

ORIGINAL ARTICLE

High HIV incidence among men who have sex with men attending a community-based voluntary counselling and testing service in Barcelona, Spain: results from the ITACA cohort

Laia Ferrer,^{1,2,3} Eva Loureiro,^{1,2,3} Michael Meulbroek,⁴ Cinta Folch,^{1,2,3,5} Felix Perez,⁴ Anna Esteve,^{1,2,3,5} Jorge Saz,⁴ Hector Taboada,⁴ Ferran Pujol,⁴ Jordi Casabona^{1,2,3,5}

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¹Center for Epidemiological Studies on STI and AIDS of Catalonia (CEEISCAT), Agencia de Salut Publica de Catalunya (ASPC), Generalitat de Catalunya, Badalona, Spain

²Institut d'Investigacio Germans Trias i Pujol (IGTP), Badalona, Spain

³CIBER Epidemiologia y Salud Publica (CIBERESP), Madrid, Spain

⁴Projecte dels Noms-Hispanosida, BCN Checkpoint, Barcelona, Spain

⁵Department of Pediatrics, Obstetrics and Gynecology, and Preventive Medicine, Universitat Autònoma de Barcelona (UAB), Bellaterra (Cerdanyola), Spain

Correspondence to

Dr Jordi Casabona, Centre for Epidemiological Studies on STI and AIDS of Catalonia (CEEISCAT), Hospital Universitari Germans Trias i Pujol, Ctra de Canyet s/n, Badalona 08916, Spain; jcasabona@iconcologia.net

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ABSTRACT

Objectives To identify the HIV incidence and its associated factors (AFs) of the ITACA, a community-based cohort of HIV-negative men who have sex with men (MSM) established in Barcelona, Spain from 2008 to 2011.

Methods Participants were men aged 18 years or older, having a negative HIV test result at baseline and agreeing to participate. Bio-behavioural data were collected by peers in each visit. HIV incidence rates using person-time measures and 95% CIs were calculated. Cox logistic regression models were used to identify AFs to seroconversion.

Results Over the period, 3544 participants with at least one follow-up visit or those who had a first visit no longer than a year prior to the date of data censoring were included in the analysis contributing 3567.09 person-year (p-y) and 85 MSM seroconverted for an overall HIV incidence of 2.4 per 100 p-y (95% CI 1.9 to 2.9) ranging from 1.21/100 (2009) to 3.1/100 p-y (2011). Independent AF included: foreign origin, having more than five HIV tests at baseline, reporting in the preceding 6 months the following: condomless anal sex with the last steady partner of unknown serostatus, more than 10 casual partners, condomless anal sex with casual partner, self-reported gonorrhoea and entered in the cohort in 2010 or 2011.

Conclusions The ITACA cohort revealed a high and increasing HIV incidence among MSM, especially important among foreign-born men. The findings underscore the need to implement multilevel interventions for MSM taking into account different types of partners, cultural origins and the exposure to other sexually transmitted infections.

INTRODUCTION

HIV infection remains an important public health challenge in Europe (UE/EEA) with a new diagnosis rate of 5.8 per 100 000 inhabitants in 2012, being especially high in men who have sex with men (MSM).¹ In Spain, as in most Western European countries, it is the most affected group, accounting for 51% of 3210 new HIV cases in 2012. Since 2007, the number of HIV diagnoses in MSM has increased by 11%.² Catalonia is the region of Spain with the third highest proportion of new cases reported among MSM (60.7% in 2012).²

An increasing trend in the prevalence of HIV in MSM has been observed at both national and regional levels.^{3–5} In Catalonia, where bio-behavioural monitoring has been in place since 1993, HIV prevalence in MSM has risen from 14.2% in 1993 to 20.4% in 2008.⁴ Although increases in prevalence reflect improved survival due to the use of antiretroviral therapy, incidence of HIV in MSM may also be rising. Indirect evidence for rising incidence includes an observed increase in anal intercourse without condoms⁵ leading to persistently high HIV exposure, as well as increases in sexually transmitted infection (STI) rates,⁶ including hepatitis C virus and lymphogranuloma venereum outbreaks.^{7–8} Nevertheless, incidence data derived from longitudinal studies are still scarce and vary substantially across regions. Recent data from the Amsterdam Cohort Study (ACS) of MSM reports an HIV incidence rate of 2.0/100 person-years (p-y),⁹ similar to that reported by the Explore study in the USA of 2.1/100 p-y.¹⁰ In Canada, the Omega cohort observed an incidence rate of 0.6/100 p-y¹¹ and in Australia incidence was reported to be 0.9/100 p-y.¹² In Spain, HIV incidence rates among MSM range from 2.2 to 6.7/100 p-y but these estimations are based primarily on clinical settings or are derived from studies with small sample sizes or specific subpopulations.^{13–16}

Reported risk factors for HIV seroconversion are consistent across all cohorts and include concomitant STI, surrogates of sexual exposure like condomless anal sex and number of partners, as well as structural factors like social networks and access to health services.^{9–10,17}

A significant proportion of HIV-infected MSM in Europe are unaware of their infection and there is evidence that undiagnosed HIV disproportionately contributes to the spread of the epidemic.¹⁸ HIV counselling and testing services and programmes are central to the strategy of decreasing the percentage of HIV-positive individuals who are unaware of their infection, linking newly diagnosed individuals into the health systems and providing treatment.¹⁹ Moreover, community-based voluntary counselling and testing services (CBVCTs), when tailored to specific target populations and local context are very effective at increasing testing uptake, early HIV diagnosis and treatment.²⁰

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BCN Checkpoint is a CBVCT for MSM, set up in 2006 in Barcelona's homosexual district.²¹ In 2008, BCN Checkpoint and the Center for Epidemiological Studies on Sexually Transmitted Diseases and HIV/AIDS of Catalonia (CEEISCAT)⁴ designed and implemented, as part of the integrated HIV/STI surveillance system in Catalonia, a collaborative opportunistic cohort of MSM attending the CBVCT service, the ITACA cohort. We aim to estimate the HIV incidence rates from December 2008 to December 2011 and identify factors associated with seroconversion in HIV-negative MSM participating in the ITACA cohort.

METHODS

Study population and procedures

ITACA is an open, prospective cohort study, started in 2008, of HIV-negative MSM attending the BCN Checkpoint community-based service.

From December 2008, all MSM who approached BCN Checkpoint for an HIV test were invited to participate in the study if they met the inclusion criteria, having a negative HIV test result at baseline, being 18 years or older and agreeing to participate. Information about the study was given to the participants and written informed consent was obtained.

Following current guidelines,²² participants were asked to return for HIV testing either annually or six monthly, according to exposure risk. The most vulnerable participants, such as sex workers, were recommended to have an HIV test every 3–4 months. Men who could have been in the window period at baseline were advised to be tested again within 3 months. To minimise loss to follow-up, the BCN Checkpoint team called participants after a year since their last visit.

At each visit, all participants were offered peer counselling and rapid HIV and syphilis tests. Before knowing tests results, a trained peer of BCN Checkpoint completed a structured questionnaire collecting epidemiological and behavioural data which were used by peer to discuss specific aspects during counselling.

Rapid tests were used to detect antibodies to both HIV (Determine HIV-1/2 Ag Ab combo, Abbott Laboratories, Abbott Park, Illinois, USA) and syphilis (Determine Rapid Syphilis TP). HIV seroconversion was defined when a reactive rapid test in a participant with a previous HIV-negative test was confirmed by current local standard procedures (an ELISA followed by a western blot or by a PCR test in high-risk clients). After confirmation of a positive result, the person was proactively referred for medical follow-up at a specialist local HIV unit. Simultaneously, emotional and practical support was provided to the person to help them cope with their new situation.

BCN Checkpoint assigned a unique study code to each participant dissociated from all personal data in order to assure study anonymity. The ITACA cohort study was approved by the ethics committee of the Germans Trias i Pujol University Hospital.

For the purpose of this study, we analysed data from participants in the ITACA cohort who enrolled between December 2008 and December 2011 and who had at least one follow-up visit or participants with a single visit and <1 year from that visit to the point of administrative censoring.

Questionnaire

We designed a structured questionnaire to collect baseline information on sociodemographic characteristics, HIV-testing practices, sexual behaviour by type of partner (steady and casual), self-reported drugs use and STI diagnoses. Respondents were asked to recall behaviours for the previous 6 months. *Steady partner* was defined as someone you know for, at least, 2 months ago whom you have a commitment and have sex

regularly, not necessarily exclusive and *casual partner* was defined as a night or occasional contact with whom you have sex seldom. *Intensive drug use* was defined by self-reported use of at least one drug always or almost always during or before sex over the last 6 months. The questionnaire was piloted for comprehension with a group of MSM. A simplified version of the questionnaire, excluding redundant questions from the baseline, was used in follow-up visits.

Statistical analysis

Participant follow-up started on the date of the first visit and ended at (1) on the date of HIV seroconversion, (2) the date of the last HIV-negative visit or (3) the date of the administrative censoring (December 2011), when the time between censoring date and the baseline visit was no longer than a year. HIV incidence rates were estimated as the number of HIV seroconversions (a first positive HIV test after a previous negative HIV test at a previous visit) divided by p-y of follow-up. Ninety five per cent CIs were calculated for incidence rates.

To identify factors associated with HIV seroconversion, we used epidemiological and behavioural information reported at the last follow-up visit. For clients considered to be within the window period at the time of testing, data reported in the previous follow-up visit was included in the analysis. Cox regression models were performed and HRs and their 95% CIs were computed. The model-building strategy was to consider all statistically significant univariate associations at the 0.05 level as potential risk factors for the multivariable model.

RESULTS

Eighty five per cent of MSM who attended BCN Checkpoint for an HIV test during the study period and met the inclusion criteria agreed to participate in the ITACA cohort (5086/5983). Of these, 3544 (69.7%) participants were included in the current analysis and contributed a total of 3567.09 p-y of follow-up. Most had at least one follow-up visit (2248) and the remainder (1296) had a first visit no longer than a year prior to the date of data censoring. The main characteristics of the participants in the current analysis are shown in [table 1](#). The mean age at study entry was 33.2 years, 57.1% of participants had higher education and 74% were employed. Almost all men were self-identified as homosexual (89.4%) followed by 10.4% as bisexuals and 0.2% as heterosexuals or do not know/other. Most participants were born in Spain (66.6%) and, among foreign-born, the largest group was from Latin America (57.8%). The median number of follow-up visits was 1 (IQR=0–1) and the median time to follow-up was 11 months (IQR: 5.8–16.7). The median number of follow-up visits was 1 (IQR=0–1) and the median time to follow-up was 11 months (IQR: 5.8–16.7).

HIV incidence

During the study period, 85 seroconverters were identified giving an overall HIV incidence rate of 2.4/100 p-y (95% CI 1.9 to 2.9). Incidence was observed to increase significantly from 1.2/100 p-y in 2009 to 3.1 in 2011 ([figure 1](#)). The median time to seroconversion was 12.7 months (IQR=8.4–20.8).

HIV incidence was two times higher in foreign-born MSM (3.7/100 p-y; 95% CI 2.7 to 4.8) as compared with Spanish-born MSM (1.7/100 p-y; 95% CI 1.7 to 2.2). Although there was a significant incidence increase in Spanish-born MSM, this was not observed in foreign-born men ([figure 1](#)). No differences in HIV incidence were found between men older than 24 (2.6/100 p-y; 95% CI 1.3 to 4.0) and those younger (2.3/100 p-y; 95% CI 1.8 to 2.9).

Table 1 Description of the participants in the ITACA cohort of HIV-negative men who have sex with men recruited in a community-based voluntary counselling and testing service in Barcelona included in the current analysis (N=3544)*

Years of enrolment	2009–2011†	2009‡	2010	2011
Number of participants include in the analysis*	3544	1259	781	1504
Mean age at baseline, years (SD)	32.7 (8.8)	33.2 (8.5)	32.1 (8.5)	32.6 (9.2)
Spanish-born (%)	66.6	65.3	65.7	68.1
Higher education (%)	57.1	57.8	57.5	56.3
Homosexual	89.4	92.9	90	86.1
Employed	74.0	78.1	72.3	71.3
Number of seroconverters	85			
Person-years of follow-up	3567.09			
Median number of follow-up visits (IQR)	1 (0–1)			
Median time of follow-up, months (IQR)	11 (5.8–16.7)			
Median time between visits, months (IQR)‡	9.3 (4.8–12.3)			
Median time to seroconversion, months (IQR)§	12.7 (8.4–20.8)			

December 2008–December 2011.

*Includes men with over two visits or those with a single visit and <1 year from that visit to the point of administrative censoring (31/12/2011).

†It includes data from December 2008.

‡Among men who report over two visits.

§Among 85 seroconverters during the study period.

Factors associated with HIV seroconversion

In the univariate analysis among cases with a questionnaire at the last follow-up visit (2230; 43.8%), a number of factors were found to be associated with HIV seroconversion (table 2). Men who were not born in Spain (HR=2.37), less educated (HR=2.80) or unemployed (HR=1.68) were more likely to become HIV infected. Seroconverters were more likely to have had more than five HIV tests before entering the cohort (HR=3.01). Also more likely to be infected were: men who reported condomless anal sex with their last steady partners of unknown serostatus (HR=5.85), men with more than 10 casual partners (HR=3.33), those who reported condomless anal sex with casual partners in the preceding 6 months (HR=2.72) as well as those contacting their casual partners through the internet (HR=1.76). A history of syphilis (HR=5.82), gonorrhoea

(HR=5.85) or intensive drugs use in the preceding 6 months (HR=2.50) were also associated with HIV seroconversion as was being enrolled in either 2010 (HR=2.88) or 2011 (HR=7.99).

In the multivariate analysis (table 2), the only demographic variable, after controlling by age, that remained associated with seroconversion was being foreign-born (HRa=1.98, 95% CI 1.19 to 3.31). Men who had had more than five HIV tests before enrolment were more than twice as likely to become infected (HRa=2.64, 95% CI 1.14 to 6.11). Men who reported condomless anal sex with their last steady partner of unknown serostatus (HRa=6.94, 95% CI 3.56 to 13.51), those who reported more than 10 casual partners (HRa=2.20, 95% CI 1.02 to 4.72), those who had condomless anal sex with casual partners (HRa=2.21, 95% CI 1.27 to 3.84) and those who

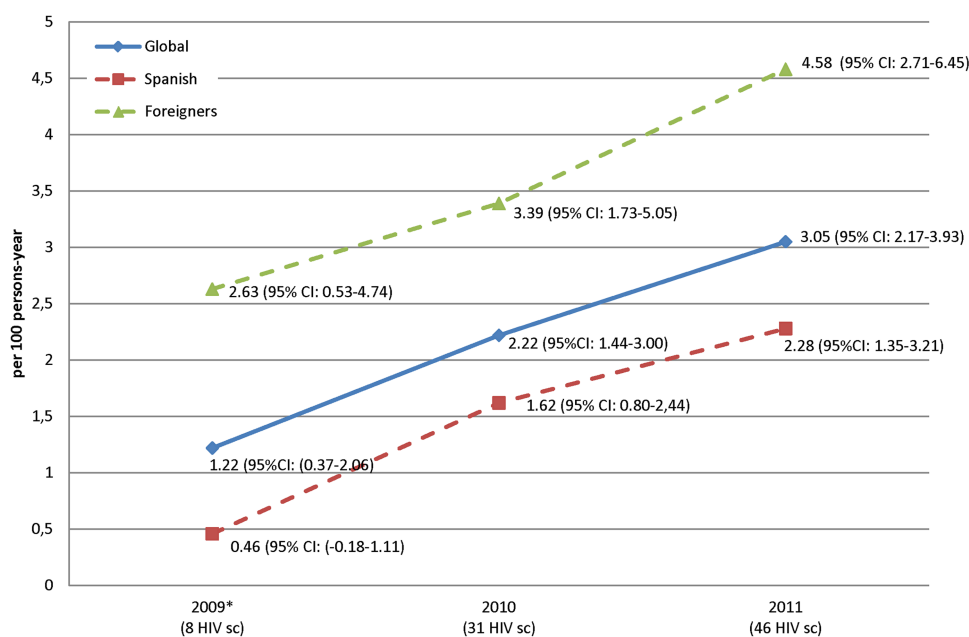
**Figure 1** Trends in HIV incidence rates among men who have sex with men by origin. The ITACA cohort (December 2008–December 2011). *It includes data from December 2008.

Table 2 Univariate and multivariate Cox regression models: factors associated with HIV seroconversion among men who have sex with men participating in the ITACA cohort with at least one follow-up visit (December 2008–December 2011)*

	HIV sc % (n/N)	p-y	HR (95% CI)	p Value	HRa (95% CI)†	p Value
<i>Sociodemographics</i>						
<i>Age</i>						
≤24	11/344	398.1	Ref		Ref	
25+	55/1884	2496.2	0.76 (0.40 to 1.46)	0.41	0.62 (0.30 to 1.29)	0.20
<i>Origin</i>						
Spanish-born	30/1460	1909.8	Ref		Ref	
Foreign-born	36/769	984.8	2.37 (1.46 to 3.85)	<0.001	1.98 (1.19 to 3.31)	0.01
<i>Education level</i>						
Low	8/123	152.2	2.80 (1.29 to 6.07)		–	–
Middle	26/820	1043	1.31 (0.78 to 2.19)		–	–
High	32/1284	1697.3	Ref			
<i>Occupation (employed)</i>						
Yes	45/1679	2230.8	Ref			
No‡	21/546	659.5	1.68 (1.00 to 2.82)	0.05	–	–
<i>Sexual orientation (homosexual)</i>						
Yes	61/2023	2663	Ref			
No	5/187	209.5	1.16 (0.47 to 2.91)	0.75		
<i>HIV testing</i>						
<i>Previous HIV test at baseline</i>						
0–1	8/525	648.4	Ref	0.001	Ref	0.01
2–5	22/975	1300.3	1.34 (0.60 to 3.01)		1.16 (0.50 to 2.67)	
>5	35/692	909.7	3.01 (1.40 to 6.50)		2.64 (1.14 to 6.11)	
<i>Sexual behaviour</i>						
<i>Condomless anal sex with the last steady male partner with the following HIV status</i>				<0.001		<0.001
HIV+	2/53	68.3	1.62 (0.40 to 6.67)		2 (0.48 to 8.35)	
Unknown	12/95	114.1	5.85 (3.11 to 11.00)		6.94 (3.56 to 13.51)	
HIV–/other§	50/2065	2696.3	Ref		Ref	
<i>Number of casual partner</i>				<0.001		0.02
0–1	13/636	791	Ref		Ref	
2–5	18/747	964.6	1.12 (0.55 to 2.29)		1.08 (0.50 to 2.33)	
6–10	7/368	497.4	0.82 (0.33 to 2.05)		0.70 (0.26 to 1.87)	
>10	27/350	472.2	3.33 (1.71 to 6.46)		2.20 (1.02 to 4.72)	
<i>Condomless anal sex with casual partner</i>				<0.001		0.01
Yes	29/506	655	2.72 (1.67 to 4.44)		2.21 (1.27 to 3.84)	
No¶	36/1703	2219.7	Ref		Ref	
<i>Contact with casual partner by Internet</i>				0.03		–
Yes	43/1121	1490.7	1.76 (1.05 to 2.95)		–	–
No	22/1088	1382.3	Ref			
<i>Intensive drug use**</i>				0.01		–
Yes	9/129	181.3	2.50 (1.23 to 5.09)		–	–
No	53/2070	2673.5	Ref			
<i>Self-reported STI</i>						
<i>Syphilis</i>						
Yes	2/20	19	5.82 (1.42 to 23.85)	0.01	–	
No	62/2192	2857.4	Ref			
<i>Gonorrhoea</i>						
Yes	7/44	60.1	5.85 (2.70 to 12.88)	<0.001	3.52 (1.45 to 8.53)	0.01
No	57/2168	2816.2	Ref		Ref	
<i>Anogenital warts</i>						
Yes	2/39	52.8	1.86 (0.45 to 7.60)	0.39		
No	62/2173	2823.5	Ref			
<i>Date of enrolment</i>						
<i>Calendar years</i>				<0.001		<0.001
2009††	40/1246	2055.5	Ref		Ref	
2010	23/776	753.4	2.88 (1.56 to 5.31)		3.27 (1.71 to 6.28)	
2011	3/207	85.7	7.99 (2.22 to 28.80)		6.31 (1.68 to 23.69)	

*Nineteen participants were excluded from the analysis because the questionnaire at time of the seroconversion follow-up visit was not collected.

†Adjusted model by age.

‡Included student, pensioner, sexual worker, retired, other.

§Consistent use of condom, non-steady partner, not to have penetrated.

¶Consistent use of condom, non-casual partner, not to have penetrated.

**Intensive drug use was defined as the use of at least one drug always or almost always during or before sex over the last 6 months.

††It includes data from December 2008.

HIV sc, HIV seroconverters; STI, sexually transmitted infection.

reported gonorrhoea (HRa=3.52, 95% CI 1.45 to 8.53) in the preceding 6 months were more likely to become HIV infected. Finally, men enrolled in 2010 (HRa=3.27, 95% CI 1.71 to 6.28) and in 2011 (HRa=6.31, 95% CI 1.68 to 23.69) were also more likely to become infected.

DISCUSSION

HIV incidence in the ITACA cohort was 2.4/100 p-y for the period 2008–2011, similar to other estimates for the Spanish MSM population derived from clinical settings.^{13–15} This observed HIV incidence rate is slightly higher than that reported in other cohorts in Western Europe and USA,^{9 10 23} much higher than those from Canadian and Australian cohorts,^{11 12} but lower than estimate from two recent Latin American cohorts.^{24 25} The high incidence rate found in the ITACA cohort is consistent with HIV surveillance data, showing that HIV reporting rates in our setting are higher than the European average.^{1 4} Moreover, finding an incidence rate similar to that found in STI clinics suggests that BCN Checkpoint is reaching an MSM population at risk of HIV infection. In 2011, the number of HIV-positive MSM diagnosed in BCN Checkpoint was 19.7% of the total number of HIV infections reported to the notifiable Disease Reporting System in Catalonia during the same year.

In contrast to data from the ACS and Sydney cohorts which reported non-significant changes in HIV incidence rates among MSM between 1996 and 2009⁹ and 2002 and 2006, respectively,¹² our data showed an increase in HIV incidence from 2009 to 2011. This is worrisome because it suggests an increase in the HIV exposure among MSM in our setting as well as a failure of current local prevention strategies.

The significant proportion of seroconverters who reported having had gonorrhoea in the previous 6 months is consistent with the results found in similar settings.^{9 11} In Catalonia, reported cases of syphilis and gonorrhoea increased between 2008 and 2011 with MSM having the highest proportion of cases.⁴ Given the well-known synergistic effect between STIs and HIV, our data reinforce the urgent need to increase the effectiveness of STI prevention programmes aimed at this population, including systematic screening in both health and non-health settings. As in other European countries, migrants in Catalonia account for almost half of new HIV diagnoses.⁴ It is therefore not surprising that the HIV incidence rate among foreign-born MSM was twice that of local MSM. Since most migrants in Catalonia come from regions of low HIV prevalence like Latin America and North Africa, most HIV infections among migrants are probably acquired locally as has been suggested by a local study of recent infections.²⁶ In the ITACA cohort, the high incidence in foreign-born MSM mainly most of whom come from Latin America highlighting their vulnerability to HIV. Moreover, the current economic crisis and the involvement of some MSM in sex work may also contribute to increased vulnerability.

As extensively reported elsewhere,^{5 9 10 24 27} a larger number of casual partners and condomless anal sex are factors independently associated with HIV acquisition. Nevertheless, as condomless anal sex with steady partner of unknown serostatus also appears to be associated with seroconversion, HIV transmission may be driven by casual partners and steady partners when there are not a previous negotiate safety discussion with them, reinforcing the need to increase testing uptake and frequency among MSM irrespective of partner type and to systematically offer treatment as prevention to discordant couples.²⁸

Finally, since enrolment date appeared to be an independent factor associated with seroconversion, the risk of seroconversion may have grown in more recent years.

Our results confirm the complexity of the circumstances leading to the acquisition of HIV by MSM. In consequence, combination prevention should be considered which comprises biomedical interventions—including condom promotion, treatment as prevention among discordant couples and, eventually, the use of pre-exposure prophylaxis among the most exposed HIV-negative MSM—behavioural interventions—including risk reduction sexual strategies—as well as structural interventions such as ensuring access to care for migrants and efforts to decrease homophobia.^{5 28–30}

The study has some limitations. First, the study population consists of participants who have voluntarily approached BCN Checkpoint for an HIV test and is therefore not representative of MSM as a whole, but rather represents a highly sexually active population with a high perception of risk. Nevertheless, sexual exposure in the cohort does not significantly differ from other local bio-behavioural surveys⁴ and BCN Checkpoint is the non-governmental organisation offering HIV testing that has the largest number of homosexual clients in Catalonia. These facts would probably point towards the tested population reflecting the average pattern of risk in the local homosexual community in our setting. Second, the short follow-up (median number of visits of 1) and the high loss to follow-up (30%) could have a significant impact on the HIV incidence estimates and the risks of seroconversion. Nevertheless, the pattern of risk behaviours such as condomless sex with casual partner and drug consumption at baseline did not differ between individuals lost or not lost to follow-up. Third, self-reported behaviour and morbidity information may always be affected by social desirability and recall bias, but the fact that interviews were conducted by trained peers would have decreased its impact. Lastly, our questionnaire did not include questions regarding networks and other social variables, which may also be affecting risk of HIV.

More intensive follow-up of the study population and better access to data beyond 2011 would have provided more robust incidence estimates and a more precise picture of the circumstances of seroconversion. During the first analysis period (2008–2011), the ITACA cohort was run as an open cohort. In order to decrease the loss to follow-up rate, we may identify a smaller sample size based on stricter recruitment, allowing more intensive and proactive follow-up. The formation of cohorts based on CBVCT creates a significant challenge for the organisations running these services—particularly in Southern Europe—usually with scarce resources. Collaboration between the MSM and public health communities is also crucial to gather and use the information generated at the programmatic level. Both Public Health and Research institutions should understand the value of these programmes and contribute to the sustainability of both their services and the cohorts derived from them. We would finally encourage other existing cohorts and CBVCT to create a multicentre European cohort of MSM which may contribute to increasing the statistical power of the cohorts, as well as identifying potential differences between settings. In this respect, the recently created European Commission funded by EURO-HIV-EDAT Project may provide a good opportunity (<https://eurohivedat.eu>).

Incidence estimates are the best indicator for monitoring the potential impact of preventive interventions, but they are also a strong advocacy instrument for the MSM community itself. The ITACA cohort is the first study in Spain to have directly estimated HIV incidence trends and identified factors associated with HIV seroconversion in MSM using a community-based approach. It has demonstrated the feasibility of implementing longitudinal studies within CBVCT and has contributed to a

better understanding of the local dynamics of HIV in MSM. Furthermore, it has shown that the distribution of vulnerability of MSM is not homogeneous. Multilevel interventions addressed to MSM should be necessary specifically tailored to different types of sexual partners and cultural origins to optimise the effectiveness of prevention.

Key messages

- ▶ There is a high and increasing HIV incidence among men who have sex with men (MSM) in Barcelona, especially important among foreign-born men.
- ▶ A significant proportion of seroconverters who reported having had gonorrhoea reinforce the urgent need to increase the effectiveness of sexually transmitted infection (STI) programmes addressed to MSM.
- ▶ Condomless anal sex with steady partner of unknown serostatus and with casual partner was associated with seroconversion, suggesting that HIV transmission may be driven by both types of partners.
- ▶ There is a need to implement multilevel interventions for MSM taking into account different types of partners, cultural origins and the exposure to other STI.

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Contributors LF contributed to the planning of the research, analysed the data and prepared the manuscript. EL and AE contributed to the planning of the research, prepared databases for the analyses, contributed to the analyses and reviewed the manuscript. CF contributed to the planning of the research and to the analyses of the data and reviewed the manuscript. MM and FP contributed to the design of the ITACA cohort, supervised the field work, data collection and data entry processes in BCN Checkpoint and made contributions to the manuscript. JS, HT and FP performed field work and data collection and made contributions to the overall process of the project. JC conceptualised the project, contributed to the planning of the research and critically reviewed all versions of the manuscript.

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High HIV incidence among men who have sex with men attending a community-based voluntary counselling and testing service in Barcelona, Spain: results from the ITACA cohort

Laia Ferrer, Eva Loureiro, Michael Meulbroek, Cinta Folch, Felix Perez, Anna Esteve, Jorge Saz, Hector Taboada, Ferran Pujol and Jordi Casabona

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