

Original

RESP

Prevalence and predictive factors of *Chlamydia trachomatis* genital infection in inmates 25 to 65 years old in four Catalan prisons

Carnicer-Pont D¹, González V², López-Corbeto E³, Turu E⁴, and the Prison Health working Group*

¹Catalan Institute of Oncology. l'Hospitalet de Llobregat (Barcelona). Cancer Control and Prevention Group. Biomedical Research Institute of Bellvitge-IDIBELL. l'Hospitalet de Llobregat (Barcelona). CIBER Epidemiology and Public Health (CIBERESP).

²Microbiology Service. University Hospital of Universitari Germans Trias i Pujol. Badalona (Barcelona). Centre of epidemiological studies on sexually transmitted infections and AIDS of Catalonia (CEEISCAT). Department of Health. Generalitat of Catalonia. Badalona (Barcelona). Research Institute Germans Trias i Pujol (IGTP). Badalona (Barcelona). CIBER Epidemiology and Public Health (CIBERESP).

³Centre of epidemiological studies on sexually transmitted infections and AIDS of Catalonia (CEEISCAT). Department of Health. Generalitat of Catalonia. Badalona (Barcelona). Research Institute Germans Trias i Pujol (IGTP). Badalona (Barcelona). CIBER Epidemiology and Public Health (CIBERESP).

⁴Programme of Health in Correctional Centres – Catalan Institute of Health.

ABSTRACT

Objective: Determine the prevalence of *Chlamydia trachomatis* (CT) infection, the risk factors for infection in inmates aged 25 to 65 years old in four Catalan prisons.

Material and method: This is a cross sectional study conducted in four Catalan prisons chosen at convenience with a random stratified sample of the penitentiary population 25 to 65 years old taken within these centres. A urine specimen was analysed using the Anyplex CT/NG Seegene technique. An “ad hoc” questionnaire was used to determine sociodemographic and behavioural risk factors for infection within the previous year. The prevalence estimates of CT were calculated. Crude and adjusted Odds Ratios (ORs) and 95% (CIs) were used to estimate associations between infection and risk factors.

Results: Out of 1469 participants 15 men tested positive for CT (prevalence: 1.02%). We explored age, country of birth, education, sexual orientation, age initiation sexual activity, number and type of sexual partners (sporadic vs. stable) in a year, concurrency of sexual partners, preservative use in previous sexual relationship, etc. The only factor independently associated with infection was being heterosexual man having sexual relationships with different sporadic partners. Among those who had had a sexually transmitted infection (STI) in life 27% did not notify to all their partners and the main reason was not being able to retrieve them.

Conclusions: CT prevalence in inmates 25 to 65 years old is very low in four prisons of Catalonia. No systematic screening of infection is justified although prisoners having different sporadic sexual partners may need more sexual infection prevention advice.

Keywords: prevalence; *Chlamydia trachomatis*; prisons; screening.

Text received: 17/10/2018

Text accepted: 19/02/2019

* The Prison Health Working Group is composed of: Solé N (Equipo de Atención Primaria Penitenciaria (EAPP) Barcelona I. Barcelona), Puig L (Equipo de Atención Primaria Penitenciaria (EAPP) Barcelona I. Barcelona), Tarrés Y (Equipo de Atención Primaria Penitenciaria (EAPP) Barcelona I. Barcelona), Quiroga T (EAPP Barcelona II. Barcelona), Guixè Q (EAPP Barcelona II. Barcelona), Macías C (EAPP Sant Esteve Sesrovires I. Barcelona), Domènech N (EAPP Sant Esteve Sesrovires I. Barcelona), Yela E (EAPP Sant Esteve Sesrovires I. Barcelona), Gramunt J (EAPP Sant Esteve Sesrovires I. Barcelona), Ruíz AM (EAPP Sant Esteve Sesrovires II. Barcelona), Mangues J (EAPP Sant Esteve Sesrovires II. Barcelona), Prats M (EAPP Sant Esteve Sesrovires II. Barcelona), Balsells R (EAPP Sant Esteve Sesrovires II. Barcelona).

INTRODUCTION

Genital infection of *Chlamydia trachomatis* (CT) is increasing among the Catalan population, most frequently among youngsters¹. The last available prevalence of the population under 25 years of age was around 8.5%². This is a highly transmissible infection, mainly asymptomatic, but with the potential to produce serious complications, most importantly pelvic inflammatory disease in women and infertility in both men and women. Early detection and treatment are crucial to guarantee prevention and control³. However, there is no good-quality evidence to suggest that widespread testing strategies have had an impact on the transmission of chlamydia in the population⁴ while other studies suggest that partner notification is more cost-effective than screening for CT control⁵.

Since 2007, the Catalan government has regularly conducted cross sectional studies of CT screening among youngsters under 25, either in correctional facilities^{6,7} or in primary health centres but the situation among persons over 25 is poorly known, particularly in key populations such as individuals in correctional facilities. It is suspected that adult inmates have a higher risk of CT infection because of potentially hazardous sexual behaviour (clients of sex workers)⁸. The only study in our country that specifically considers such issues is one from 2011 among inmates of 18 to 35 years old⁹. The only available information on prisoners older than 25 to 35 years is from 2008, which shows a CT prevalence of 4%⁹. However, the increasing trend of infection, from 5.7% in 2008 to 7.5% in 2014 among under 25 years old suggests the need to explore the situation among persons over that age.

It is unclear whether CT screening of inmates over 25 years old should be recommended in Catalan prisons. There are no European Guidelines regarding CT screening in prisons and the Centres for Disease Control (CDC) of Atlanta¹⁰ recommend screening on entering prison for all women and men younger than 35 and 30, respectively. On the other hand, some Spanish Scientific Societies recommend screening for STIs in people entering correctional centres¹¹. The objective of this study is to determine the prevalence of CT, the risk factors for infection in inmates aged 25 to 65 years old in four Catalan prisons so as to provide more information for the debate on systematic screening among this population.

MATERIAL AND METHOD

There are two prison administrations in Spain: the Central Government and the Catalan administration. The Catalan administration manages nine prisons containing mainly two types of inmate: preventive (those on short time stays, mostly recently incarcerated and still not sentenced) and convicted inmates (those with a longer average stay). The socio-demographic and behavioural characteristics of these inmates are expected to be different and may have an effect on CT infection. This is a cross sectional study with a representative sample of the prison population of 25 to 65 years of age in Catalonia. In 2017, there were 5214 new prisoners in Catalonia and the total prison population was 14,868 people¹². There were 2053 preventive inmates (13.8%) and 12,815 convicted prisoners (86.2%). The sex distribution of this population was 13657 men (93%) and 1028 women (7%). The average stay in prison was 267 and 1232 days among preventive and convicted prisoners, respectively. Weekend leave permits were given to 2204 inmates. Most of the inmates, except the ones with security restrictions, have one or two conjugal visits a month. This study is conducted in two prisons for convicted inmates and two for preventive inmates as this makes the study more representative and also because of the availability of health professionals within prison system.

Process

A urine specimen was analysed using the *Anyplex CT/NG Seegene* technique. An "ad hoc" questionnaire was used to determine socio-demographic, behavioural and risk practices for infection over the previous year. The questionnaire was administered by health professionals to all participants after obtaining their informed consent.

Sample size

We took a convenience sample of four out of nine prisons and a random sample of 1498 out of 3325 prisoners from the four centres. There were two prisons with preventive inmates and two with convicted inmates. This was sufficient to estimate CT prevalence with a 95% confidence interval and a precision of ± 0.75 , provided that previous prevalence was not greater than 4%. The participating centres received a random number table stratified by sex and age group (25 to 35 and 36 to 65) for participation. The exclusion criteria was having done the test in the previous month.

Questionnaire

The questionnaire explored socio-demographic data (sex, age, country of birth, date of arrival to the country, date of entry in prison, educational level) and behaviour over the previous year (sexual orientation: heterosexual, homosexual, bisexual, transexual or unknown; number of partners; age of first sexual relation; type of partners: sporadic, stable, unknown; concurrency of sexual partners in a year; new partner in three months; preservative use in previous sexual contact; practicing sex in clubs; use of chats; being a sex worker; being client of a sex worker; having had an STI in a year; Hepatitis C, B and HIV serostatus). Questions were piloted with 15 prisoners for understanding and internal validity.

Ethical considerations

Approval of the study was obtained from the Ethics Committee of the "Institute of Research in Primary Health" IDIAP Jordi Gol. An information sheet and the informed consent were given to candidates. After signing the informed consent, the participating inmates were asked to collect urine for testing in a sampling devise and also answer the above mentioned questionnaire. Both the questionnaire and urine sample were linked by an alpha-numeric identification code that enabled the data be managed without personal identification. To comply with the Spanish Organic Law on Personal Data Protection (LOPD) informed consents were kept under protection in each Penitentiary centre. This document, which also included the alpha-numeric number, allowed health professionals to identify the results, record them in the computerized medical record and, when necessary, treat the inmates according to the results of the tests.

Specimen collection and analysis

First void urine specimens were collected from 1498 individuals using the Multicollect Specimen Collection kit (Abbott Molecular Inc, Abbott Park, IL, USA) as recommended by the manufacturer. The pooling was carried out by combining 400 microlitres of each specimen to yield a total volume of 1600 microlitres. Five hundred microlitres of each pool were used to perform DNA extraction of *Chlamydia trachomatis* by MICROLAB Nimbus IVD system (Seegene, Seoul, Korea) according to the manufacturer's instructions. The semi-quantitative results were obtained based on cyclic-CMTA (catcher melting temperature analysis)^{13,14}. The reaction was performed in a CFX96 real time thermocycler (bio-Rad, Hercules, CA, USA) according to the

manufacturer's instructions. Each pooled set of specimens was tested, and *Chlamydia trachomatis* positive pooled samples were individually tested to identify the positive specimen(s).

Data collection and analysis

After receiving the laboratory results, the information from test results and questionnaires was entered into a database at the Catalan Institute of Oncology (ICO). Data analysis was done using Stata V.14, (Stata statistical software: release¹⁴. College Station, Texas, USA: StatCorp, 2014), accounting for stratification and weighting of the sample. The prevalence estimates of CT were calculated as the number of positive participants divided by the number of participants whose urine specimens were tested. Ninety-five percent confidence intervals (CIs) were generated from proportions of binomial distributions. Crude and adjusted Odds Ratios (ORs) were used to estimate associations between infection and risk factor and 95% CIs were calculated. Gender stratification was not possible because no woman tested positive for infection.

RESULTS

1498 inmates were evaluated during the period of study. After excluding 29 (1.9%) of inmates who were found to be younger than 25 or older than 65, there were 1374 men and 95 women eligible for participation. The average age was 40 years (range: 25-65 years). There were 12 (0.8%) and 21 (1.5%) out of 1374 men who mentioned having had sex with men (MSM) or who were bisexual, respectively. Half of the participants were foreigners. Most of them came from Western Europe (54%) followed by Latin America (16%), North Africa (10%) and Central Europe and Central Asia (6%). Most of them (91%) had gone to school and had received a primary (39%), secondary (43%) or university (9%) education.

Characteristics of inmates by sex

No significant differences were found between men and women in terms of socio demographic characteristics (age, born in foreign country, educational level). As regards risky practices, there were more men than women with a heterosexual orientation (95.8% vs 84.2%, $p < 0.001$), who had their first sexual relationship when they were 5 to 15 years old (61.7% vs 45.2%, $p < 0.05$), who had different sporadic partners (19.3% vs 8.4%, $p < 0.01$), had more than two partners

in the previous year (14.2% vs 7.4%, $p=0.05$), practiced sex in clubs (46.5% vs 28.4%, $p<0.05$), used chats to find sexual partners (17.6% vs 3.2%, $p<0.0001$), consumed drugs before or while having sex (76.4% vs 53.7%, $p<0.0001$), were clients of sex workers (56.6% vs 5.3%, $p<0.0001$) and had a positive hepatitis B serostatus (29.3% vs 6.3%, $p<0.0001$), (Table 1).

Characteristics of inmates by type of prison

The characteristics of inmates vary notably according to their correctional process. There were more foreigners in preventive centres than in centres with convicted inmates as well as inmates who had had their first sexual relation at a young age. There were more men in centres for convicted inmates, as well as more inmates who had different sporadic partners, concurrent sexual partners, practiced sex in clubs, used chats to find new sexual partners, consumed drugs while having sex, were sex workers or clients of same, had been diagnosed with an STI in the previous year and with positive hepatitis C, B and HIV serostatus. *CT* prevalence, although not significant, was higher in centres with convicted inmates (13 *CT* infections out of 1078 tested, 1.2% prevalence) than in centres with preventive ones (2 *CT* infections out of 391 tested, 0.5% prevalence) (Table 2).

Chlamydia trachomatis prevalence

15 men and no woman were positive for *CT* infection. The prevalence was 1.02%. Bivariate analysis is presented in Table 3, where the only variables associated with infection were having sporadic non stable partners and having more than 2 partners. After multivariate analysis (Table 4) adjusting for the variables independently associated with infection (having sex with different sporadic non stable partners and having more than two partners in a year) the only factor remaining weakly associated with infection is having sex with different sporadic non stable partners (OR: 1.8, 95% CI:0.9-3.4).

Other Sexually Transmitted Infections (STI) and partner notification

Out of 1469 participants, 78 (5.4%) inmates mentioned having an STI in the 12 months prior to the date of the interview. Three were diagnosed with syphilis, two had gonorrhoea and the remaining 73 did not mention any STI. Information about knowledge, attitudes and practices related to partner notification during their lives is shown in Table 5.

No question about STI-related partner notification within the previous 12 months was asked but

there were 224 answers to the question if they notified partners at some time in their lives. Most of them, 163 (73%), mentioned notifying all their sexual partners, 18 (8%) mentioned notifying only some of their partners and 43 (19%) did not notify any of their partners. 43 out of 61 (70%) mentioned the reasons for not notifying some or all their partners about the STI. The main reasons were not being able to make contact (19 out of 43, or 44%) followed by feeling ashamed (11 or 26%), believed there was no obligation to notify (8 or 19%), and because the doctor did not tell them to do so (5 or 12%). Partner notification was not associated with any of the potential differential variables such as age, sex, sexual orientation, educational level or country of birth.

DISCUSSION

This analysis of *CT* prevalence amongst inmates over 25 is one of the few studies available in Catalonia. Until now, there was no robust data to aid in deciding on the advisability of *CT* screening in inmates over 25. Our findings show that *CT* prevalence is very low in this population. Prevalence was higher in men than in women, unlike *CT* prevalence studies in the general population and similarly to other results from prison studies, although not significantly so¹⁵⁻¹⁸. In Catalonia, because of this low prevalence in correctional facilities, systematic screening of *CT* in inmates older than 25 years is not justified. In addition, it is noteworthy that preventive inmates (most recently admitted to prison) and convicted inmates (incarcerated for much longer periods) despite not showing significant differences in infection (0.5% vs. 1.2%), their prevalence is still very low compared to the *CT* prevalence of inmates under 25 (7.5% in the year 2014). The prevalence of *CT* is low, but it is consistent with the history of previous STIs, which were mentioned only by 10%. It is also noteworthy that all cases occurred in heterosexual men, probably because in these correctional centres heterosexual orientation was more frequent in men (97.3%) than in women (85.1%). Additionally, women showed a lower risky sexual behaviour (fewer different sporadic partners than men, lower mean number of sexual partners, less practice of sex in clubs, use of chats to find new partners or drug consumption while having sex), explaining the lower *CT* prevalence.

In a population study conducted in the city of Barcelona, the increase of STIs was observed in men who have sex with men (MSM), men who have sex with women (MSW) and women who have sex with

Table 1. Characteristics of inmates by sex

		Participants N=1.469	Women N=95		Men N=1.374		P value
			N, means	%, range	N, means	%, range	
Age (means, range)			39,5	37,7-41,4	40	39,6-40,5	
Country of birth	Spain	734	46	51,6	688	49,9	0,755
	Abroad	734	49	51,6	686	49,9	
Educational level	No studies	129	4	4,2	125	9,1	0,462
	Primary level	574	42	44,2	532	38,7	
	Secondary level	630	41	43,2	589	42,9	
	University level	129	8	8,4	121	8,8	
	Unknown	7	-	-	7	0,5	
Sexual orientation	Heterosexual	1.396	80	84,2	1.316	95,8	<0,001
	Homosexual	16	4	4,2	12	0,9	
	Bisexual	30	9	1,0	21	1,5	
	Transsexual	1	1	1,0	0	0	
	Unknown	26	1	1,0	25	1,6	
Age 1st sexual relation	5 to 10	36	1	1,0	35	2,5	0,026
	11 to 15	855	42	44,2	813	59,2	
	16 to 20	511	46	48,4	465	33,8	
	21 to 25	42	5	5,3	34	2,5	
	Older than 25	3	0	0	3	0,2	
	Unknown	25	-	-	-	-	
Type of partners	Sporadic non stable	273	8	8,4	265	19,3	<0,01
	Stable	796	64	67,4	732	53,3	
	Unknown	400	23	24,2	377	27,4	
Concurrency sex in a year	Yes	207	7	7,4	200	14,6	0,134
	No	1.111	74	77,4	1.037	75,5	
	Unknown	151	14	14,7	137	9,9	
Number of sexual partners in a year	0	336	17	17,9	319	23,2	0,05
	1-2	813	65	68,4	748	54,4	
	More than 2	208	7	7,4	201	14,2	
	Unknown	112	6	6,3	406	7,7	
New partner in 3 months	Yes	116	10	10,5	105	7,6	0,525
	No	1.202	73	76,8	1.130	82,2	
	Unknown	151	12	13,7	139	22,2	
Preservative (condom) use in previous sexual contact	Yes	398	17	17,9	381	27,7	0,123
	No	1.014	75	78,9	939	68,3	
	Unknown	57	3	3,2	54	4,0	

Continue

Table 1. Characteristics of inmates by sex (continuation)

		Participants N=1.469	Women N=95		Men N=1.374		P value
			N, means	%, range	N, means	%, range	
Sex in clubs	Yes	666	27	28.4	639	46.5	<0.05
	No	778	67	70.5	711	51.7	
	Unknown	25	1	1	24	1.7	
Using chats to find partners	Yes	245	3	3.2	242	17.6	0.001
	No	1.197	91	95.8	1.106	80.5	
	Unknown	27	1	1.05	26	1.9	
Drug consumption and sex	Yes	1.101	51	53.7	1.050	76.4	<0.001
	No	352	43	45.3	309	22.5	
	Unknown	16	1	1.05	15	1.1	
Sex worker	Yes	116	7	7.4	109	7.9	0.446
	No	1.330	85	89.5	1.245	90.6	
	Unknown	23	3	3.2	20	1.46	
Client of sex workers	Yes	574	5	5.3	569	56.6	<0.001
	No	856	18	82.1	778	1.9	
	Unknown	39	12	12.6	27	5.1	
STI in a year	Yes	78	8	8.4	70	5.1	0.081
	No	1.305	80	84.2	1.225	89.2	
	Unknown	86	7	7.4	79	5.7	
Hep C serostatus	Yes	192	11	11.6	181	13.2	0.612
	No	1.134	76	80	1.058	77	
	Unknown	143	8	8.4	135	9.8	
Hep B serostatus	Yes	408	6	6.3	402	29.3	<0.001
	No	894	80	84.2	814	59.2	
	Unknown	167	9	9.5	158	11.5	
HIV serostatus	Yes	116	6	6.3	110	8.0	0.385
	No	1.216	83	87.4	1.133	82.5	
	Unknown	137	6	6.3	131	9.5	

Note. STI: sexually transmitted infection.

men (WSM), with the exception of women infected with HIV, in which a reduction was observed¹⁹. They have also found an increase in risky sexual behaviour: basically an increase in the number of partners and subgroups prone to higher-risk sexual practices (Chemsex) mainly associated with MSM.

In our setting, risky sexual behaviour (different sporadic sex partners, concurrency of sexual partners, sex in clubs, drug consumption) is found more frequently among convicted than preventive inmates. This may be explained by the fact that convicted

inmates may be more prone to living dangerously when they are under have a leave permit to be outside prison, or even within prison, while having their conjugal visits. However, the use of condoms in previous relationship is not a differential factor between types of inmates.

Further qualitative observation should enable the reasons explaining such differences to be identified.

This study presents some limitations: Firstly, the low prevalence obtained may have limited the identification of other possible predictors of infection and

Table 2. Characteristics of inmates by type of correctional centre

	Centres of Convicted inmates			Centres of Preventive inmates			P value
	N answers	N, means	%, range	N answers	N, means	%, range	
CT prevalence	1.078	13	1.2	391	2	0.5	0.242
Sex (man)	1.078	1.023	94.9	391	351	89.8	0.000
Age (means, range)	1.078	43	26-65	391	39	25-65	-
Born abroad	1.074	497	48.1	395	238	60.2	0.000
Illiterate (no education)	1.077	93	8.6	385	36	9.3	0.077
Heterosexual orientation	1.065	1.028	96.5	382	368	96.3	0.822
Age group 1st sex (5 to 15 years)	1.053	379	35.9	388	174	44.8	0.000
Different sporadic partners	794	220	27.7	275	53	19.3	0.006
Concurrency sex in a year	981	173	14.6	339	34	10.0	0.000
Number of partners in a year (mean)	993	2	-	364	1	-	-
New partner in 3 months	985	95	9.6	337	20	5.9	0.113
Preservative use in previous sex	1.078	307	28.5	391	91	23.3	0.177
Practicing sex in clubs	1.063	518	48.7	381	143	37.5	0.000
Using chats to find partners	1.061	197	18.6	383	44	11.5	0.002
Drug consumption and sex	1.066	98	9.2	391	16	4.2	0.007
Sex worker	1.069	841	78.7	384	252	65.6	0.000
Client of sex workers	1.059	492	46.5	375	77	20.5	0.000
STI in a year	942	72	7.0	369	4	1.1	0.000
Hep C serostatus	1.064	171	16.1	376	21	5.6	0.000
Hep B serostatus	1.057	371	35.1	373	37	9.9	0.000
HIV serostatus	1.063	111	10.4	372	8	2.1	0.000

Note. CT: *Chlamydia trachomatis*; STI: sexually transmitted infection.

may explain the borderline significance of the risk factors associated with infection. Secondly, the study characterizes a specific population: prison inmates in Catalonia. Prisoners from other regions or countries may have similar or different STI risk behaviours. Finally, the questionnaire was mainly administered by health professionals who may have influenced the sense of some answers. We should not discount the “look good effect” on some occasions.

On the other hand, the study provides real data on the prevalence of CT infection in prisoners over 25 for the first time, which allows the Health Administration to make decisions with greater guarantees. In addition, this type of work allows the most affected groups to be identified, which should help to redesign preventive programs in order to find the most efficient way to reach these groups in the population. In our study, CT infection was more frequent among

inmates with multiple diverse sporadic partners. No other socio demographic or behavioural characteristic was found to be associated. Therefore, the use of condoms should be particularly reinforced amongst these inmates. Being in prison should become an opportunity for inmates to get full training on STI prevention. In primary health care centres, partner notification has proven to be more cost-effective than opportunistic screening to stop transmission of CT and other curable STI, we therefore think that the same situation may apply to prisons. Although most of the inmates who have had an STI mentioned notifying all their partners, there were still a considerable number (27%) who did not. Similarly to the findings of other studies conducted in Catalonia among MSM¹⁹ or among users of primary health care centres²⁰, not being able to locate their partners, feeling ashamed or believing that there was no obligation to

Table 3. Bivariate analysis of risk factors for *Chlamydia trachomatis*

Socio demographic and behavioural variables		Participants N=1.469	CT infection N (%)	P value
Type of prison	Preventive inmates	395	2 (0.5)	0.234
	Convicted inmates	1.974	13 (1.2)	
Sex	Men	1.374	15 (100)	0.306
	Women	95	0	
	Unknown	0	0	
Age group	25 to 35	497	7 (1.4)	0.541
	36 to 45	569	6 (1.1)	
	46 to 55	300	2 (0.7)	
	56 to 65	101	0	
	Unknown	2	0	
Country of birth	Spain	734	4 (0.5)	0.070
	Abroad	735	11 (1.5)	
	Unknown	1	0	
Educational level	No studies	129	2 (1.5)	0.893
	Primary level	575	6 (1.0)	
	Secondary level	629	5 (0.8)	
	University level	129	2 (1.5)	
	Unknown	7	0	
Sexual orientation	Heterosexual	1.397	15 (1.1)	0.978
	Homosexual	15	0	
	Bisexual	30	0	
	Transsexual	1	0	
	Unknown	26	0	
Age group 1st sexual relation	5 to 10	33	0	0.751
	11 to 15	855	10 (1.2)	
	16 to 20	511	4 (0.8)	
	21 to 25	42	1 (2.4)	
	Unknown	28	0	
Type of partners	Sporadic non stable	273	8 (2.9)	0.002
	Stable	796	6 (0.7)	
	Unknown	400	1 (0.2)	
Concurrency sex in a year	Yes	207	4 (1.9)	0.195
	No	1.111	11 (1.0)	
	Unknown	151	0	
Number of sexual partners in a year	0	336	1 (0.3)	0.018
	1 or 2	813	8 (1.0)	
	More than 2	208	6 (2.9)	
	Unknown	112	0	
New partner in 3 months	Yes	116	2 (1.7)	0.338
	No	1.202	13 (1.1)	
	Unknown	151	0	

Continue

Table 3. Bivariate analysis of risk factors for *Chlamydia trachomatis* (continuation)

Socio demographic and behavioural variables		Participants N=1,469	CT infection N (%)	P value
Preservative (condom) use in previous sexual contact	Yes	394	2 (13.3)	0.530
	No	1,022	13 (86.7)	
	Unknown	39	0	
Practice of sex in clubs	Yes	666	10 (1.5)	0.237
	No	778	5 (0.6)	
	Unknown	25	0	
Using chats to find partners	Yes	245	4 (1.6)	0.520
	No	1,197	11 (0.9)	
	Unknown	27	0	
Drug consumption and sex	Yes	1,101	12 (1.1)	0.854
	No	352	3 (0.8)	
	Unknown	16	0	
Sex worker	Yes	116	2 (1.7)	0.660
	No	1,330	13 (0.8)	
	Unknown	23	0	
Client of sex workers	Yes	574	4 (0.7)	0.452
	No	856	11 (1.3)	
	Unknown	39	0	
STI in a year	Yes	78	2 (2.5)	0.255
	No	1,305	13 (1.0)	
	Unknown	86	0	
Hep C serostatus	Yes	192	1 (0.5)	0.707
	No	1,134	12 (1.1)	
	Unknown	143	2 (1.4)	
Hep B serostatus	Yes	408	3 (0.7)	0.792
	No	894	10 (1.1)	
	Unknown	167	2 (1.2)	
HIV serostatus	Yes	116	1 (0.9)	0.859
	No	1,216	12 (1.0)	
	Unknown	137	2 (1.5)	

Note. CT: *Chlamydia trachomatis*; STI: sexually transmitted infection.

notify were the main reasons for not notifying their partners. This may be explained by low motivation, low health education and a lack of appropriate tools for notification.

Health professionals have a crucial role in enforcing partner notification and in convincing persons recently diagnosed with an STI about the need to do so. Unfortunately, most of these health professionals

are overworked, lack awareness of the importance of partner notification in stopping transmission of STIs or do not have appropriate tools that show how to notify partners. In this era of new technologies, the use of internet or new phone applications could facilitate partner notification promoted by health professionals. This should be part of the caring process in prisons.

Table 4. *Chlamydia trachomatis*: risk factors for infection among inmates

Variable	N answers	N condition	CT infection	CT prevalence (%)	Crude Odds ratio 95% (CI)	Adjusted Odds ratio 95% (CI)
CT prevalence (overall)	1.469	1.469	15	1.0	NA	
Convicted inmates	1.469	1.074	13	1.2	2.4 (0.7-7.0)	
Sex (man)	1.469	1.374	15	1.09	*	
Age (25 to 34 years)	1.467	497	7	1.4	0.9 (0.9-1.0)	
Born abroad	1.469	735	11	1.5	2.8 (0.9-8.8)	
No studies or high school	1.462	129	2	1.5	1.2 (0.7-2.0)	
Heterosexual orientation	1.469	1.397	15	1.07	*	
Age group 1st sex (11 to 15 years)	1.441	855	10	1.1	0.8 (0.3-2.3)	
Different sporadic partners	1.069	273	8	2.9	2 (1.2-3.4)	1.8 (0.9-3.4)
Concurrency sex in a year	1.320	207	4	1.9	2.0 (0.6-6.2)	
More than two partners in a year	1.357	208	6	2.9	3.8 (1.3-10.7)	1.5 (0.4-5.6)
New partner in 3 months	1.318	116	2	1.7	1.2 (0.7-1.9)	
Preservative use in previous sex	1.430	394	2	0.5	0.7 (0.4-1.2)	
Practicing sex in clubs	1.444	666	10	1.5	1.5 (0.9-2.6)	
Using chats to find partners	1.442	245	4	1.6	1.3 (0.7-2.4)	
Drug consumption and sex	1.453	1.101	12	1.1	1.1 (0.6-2.1)	
Sex worker	1.446	116	2	1.7	1.8 (0.4-8.0)	
Client of sex workers	1.430	574	4	0.7	0.5 (0.2-1.7)	
STI in a year	1.383	78	2	2.6	2.6 (0.6-12.0)	
Hep C serostatus	1.326	192	1	0.5	0.8 (0.4-1.6)	
Hep B serostatus	1.302	408	3	0.7	0.9 (0.6-1.3)	
HIV serostatus	1.332	116	1	0.9	0.9 (0.5-1.9)	

Note. CI: confidence interval; CT: *Chlamydia trachomatis*; NA: not applicable; STI: sexually transmitted infection.

*All infected were men and of heterosexual orientation.

Table 5. Knowledge, attitudes and practices related to notifying partner at some point in inmates' life

	N answers	%
1. Gave answer about notifying partner at some point in their life	224	100
Notified all partners	163	73
Notified only some partners	18	8
Notified no partners	43	19
2. Did not notify partners at some point in their life	61	100
Gave reasons for not notifying partners	43	70
Unable to locate partner	19	44
Ashamed of the situation	11	26
Believed that there was no obligation to tell partner	8	19
The doctor did not tell him/her to notify partner	5	12

CORRESPONDENCE

Dolors Carnicer-Pont
 Instituto Catalán de Oncología. Grupo de Control y Prevención del Cáncer. Instituto de Investigación Biomédica de Bellvitge. L'Hospitalet de Llobregat. Barcelona. CIBER Epidemiología y Salud Pública (CIBERESP).
 E-mail: dcarnicer@iconcologia.net

REFERENCES

1. SIVES 2015. Integrated Surveillance System for STI and HIV in Catalonia. [Internet]. Public Health Agency of Catalonia. Generalitat of Catalonia 2015;22. p. 43. [fecha de acceso 20 Oct 2017]. Disponible en: http://www.ceeiscat.cat/documents/sives2015_CAT
2. Lopez-Corbeto E, González V, Casabona J, Grupo de estudio CT/NG-ASSIR. Prevalencia y tasa de reinfección de la infección genital por *C. trachomatis* en menores de 25 años. *Enferm Infecc Microbiol Clin*. 2017;35:359-63.
3. Department of Health. Generalitat of Catalonia. Practical clinical guide of sexually transmitted infections. [Internet]. 2009. [fecha de acceso 20 Oct 2017]. Disponible en: <http://www20.gencat.cat/docs/canalsalut/2009>
4. European Centre for Disease Prevention and Control. Chlamydia control in Europe: literature review. [Internet]. Estocolmo: ECDC; 2014. [fecha de acceso 20 Oct 2017]. Disponible en: <https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/chlamydia-control-europe.pdf>
5. Althaus CL, Turner KM, Mercer CH, Auguste P, Roberts TE, Bell GE, et al. Effectiveness and cost-effectiveness of traditional and new partner notification technologies for curable sexually transmitted infections: observational study, systematic reviews and mathematical modelling. *Health Technol Assess*. 2014;18:1-100.
6. López-Corbeto E, Humet V, Leal MJ, Teixidó N, Quiroga T, Casabona J, et al. Conductas de riesgo y prevalencia de *Chlamydia trachomatis* en presos según el tiempo de estancia en prisión. *Med Clin (Barc)*. 2014;143:440-3.
7. López-Corbeto E, Gonzalez V, Bascuñana E, Humet V, Casabona J, Grupo de estudio CT/NG-ASSIR y CT/NG-Prisiones. Tendencia y determinantes de la infección genital por *Chlamydia trachomatis* en menores de 25 años. *Cataluña 2007-2014. Enferm Infecc Microbiol Clin*. 2016;34:499-504.
8. Garriga C, Gómez-Pintado P, Díez M, Acín E, Díaz A. Características de los casos de sífilis infecciosa diagnosticados en Instituciones Penitenciarias, 2007-2008. *Rev Esp Sanid Penit*. 2011;13:52-7.
9. Centres for Disease Control and Prevention. Sexually Transmitted Diseases Treatment Guidelines. Special populations. [Internet]. En: CDC. gov. CDC; 16 Dic 2016. [fecha de acceso 11 Nov 2017]. Disponible en: <http://www.cdc.gov/std/tg2015/specialpops.htm>
10. Grupo de expertos de GESIDA, Secretaría del Plan Nacional sobre el SIDA, Grupo de estudio de ITS de la SEIMC, Grupo Español para la Investigación de las Enfermedades de Transmisión Sexual de la Academia Española de Dermatología y Venerología y de la Sociedad Española de Infectología Pediátrica. Documento de Consenso sobre el diagnóstico y tratamiento de la infecciones de transmisión sexual en adultos, niños y adolescentes. [Internet]. 2017. [fecha de acceso 22 Ene 2018]. Disponible en: <https://www.seimc.org/contenidos/gruposdeestudio/geits/pcientifica/documentos/geits-dc-ITS-201703.pdf>
11. Departamento de Justicia de la Generalitat de Catalunya. Descriptors estadístics de serveis penitenciaris i rehabilitació. [Internet]. 2019. [fecha de acceso 22 Ene 2018]. Disponible en: http://www.gencat.cat/justicia/estadistiques_serveis_penitenciaris/
12. Cho CH, Chulten B, Lee CK, Nam MH, Yoon SY, Lim CS, et al. Evaluation of a novel real-time RT-PCR using TOCE technology compared with culture and Seeplex RV15 for simultaneous detection of respiratory viruses. *J Clin Virol*. 2013;57:338-42.
13. Chun JY, Kim KJ, Hwang IT, Kim YJ, Lee DH, Lee IK, et al. Dual priming oligonucleotide system for the multiplex detection of respiratory viruses and SNP genotyping of CYP2C19 gene. *Nucleic Acids Res*. 2007;35:e40.
14. Bernstein KT, Chow JM, Ruiz J, Schachter J, Horowitz E, Bunnell R, et al. Chlamydia trachomatis and Neisseria gonorrhoeae infections among men and women entering California prisons. *Am J Public Health*. 2006;96:1862-6.
15. Menon-Johansson AS, Winston A, Matthews G, Portsmouth S, Daniels D. The first point prevalence study of genital Chlamydia trachomatis infection in young male inmates in the UK. *Int J STD AIDS*. 2005;16:799-801.

16. Centers for Disease Control and Prevention, NCHHSTP, DSTDP, HSREB. Evaluation of large jail STD screening programs, 2008-2009. [Internet]. CDC; 2011. [fecha de acceso 20 Oct 2017]. Disponible en: <https://www.cdc.gov/std/publications/jailscreening2011.pdf>
17. Verneuil L, Vidal JS, Ze Bekolo R, Vabret A, Petitjean J, Leclercq R, et al. Prevalence and risk factors of the whole spectrum of sexually transmitted diseases in male incoming prisoners in France. *Eur J Clin Microbiol Infect Dis.* 2009;4:409-13.
18. Martí-Pastor M, García de Olalla P, Barbera MJ, Manzardo C, Ocaña I, Knobel H, et al. Epidemiology of infections by HIV, Syphilis, Gonorrhea and Lymphogranuloma Venereum in Barcelona City: a population-based incidence study. *BMC Public Health* 2015;15:1015.
19. Carnicer-Pont D, Barbera-Gracia MJ, Fernández-Davila P, Garcia de Olalla P, Muñoz R, Jacques-Aviñó C, et al. Use of new technologies to notify possible contagion of sexually-transmitted infections among men. *Gac Sanit.* 2015;29:190-7.
20. Tuneu MJ, Valles X, Carnicer-Pont D, Barbera M, Godoy P, Avecilla-Palau A, et al. Pilot study to introduce a notification card for partner notification of sexually transmitted infections in Catalonia, Spain, June 2010 to June 2011. *Euro Surveill.* 2013;18. pii=20516.