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Who attends a free sexual health center in Paris for HIV/STI screening? an observational study

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Abstract

Background A key-population approach to sexually transmitted disease prevention does not fully take into account the multidimensional nature of sexual risk behavior. Visits to sexual health centers for HIV/STI screening provide an opportunity to spread prevention messages and tools, but few data are available on patients' sexual and prevention behaviors. This study aimed to identify the profile of patients consulting for HIV/STI testing in a Parisian sexual health center.

Methods This observational study included 5,130 patients who attended the center for HIV/STI testing from August 2017 through January 2020 and completed a self-administered electronic questionnaire. Data were obtained from the consultation database and the questionnaire. The data included STI results, sociodemographic characteristics, sexual and prevention behaviors, as well as HIV knowledge. To identify homogeneous groups of patients regarding sexual risky behavior, we conducted a mixed approach including both a priori classification and agglomerative hierarchical clustering (AHC) based on multiple correspondence analysis (MCA). Sexual behaviors and substance use were included in the MCA.

Results Median age of patients was 26 years [Q1–Q3:23–32]. Seven clusters of patients were identified. Two clusters had a high HIV/STI positivity rate (15–19%) with very different profiles: cluster 1 included socially disadvantaged patients who had no health insurance and cluster 5 included 89% of men who have sex with men. Two clusters had an HIV/STI positivity rate corresponding to that observed in the overall study population (10–11%) but exhibited risky behaviors (cluster 7 with a high frequency of unprotected sexual intercourse, substance use, cannabis use and weekly binge drinking) or lack of knowledge on HIV (cluster 6 including 100% of patients having transactional sex).

Conclusions The multidimensional approach demonstrated that both key populations and lower-risk populations visit a sexual health center. While several groups could benefit from tailored interventions, knowledge of HIV and its treatment should be enhanced for every patient visiting a sexual health center. To provide a complete offer in sexual health, patients' profiles and expectations need to be taken into account.

Keywords HIV, STI, Prevention, Sexual health center, Sexual behavior, Unsafe sex, Health risk behaviors

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Background

Worldwide, 10.9 million adults aged 15–49 years old acquired HIV in 2022 (a rate of 0.028 for 100 person-years) including 50,000 in Western and Central Europe and North America (where the rate is 0.011 per 100 person-years) [1]. Of these new HIV infections, the majority (55% worldwide, 83% in Western and Central Europe and North America) are observed among specific populations and their sexual partners, even though these specific populations are a very small proportion of the entire population [1]. The World Health Organization (WHO) suggests dedicated interventions focusing on these specific populations who are at increased HIV risk, and identified the key populations: men who have sex with men (MSM), injection drug users (IDU), people in prisons and other closed settings, sex workers and their clients, and transgender people [2, 3].

Research studies on HIV/STI risk behaviors have often evaluated these risks together, based solely on the presence of risk factors or by summing the number of risky behaviors by means of a score [4–6]. In studies conducted in sexual health centers, risky behaviors are described by a single categorical variable summarizing the type of identified key population for HIV/STI risks (MSM, IDU, sex workers, persons with multiple partners, persons with low income, migrants) [7, 8]. However, as pointed out by UNAIDS, sexual behavior indicators related to HIV risk should not be analyzed in isolation [9, 10]. Such methods may not fully categorize risks and they do not take into account factors that may influence HIV/STI risk such as substance use, low income or history of sexual assault [5]. Sexual health is defined by multiple interlocking dimensions taking into account both sexual and prevention behaviors, knowledge, access to sexual care as well as an environment promoting sexual health [11]. Scientific research that aims to understand sexual health and sexual prevention behavior should take into account the multiple dimensions that define it, and not sexual outcomes. From definition to application in research, some researchers have started to demonstrate multidimensional patterns of sexual health and sexual and prevention behaviors [12]. Studies focusing on MSM have shown that there are no monolithic groups with regard to HIV/STI risk, and have suggested the need for preventive strategies tailored to each subgroup, as well as to demographic and socioeconomic factors [13–16]. Such a multidimensional approach to sexual health and prevention has been conducted in the general population [17, 18], but it has rarely been applied among attendees of sexual health centers [6]. However, this multidimensional approach should benefit attendees of sexual health centers [6].

A visit for HIV/STI testing is an opportunity to increase patients' knowledge of these infections, to heighten their self-perception of risk of STI [19] and to promote other prevention strategies such as post (PEP) or pre-exposure prophylaxis (PrEP) [17, 20–22]. Indeed, according to the Health Belief model, the adoption of preventive health behaviors is influenced by personal perceptions (vulnerability, seriousness, benefit) and indirectly by cues to action, which can be events experienced by the individual [23]. Moving from a key-population approach to a multidimensional one may lead to better understanding of sexual risk behaviors and make it possible to tailor sexual health prevention and care to patient needs [18, 24, 25].

This study aimed to identify the different profiles of patients consulting for HIV/STI testing in a Parisian sexual health center.

Methods

Setting

This cross-sectional observational study was conducted in a sexual health center in a Paris hospital (Fernand-Widal Hospital) [22]. The center offers free tests for HIV, HBV, HCV, syphilis, chlamydia and gonorrhea and provides access to PEP without an appointment. The center also provides PrEP consultations by appointment for eligible patients. This center is part of the French national network of free testing centers for HIV/STI, which mainly targets socially disadvantaged and high-risk populations although access is not restricted to these populations [26].

Since August 2017, the reception agent invites every new patient who understands written French to complete an anonymous self-administered electronic questionnaire. Patients are informed in writing that their participation is optional and that the doctor who will receive them does not have access to the answers they enter in the questionnaire. Patients complete the questionnaire, prior to medical consultation, on a dedicated computer in a private area in the waiting room.

Study population

From August 2017 through January 2020, 8,174 patients aged over 18 were screened for HIV/STI. Among them, 966 (12%) did not understand written French and were not eligible. Of the 7,208 eligible patients, 5,148 (71%) agreed to complete the questionnaire. A small number ($n = 18$) stated that they had no sex life and were excluded, leading to 5,130 patients included in final analysis.

Data collection

Data were obtained from the consultation database and the self-administered questionnaire. The consultation database contained date of consultation, self-defined gender (male, female, transgender), year of birth, STIs tested, test results, acceptance of SMS notification [27] and date of return for results. The self-administered questionnaire

included sociodemographic data and sexual behaviors or practices. The questionnaire also included true and false statements to assess the level of knowledge regarding HIV transmission and post-exposure prophylaxis (PEP) [22].

Measures

The outcome variable (i.e. cluster) identified subgroups of the population sharing the same risk-profile pattern based on similarity of risky behavior (the construction of this variable is explained below in the analysis section). The predictors (i.e. variables used to create the cluster, see below) were based on sexual behaviors and practices collected in the questionnaire: self-defined gender (male, female or transgender), self-defined sexual orientation, gender and number of sexual partner(s) during the last 12 months, unprotected sexual intercourse at least once since the last HIV testing or ever, transactional sex, binge drinking, cannabis use and substance use.

Descriptive variables included sociodemographic data, data on uptake of the center's services and knowledge or beliefs regarding HIV transmission routes and prevention. The following sociodemographic data were included in descriptive analyses: gender (male, female, transgender), age at the visit to the center (18–24, 25–34, ≥ 35), birthplace (France, sub-Saharan Africa, other country, do not wish to answer), educational level (under, equal to or lower than high school diploma, other diploma), activity status (employed, student/training, unemployed), financial situation, need of help to read information material (as a proxy for a low level of health literacy [28]), self-perceived health, and forgoing of health care for financial reasons. The following data on uptake of the center's services were included in descriptive analyses: agreeing to receive test results by SMS or failure to return for results at 30 days in the event of positive results.

Analysis

Firstly, sociodemographic data, sexual and prevention practices of the study population were described. To identify patients' profile groups, we then conducted a mixed approach including both a priori and *a posteriori* distribution computed by unsupervised clustering. Because of the universal health coverage provided by the French national health service for low income patients (whatever their nationality), almost everyone is covered by health insurance. The few people without social insurance represent a distinct population with highly specific expected needs [29]. The rarity of not having health insurance in France makes this group both statistically and conceptually distinct. Therefore, they should be treated separately—not classified in the same framework as the insured population but rather described through their unique behaviors (e.g., sexual behavior and substance use). Patients with no health insurance were therefore a priori classified together in a single group.

For patients with health insurance, multiple correspondence analysis (MCA) followed by agglomerative hierarchical clustering (AHC) using Ward's criterion was performed to identify patterns according to risky behaviors related to sex or substance use, that may be associated with high risk of HIV/STI infection [30–35]. Based on the literature and on data available in our center, the following sexual behaviors were included in the MCA: unprotected sexual intercourse (since the last test or ever) [4, 5, 36, 37], number of sexual partners during the previous year [4, 5, 37], transactional sex (providing or receiving gifts or services for sexual relationships) [37, 38], history of sexual violence [37] and sexual orientation based on partner's gender during the previous year. Substance use associated with risky sexual behaviors was also included in the MCA [13, 39, 40]: binge drinking, cannabis use and substance use. All the groups identified were then classified by sociodemographic data, sexual behaviors, substance use, knowledge of HIV prevention and follow-up (notification of results by SMS, failure to return for results).

Percentages were compared using the chi-square test or Fisher's exact test according to theoretical frequencies.

Results

The sociodemographic characteristics of the study population ($n = 5{,}130$) are presented in Table 1 (see also Table S1 for a full description). The patients' median age was 26 years (Q1–Q3: 23–32) and 19% were born outside France. Two-thirds of patients (67%) had an educational level above the high school diploma. Slightly more than one-third were students or in training (36%). Regarding their financial situation, 17% of patients reported that they sometimes lacked money. Almost 8% of patients stated they had no health insurance coverage.

The mixed approach used for classification identified 7 groups of patients (one pre-specified cluster and 6 clusters obtained with AHC) (Fig. 1, see also Figures S1, S2 and S3 for detailed classification). The clusters are described in Tables 2 and 3.

Cluster 1 included patients with **no health insurance** ($n = 405$; 8% of the study population). Compared with the other clusters (Table 2), cluster 1 was characterized by its disadvantaged social profile with the highest proportions of patients who did not have a high school diploma (19%), were unemployed (29%), reported financial difficulties (27%), needed help to read hospital information material (14%) and forewent health care for financial reasons (23%). Cluster 1 also had relatively high proportions of patients who reported transactional sex (12%) and had a history of sexual violence (18%). Only cluster 6 had higher percentages for these two variables. Lastly,

Table 1 Description of the study population ($n = 5,130$)

	n	%
Age (years)		
18–24	1,889	36.8
25–34	2,245	43.8
≥ 35	996	19.4
Birthplace		
France	4,129	80.5
Sub-Saharan Africa	295	5.8
Other country	652	12.7
Do not wish to answer	54	1.1
Educational level		
< High school diploma	437	8.5
High school diploma	1,205	23.5
> High school diploma	3,446	67.2
Other diploma / Other situations	42	0.8
Activity status		
Employed	2,603	50.7
Student/Training	1,834	35.8
Unemployed	693	13.5
Financial situation		
More than enough money	1,580	30.8
Enough money	2,401	46.8
Not always enough money	847	16.5
Do not wish to answer	302	5.9
Health insurance coverage		
Yes	4,725	92.1
No	405	7.9
Need help to read information material*		
No	4,818	93.9
Yes	312	6.1
Self-perceived health		
Very good	1,890	36.8
Good	2,479	48.3
Fair	651	12.7
Bad/very bad	74	1.4
Do not wish to answer	36	0.7
Forgoing of health care for financial reasons		
No	4,379	85.4
Yes	640	12.5
Do not wish to answer	111	2.2

*Proxy for a low level of health literacy [28]

cluster 1 had the second highest proportion of positive STI test results (15%), behind cluster 5 (19%), versus 11% in the overall study population (Table 3). Compared with the other clusters, cluster 1 had elevated HIV (1%), HBV (1%), chlamydia (10%) and gonorrhea positivity rates (7%) (Table S3). Cluster 1 had among the highest proportions of false beliefs on HIV (45%) and lack of knowledge on HIV (11%) and PEP (62%) (Table 3).

Cluster 2 included 13% of the study population ($n = 676$). These patients differed strongly from the other clusters by their low number of sexual partners during the previous year, with 100% of this cluster reporting **one or no partners** whereas 19% of the overall population reported one or no partners. Compared with the other clusters (Table 2), cluster 2 had the highest proportion of students (48%). Patients in cluster 2 were more socially advantaged, with the lowest proportion of financial difficulties (10%) and forgoing of health care (8%). Cluster 2 also had the second lowest proportion of substance use (7%) and the lowest proportions of weekly binge drinking (3%) and positive STI test results (6%) (Table 3). Cluster 2 had one of the highest proportions of false beliefs on HIV (44%) and the highest proportion of lack of knowledge on PEP (68%).

Cluster 3 included 9% of the study population ($n = 449$). Cluster 3 differed strongly from the other clusters by its very high proportion of patients **who did not state their sexual orientation** (97%). Cluster 3 also had the highest proportion of patients who did not wish to answer questions on binge drinking (9%) or number of sexual partners (18%), and the second highest proportion of missing answers on their financial situation (11%). Cluster 2 was in the middle levels for the other variables of Table 2. The proportion of positive STI results in cluster 3 (10%) was very close to that of the overall study population (11%) (Table 3). However, cluster 3 had one of the highest proportions of false beliefs on HIV (44%) and lack of knowledge on PEP (65%).

Cluster 4 included 32% of the study population ($n = 1,653$). It was relatively close to cluster 2 (Table 2). It included a high proportion of **students** (40%) and among the lowest proportions of substance use (2%) and weekly binge drinking (4%). Cluster 4 differed from cluster 2 regarding the number of sexual partners, with a **median of 3 partners** (vs. 1 partner in cluster 2). Lastly, 8% of patients in cluster 4 had positive STI test results vs. 11% in the overall population (Table 3). However, cluster 4 had one of the highest proportions of lack of knowledge on PEP (64%).

Cluster 5 included 13% of the study population ($n = 692$). It differed strongly from the other clusters by its very high proportion of **MSM** (89%). Compared with the other clusters (Table 2), cluster 5 had the highest proportion of patients with more than a high school diploma (75%) and the highest proportion of persons in employment (64%). Cluster 5 had the lowest proportion of unprotected intercourse (46%), the highest number of sexual partners (median 8) and the highest proportion of positive STI test results (19%) (Table 3). Compared with other clusters, cluster 5 had a high positivity rate for syphilis (3%), chlamydia (9%) and gonorrhea (11%) (Table S3). Cluster 5 had among the lowest proportions of false beliefs on HIV (24%), lack of knowledge on HIV (2%) and on PEP (23%).

Cluster 6 included 5% of the study population ($n = 239$). All patients in this cluster reported **transactional sex**

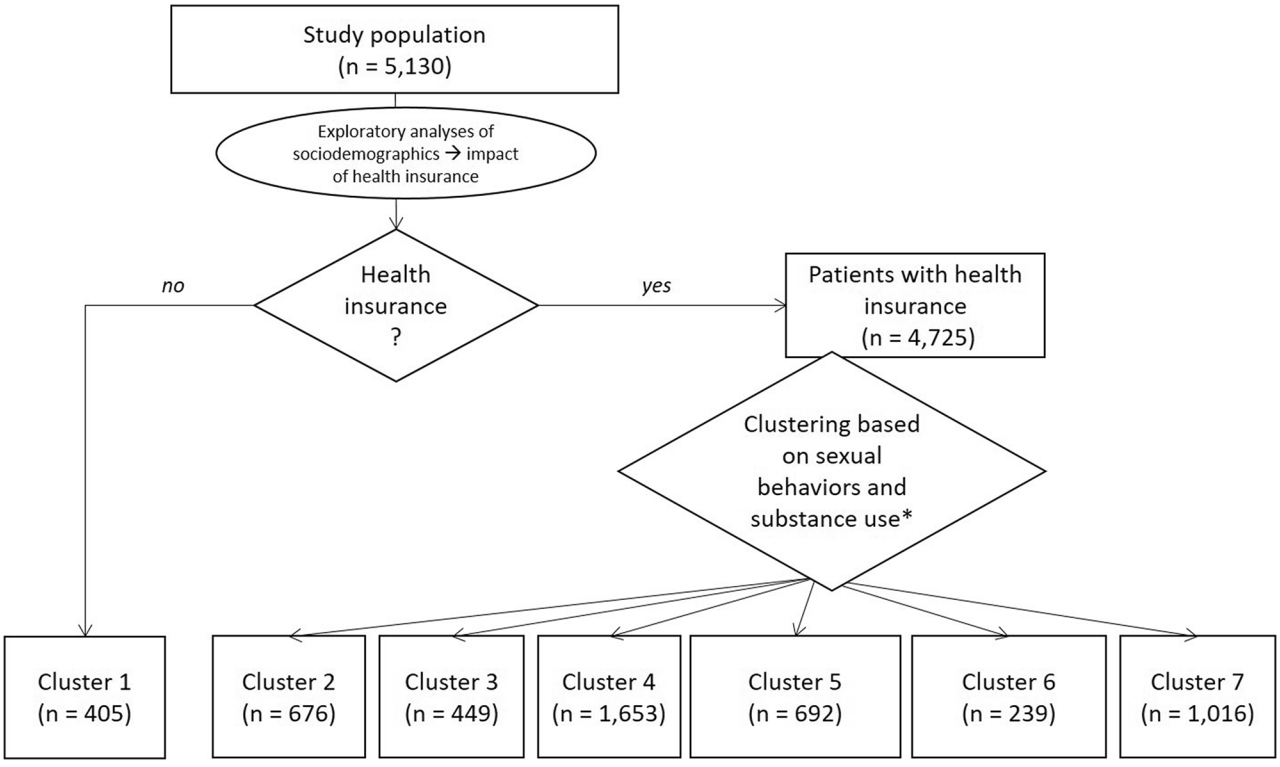

Fig. 1 Study design.
*Based on the literature and the data available in our center, the following behaviors were included in the multiple correspondence analysis: unprotected sexual intercourse (since the last test or ever), number of sexual partners during the previous year, transactional sex during the previous year, history of sexual violence, sexual orientation, binge drinking, cannabis use and substance use

(more than half of patients providing gifts or services for sexual relationships and slightly less than half receiving gifts or services for sexual relationships). Compared with the other clusters (Table 2), cluster 6 had a very high proportion of a history of sexual violence (33%) and of transgender persons and their partners (10%). Cluster 6 had the second highest proportion of patients without a high school diploma and the second highest proportion of financial difficulties (23%). Lastly, cluster 6 had a positive STI test rate of 11% and a high proportion of lack of knowledge on HIV (10%) (Table 3 and S3).

Cluster 7 included 20% of the study population ($n = 1{,}016$). This cluster differed strongly from the other clusters by its very high proportions of **unprotected sexual intercourse** (95%), **substance use** (73%), cannabis use (86%) and weekly binge drinking (57%). It had among the highest proportions of patients with more than a high school diploma (74%). Lastly, cluster 7 had a positive STI test rate of 10% (Table 3).

Discussion

Using hierarchical clustering, 5,130 attendees of a Parisian sexual center were categorized in 7 clusters based on their profiles. Clustering demonstrated that sexual health center attendees are a highly heterogeneous population [41, 42]. Access to free sexual health centers in France is not limited to key populations and not all attendees should be considered as such. Based on the 7 clusters, low and high-risk groups for HIV/STI positivity and patient groups needing increased knowledge and addiction prevention were identified.

Two clusters had high HIV/STI positivity rates (15–19%) corresponding to two very different profiles: cluster 5 included 89% of MSM, whereas cluster 1 included patients with no health insurance who were very socially disadvantaged. Infections differed in these two clusters, with an elevated risk of HIV, HBV, chlamydia and gonorrhea for patients with no health insurance (cluster 1), whereas cluster 5 (MSM) presented with syphilis, chlamydia and gonorrhea. Differences in STI rates according to gender and sexual preferences have already been shown among STI clinic attendees in the Netherlands [6]. Education level and socioeconomic status also seem to be associated with sexual behaviors and attitudes, as reported in the National Surveys of Sexual Attitudes and Lifestyles conducted in Britain [43]. This is coherent with differences within our cluster in terms of sexual behaviors and thus STI, based on their different educational and social level. Besides, a recent work on STI clinic attendees in the Netherlands has also underlined how

Table 2 Description of clusters

Patient characteristics *	Total		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	
	N = 5,130 n %		*n* = 405 %	*n* = 676 %	*n* = 449 %	*n* = 1,653 %	*n* = 692 %	*n* = 239 %	*n* = 1,016 %	*p*
Median age (Q1–Q3)	*26*	*(23–32)*	27 (22–31)	25 (21–31)	26 (23–32)	26 (22–32)	31 (25–40)	29 (25–37)	26 (23–30)	
Diploma										< 0.001
< High school diploma	*437*	*8.5*	19.0	7.0	10.7	7.1	7.2	15.1	6.0	
High school diploma	*1,205*	*23.5*	29.1	30.6	20.5	25.5	16.8	20.5	19.8	
> High school diploma	*3,446*	*67.2*	49.1	61.8	67.2	66.9	75.4	61.5	74.0	
Activity status										< 0.001
Employed	*2,603*	*50.7*	37.5	44.1	50.6	49.1	64.0	57.7	52.5	
Student/Training	*1,834*	*35.8*	33.6	48.1	33.4	40.2	22.8	21.8	34.3	
Unemployed	*693*	*13.5*	28.9	7.8	16.0	10.7	13.2	20.5	13.3	
Financial situation										< 0.001
Not always enough money	*847*	*16.5*	27.4	9.5	15.1	15.5	13.9	23.4	19.3	
Do not wish to answer	*302*	*5.9*	16.5	4.9	11.1	4.7	3.6	10.9	2.3	
Need help to read hospital materials	*312*	*6.1*	14.1	7.7	5.8	4.7	5.5	6.7	4.5	< 0.001
Self-perceived health										< 0.001
Quite good/fair	*651*	*12.7*	17.0	10.2	14.0	12.3	12.3	18.8	11.4	
Bad/ very bad	*74*	*1.4*	4.7	1.0	1.8	0.7	0.7	4.2	1.4	
Forgoing of health care	*640*	*12.5*	23.2	7.5	12.3	10.2	10.8	17.2	15.3	< 0.001
Substance use§	*1,175*	*22.9*	23.0	6.8	16.9	2.4	16.8	26.4	73.0	< 0.001
Cannabis use	*2,196*	*42.8*	45.2	30.6	34.7	29.5	28.3	38.5	86.0	< 0.001
Binge drinking										< 0.001
No binge	*1,507*	*29.4*	28.6	41.3	37.2	38.1	31.5	30.5	2.4	
Weekly binge	*898*	*17.5*	20.0	3.3	13.4	4.2	8.0	13.4	56.8	
Do not wish to answer	*154*	*3.0*	7.2	1.8	9.1	1.3	1.6	11.7	1.2	
Sexual orientation										< 0.001
MSM	*946*	*18.4*	19.0	5.9	0.0	3.6	88.9	22.6	9.9	
WSM	*1,624*	*31.7*	27.9	46.5	0	48.0	2.5	13.4	34.8	
MSW (exclusively)	*1,901*	*37.1*	39.3	46.6	0	46.4	6.1	34.3	52.8	
WSW (exclusively)	*34*	*0.7*	0.5	0.9	1.1	0.4	0.7	1.3	0.6	
DNW to be defined by sexuality/to answer	*521*	*10.2*	9.9	0.0	97.1	0.0	0. 0	18.8	0.0	
(Partners of) transgender persons	*104*	*2.0*	3.5	0.2	1.8	1.6	1.9	9.6	1.9	
Unprotected sexual intercourse at least once	*4,050*	*79.0*	81.7	75.4	73.7	85.8	45.8	73.6	95.2	< 0.001
Median number of sexual partners (Q1–Q3)	*4*	*(2–6)*	4 (2–8)	1(1–1)	2(1–5)	3 (2–4)	8(5–15)	6(3–12)	6(3–8)	< 0.001
Missing number of sexual partners	*126*	*2.5*	4.9	0.0	17.8	0.0	0.0	10.9	0.0	< 0.001
Transactional sex	*288*	*5.6*	12.1	0.0	0.0	0.0	0.0	100.0	0.0	< 0.001
History of sexual violence	*626*	*12.2*	18.3	7.7	7.6	11.7	6.4	33.1	14.8	< 0.001

*Not all categories are presented; § Substance = cocaine and other psychoactive substances (except alcohol); DNW = do not wish; WSM, women who have sex with men; MSW, men who have sex with women; WSW, women who have sex with women

lower educational levels were independent determinants of STI, which is highly coherent with the findings in our own cluster [44]. Preventive actions against HIV/STI targeting these two groups of patients require very different pathways, as they had opposite knowledge profiles: cluster 5 (MSM) had the highest level of knowledge whereas cluster 1 with (patients without health insurance) had the lowest level.

Two clusters had an HIV/STI positivity rate nearly identical to the overall study population (10–11% vs. 11%), but they could benefit from preventive actions since cluster 6 (patients having transactional sex) had a low level of knowledge on HIV (10%) and cluster 7 included patients with several indicators of risky sexual behavior and substance use. The profile of patients in cluster 7 was consistent with previous studies that highlighted how high-risk sexual behavior is associated with substance use. This finding confirmed that both these factors should be taken into account when addressing HIV/STI risk [13, 40].

Based on our findings, one approach to prevention would be to improve information on HIV transmission

Table 3 Knowledge, HIV/STI positivity rates and communication of STI results according to clusters

	Total		Cluster 1	Cluster 2	Cluster 3	Cluster 4	Cluster 5	Cluster 6	Cluster 7	*p*
	N **= 5,130** **n %**		***n*** **= 405** **%**	***n*** **= 676** **%**	***n*** **= 449** **%**	***n*** **= 1,653** **%**	***n*** **= 692** **%**	***n*** **= 239** **%**	***n*** **= 1,016** **%**	
Knowledge										
False beliefs on HIV*	*1,966*	38.3	44.7	44.4	43.9	38.6	24.1	35.2	39.3	< 0.001
Lack of knowledge on HIV**	*201*	3.9	11.4	4.0	5.9	3.1	1.9	9.6	1.5	< 0.001
Lack of knowledge on PEP***	*2918*	56.9	61.7	67.8	65.3	63.9	22.8	49.8	57.4	< 0.001
Positivity rates - all STI	*539*	10.5	15.1	5.6	9.6	8.2	19.4	11.3	9.8	< 0.001
Communication of STI results										
FTR at 30 days******	*102*	2.0	3.7	0.7	2.9	1.6	2.3	5.0	1.5	< 0.001
SMS notification of results										< 0.001
Not offered	*11*	2.3	5.9	1.5	3.12	1.81	2.9	2.9	1.4	
Accepted	*4797*	93.5	87.9	95.1	92.9	94.8	90.8	89.1	95.7	
Declined	*215*	4.2	6.2	3.4	4.01	3.4	6.4	8.0	3.0	

* False beliefs regarding HIV were assessed by incorrect answers to three questions related to false HIV transmission routes: sharing a drink with an infected person, kissing an infected person, and using public toilets

** Knowledge was assessed by correct answers to two questions related to true HIV transmission routes: having unprotected sexual intercourse and sharing used needles

*** Lack of knowledge on PEP = regarding urgent delivery

**** FTR: Failure to return for results

and treatment (as well as PEP and PrEP). The strong community involvement of MSM may partly explain the high level of knowledge regarding PEP in cluster 5, but knowledge of PEP needs to be improved in all other clusters. PrEP campaigns already target MSM but PrEP indications should be extended on a larger scale [45, 46]. Patients with high risk of both substance use and risky sexual behavior (cluster 7) and patients with no health insurance (cluster 1) could benefit from PrEP. However, awareness of PrEP remains low among the at-risk heterosexual population [47]. Moreover, the higher rate of failure to return for results at 30 days observed among patients with no health insurance (cluster 1) needs to be specifically addressed to limit loss of follow-up in this high-risk group of socially disadvantaged patients.

Strengths and limitations

Our study was conducted on a large sample of patients ($n = 5{,}130$) in the setting of a free sexual health center and the participation rate was high (71%). However, attendees who did not understand written French and were not able to use a computer were not included. This may cause a selection bias, especially in cluster 1 since our sexual health center provides free sexual testing that targets solutions for people without health insurance. Besides, among the eligible population, some patients (29%) refused to complete the questionnaire and we cannot rule out a possible selection bias. To discuss this bias, all non-participants were compared with participants concerning their profile and STI rate. Compared with participants (data not shown), non-participants were older (mean age 36 vs. 29 years, $p < 0.001$), the majority were men (70% vs. 64%, $p < 0.001$) and were more likely to have positive test results for HBV, HCV, HIV ($p < 0.001$) and syphilis ($p = 0.002$). However, we found no significant difference for chlamydia ($p = 0.663$) and gonorrhea ($p = 0.054$). In the future, the questionnaire may be translated and validated in other languages to be able to include more diverse participants. Besides, the use of a self-administered computerized questionnaire to collect data carried the risk of misunderstanding of some questions. However, self-administration and anonymity also limit social desirability bias, especially since patients are informed that the doctor who will see them does not have access to their answers [48]. A potential limitation in our study is that gender at birth was not available. Patients were asked to give their own definition of their gender. This approach seems more inclusive and is consistent with the possibility for anonymous screening, but it does not allow identification of sex at birth.

Most previous studies conducted in sexual health centers have explored the association between STI risk and various sociobehavioral factors, but did not take a multidimensional approach [44, 49–51]. In our study, we adopted a mixed approach that enabled the inclusion of a subgroup of patients with specific characteristics ($n = 405$) which was not comparable with the other groups (Table S2). This choice was coherent with the associations reported between socioeconomic disadvantage/deprivation and risky sexual practices [17, 52]. Lastly, the availability of data on uptake of the center's services, such as agreeing to receive test results by SMS or failure to return for results at 30 days in the event of positive results, allowed us to compare profiles

and provide avenues for improving patients' follow-up according to their profiles. However, no detailed information regarding condom use was available.

Conclusion

Patients consulting in a free sexual health center are not a homogeneous population. They are a combination of high and low-risk groups in relation to HIV/STI. Our findings demonstrate the importance of adapting the organization of the center (care, prevention, organization of consultations, communication of test results) to its attendees' special needs. As sexual health care develops toward a more integrative perspective (going beyond screening and treatment of STI), the key-population approach needs to be completed by taking into account other factors that may impact sexual health.

Abbreviations

HBV	Hepatitis B virus
HCV	Hepatitis C virus
HIV	Human immunodeficiency virus
IDU	Injection drug users
MSM	Men who have sex with men
PEP	Post-exposure prophylaxis
PrEP	Pre-exposure prophylaxis
STI	Sexually transmitted infections
UNAIDS	United Nations Programme on HIV/AIDS
WHO	World Health Organization

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12889-025-21881-7.

Supplementary Material 1: Characteristics of the study population

Supplementary Material 2: Characteristics of the study population according to health insurance coverage

Supplementary Material 3: HIV/STI positivity rates according to cluster

Supplementary Material 4: Representation of variables: two-dimensional MCA plot. Correlations between the variables

Supplementary Material 5: Representation of modalities: graph of MCA modalities

Supplementary Material 6: Dendrogram

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Author contributions

MH designed the study, conducted data analysis, interpretation of data and drafted the manuscript. EM designed the study, participated in data analysis and reviewed the manuscript. CS participated in interpretation of data and reviewed the manuscript. ELR designed the study, participated in interpretation of data and writing, and reviewed the manuscript. PT designed the study, participated in analysis, interpretation of data and writing, and reviewed the manuscript. All authors read and approved the final manuscript.

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Data availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study is based on anonymized patients' medical data, including a self-administered questionnaire used in routine care. Completion of the self-administered questionnaire was proposed only to patients who understood written French, by the reception agent (verbal information) before the consultation. Patients were informed that completion of the self-administered questionnaire was optional and that non-participation would not affect care. Moreover, patients were informed by poster in the center and on the welcome page of the self-administered questionnaire of their right to object to the use of their data for research purposes (written information). This procedure complies with French law, as observational studies conducted on previously collected data require individual information and absence of patient objection (no explicit consent is required). Use of these data for research received institutional review board approval from the French Data Protection Authority (authorization CNIL no. 2005208 v0). The Comité d'Evaluation de l'Ethique des Projets de Recherche Biomédicale (CEERB) Paris Nord (Institutional Review Board -IRB 00006477- of HUPNVS, Paris 7 University, AP-HP), reviewed and approved the research project (N° CER-2021-116). This procedure complies with the European General Data Protection Regulation and this study has been declared to the AP-HP (Paris hospitals) Data Protection Office (no. 20210504154833).

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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