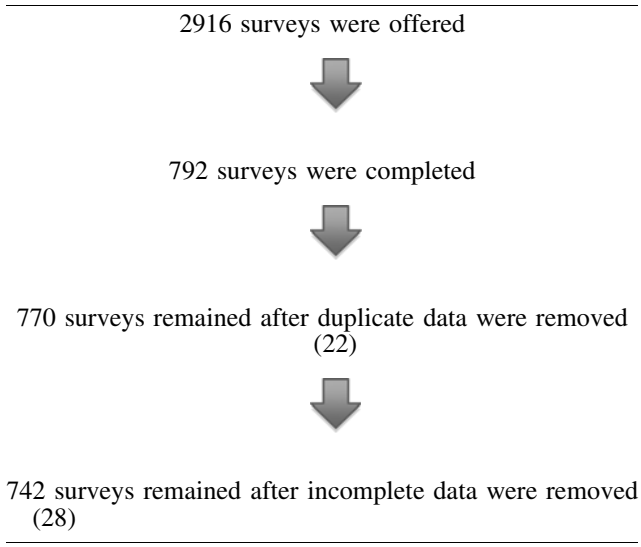
(*Appendix follows* →)

Appendix 1: Response rate and representativeness

Infectious diseases physicians selected patients who met the inclusion criteria:

- Age ≥18 years,
- Documented HIV infection
- Men who have sex with men

The survey response rate was 26.4%: 770 surveys out of 2916 questionnaires handed out.



Characteristic of the Patients Who Responded to the Survey and the Patients Who Did Not Respond to the Survey

	Total (n = *2916*)	*Responded to the survey* (n = *770*)	*Did not respond to the survey* (n = *2146*)	p
Age, median (IQR)	38 (32–46)	38 (32–46)	38 (32–46)	NS
Year of HIV diagnosis, median (IQR)	2010 (2006–2014)	2011 (2006–2014)	2010 (2006–2014)	0.010
University and secondary studies, *n* (%)	2642 (92)	712 (94)	1930 (91)	NS
Foreigner, *n* (%)	848 (29%)	200 (26%)	648 (31%)	0.020

[a]Fisher's Exact Test.
IQR, interquartile range; NS, not significant.