

Reattendance and chlamydia retesting rates at 12 months among young people attending Australian general practice clinics 2007–10: a longitudinal study

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Abstract. **Background:** Clinical guidelines commonly recommend annual chlamydia (*Chlamydia trachomatis*) testing in young people. General practice (GP) clinics can play an important role in annual testing, as a high proportion of young people attend these clinics annually; however, little is known about the timing of attendance and testing in this setting.

Methods: The Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections and Blood-Borne Viruses system extracted consultation and pathology data on 16–29-year-olds attending 25 GP clinics in 2007–10. We calculated the proportion of individuals with an initial negative test that reattended at 12 months (± 3 months) and retested at 12 months (± 3 months). Individuals with an initial positive test were excluded, as guidelines recommend retesting at 3 months. **Results:** Among 3852 individuals who had an initial negative test, 2201 (57.1%) reattended at ~ 12 months; reattendance was higher among females (60.8%) than males (44.1%; $P < 0.001$) and higher among 16–19-year-olds (64.2%) than 25–29-year-olds (50.8%; $P < 0.001$). Of 2201 individuals who reattended at 12 months, 377 had a chlamydia test (retesting rate of 9.8%); retesting was higher among females (10.8%) than males (6.1%; $P < 0.01$) and higher among 16–19-year-olds (13.3%) than 25–29-year-olds (7.5%; $P < 0.001$). **Conclusion:** Although over half of young people reattended their GP clinic ~ 1 year after a negative chlamydia baseline test, only 9.8% were retested at this visit. Strategies are needed to promote regular attendance and testing to both patients and clinicians.

Additional keywords: adolescent, general practitioner, mass screening, young adult.

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Introduction

Chlamydia (*Chlamydia trachomatis*) infection is the most commonly notified infection in Australia, the United States and Europe, with the majority of notifications among young people aged 15–29 years.^{1,2} Chlamydia is asymptomatic in $>80\%$ of cases and, if untreated, can cause pelvic

inflammatory disease and infertility.³ To prevent ongoing transmission and sequelae among individuals, and to decrease population prevalence, screening young people aged 16–29 years is recommended.^{4,5}

General practitioners (GPs) play an important role in chlamydia control; nearly 90% of young females and 70% of

young males visit a GP annually,⁶ and three-quarters of chlamydia infections in young people are diagnosed by GPs.⁷ Many clinical guidelines recommend annual testing in females aged 16–25 years; Australian guidelines extend this to males and up to 29 years of age.^{8–10} Recent Australian data revealed that in any year, <10% of young people aged 16–29 years old were tested,¹¹ with higher testing rates among females.^{12,13} Only one longitudinal study has previously been conducted to assess annual testing rates among females.¹⁴ This study is the first to examine chlamydia retesting rates longitudinally in both male and female young patients testing negative in primary care clinics.

Methods

Data were collated on 16–29-year-olds attending 25 GP clinics participating in the Australian Collaboration for Coordinated Enhanced Sentinel Surveillance of Sexually Transmitted Infections and Blood-Borne Viruses (ACCESS) Primary Health Clinic Network during the project's pilot period (1 January 2007–31 December 2010). ACCESS has been described in detail previously.¹⁵ In summary, ACCESS is a network of sentinel sites in clinical and laboratory settings. GP clinics were recruited in 2007 through advertising and data were obtained retrospectively; clinicians received no additional training or interventions to increase chlamydia testing. All clinics provided data from 2007 to 2009; eight clinics did not participate in 2010.

Nonidentifiable routine clinical and chlamydia testing data were retrospectively extracted from patient management systems using GRHANITE software (<http://www.grhanite.com/>, accessed 11 June 2014).

Annual baseline chlamydia testing rates were calculated as the proportion of young people with at least one GP consultation who had ≥ 1 chlamydia test request in a 12-month period. Annual reattendance rates were measured as the proportion of individuals testing negative at baseline test who reattended at the same clinic 12 ± 3 months later. Annual retesting rates were measured as the proportion of individuals who reattended the same clinic at 12 ± 3 months and retested for chlamydia. A baseline test was an individual's first test in the study period or a given year, depending on the analysis. Individuals with an initial positive test were excluded, as guidelines recommend retesting at 3 months.

To ensure clinic attendees had an opportunity to reattend and be retested for chlamydia 12 ± 3 months after their first test, we censored the first test at 7 October 2009 for 17 clinics (those participating for the entire study period) and 7 October 2008 for the eight clinics that did not participate in 2010 (referred to as the baseline period).

Clinic locations were defined as a major city or regional city according to the Australian Standard Geographical Classification Remoteness Areas (<http://www.abs.gov.au>, accessed 11 June 2014).

Chi-squared tests for differences in proportions and trend were used to compare annual reattendance and retesting rates by age group, sex, year and clinic location ($P < 0.05$).

All analyses were conducted using Stata ver. 11 (Statacorp, College Station, TX, USA). Standard errors in all statistical

analyses took account of any potential intracluster correlations within clinics using Stata's complex survey estimation; 95% confidence intervals (CIs) were adjusted accordingly.

The project was approved by the Royal Australian College of General Practitioners' National Research and Evaluation Ethics Committee.

Results

Overall 55 318 individuals aged 16–29 years (median age: 22 years; 60% female) attended participating clinics in the study period; 6489 (11.7%) had a chlamydia test, among whom 625 (9.6%) tested positive (Table 1). The remaining analysis is based on the 3852 individuals who tested negative at baseline and had an adequate follow-up time; 841 (21.8%) were male and 3011 (78.2%) were female.

Among 3852 individuals who tested negative at baseline, 2201 (57.1%) reattended in the 9–15-month annual testing window (Table 2); reattendance was higher among females (60.8%; 95% CI: 56.5–65.0) than males (44.1%; 95% CI: 37.7–50.8; $P < 0.001$) and higher among 16–19-year-olds (64.2%; 95% CI: 59.0–69.1) than 25–29-year-olds (50.8%; 95% CI: 47.3–54.3; $P < 0.001$). There was no significant difference detected in reattendance rates at 9–15 months by year or by clinic location.

Of 2201 young people who re-attended at 9–15 months, 377 (17%) had a chlamydia test; the overall retesting rate at 9–15 months was 9.8% (377/3852; 95% CI: 9.0–10.7) for those with a negative test at baseline (Table 2). The annual retesting rate was significantly higher among females (326/3011 (10.8%); 95% CI: 9.9–11.9) than males (51/841 (6.1%); 95% CI: 4.3–8.5; $P < 0.01$) and 16–19-year-olds (114/858 (13.3%); 95% CI: 11.0–15.9) than 25–29-year-olds (100/1329 (7.5%); 95% CI: 6.1–9.3; $P < 0.001$). Retesting rates also increased over time: 10.6% (95% CI: 9.3–12.1) in 2008 (Baseline Test (BT) 2007), 16.1% (95% CI: 14.4–18.0) in 2009 (BT 2008) and 16.8% (95% CI: 14.5–19.5) in 2010 (BT 2009) ($P < 0.001$). Of 377 people retesting at 9–15 months, 8.0% (95% CI: 5.4–11.2) tested positive.

Table 1. Chlamydia testing and positivity rates by year and in the overall study period at participating general practice (GP) clinics
CI, confidence interval

	Individuals ^A		Testing ^D		Positivity ^E		
	<i>n</i>	<i>n</i>	%	95% CI	<i>n</i>	%	95% CI
2007 ^B	27 120	1908	7.0	6.7–7.3	123	6.4	5.3–7.6
2008 ^B	29 488	2174	7.4	7.8–8.4	164	7.5	6.5–8.7
2009 ^B	31 189	2539	8.1	7.8–8.4	191	8.8	6.5–8.6
2010 ^C	13 331	1562	11.7	11.2–12.3	147	9.4	8.0–11.0
Overall	55 318	6489	11.7	11.5–12.0	625	9.6	8.9–10.4

^AIndividuals aged 16–29 years.

^BBased on 25 GP clinics with available data.

^CBased on 17 GP clinics with available data.

^DThe testing rate is the proportion of attending individuals with at least one chlamydia test request in a 12-month period.

^EThe positivity rate is the proportion of individuals testing positive at least once in a given year or in the overall time period.

Table 2. Chlamydia reattendance and annual testing rates among 16–29-year-old individuals with a baseline negative test at participating general practice clinics

	N	Annual reattendance			Annual testing		
		<i>n</i> (%)	95% CI	<i>P</i> -value	<i>n</i> (%)	95% CI	<i>P</i> -value
Individuals with negative baseline test ^A							
Overall ^B	3852	2201 (57.1)	52.3–61.9	–	377 (9.8)	9.0–10.7	
Sex							
Male	841	371 (44.1)	37.7–50.8	<0.001	51 (6.1)	4.3–8.5	<0.01
Female	3011	1830 (60.8)	56.5–65.0		326 (10.8)	9.9–11.9	
Age group (years)							
16–19	858	551 (64.2)	59.0–69.1	–	114 (13.3)	11.0–15.9	–
20–24	1665	975 (58.6)	52.3–64.5	<0.001 ^D	163 (9.8)	8.3–11.5	<0.01 ^D
25–29	1329	675 (50.8)	47.3–54.3	<0.001 ^E	100 (7.5)	6.1–9.3	<0.001 ^E
Year ^C							
2007	1510	881 (58.3)	52.2–64.2	0.15 ^F	160 (10.6)	9.3–12.1	<0.001 ^F
2008	1589	973 (61.2)	57.1–65.2		256 (16.1)	14.4–18.0	
2009	1279	806 (63.0)	55.9–69.6		215 (16.8)	14.5–19.5	
Clinic location ^G							
Major city	2207	1237 (56.0)	50.5–61.5	0.58	215 (9.7)	8.8–10.8	0.91
Not a major city	1645	964 (58.6)	50.6–66.2		162 (9.9)	8.5–11.4	

^AOnly baseline negative tests with at least 15 months of follow-up data are included.

^BOverall refers to the reporting period 2007–10 (17 clinics provided data in 2007–10; 8 clinics provided data in 2007–09).

^CCalculated separately by year, based on the first test in each year. An individual may be counted in more than one year (totals will not add up to overall).

^DComparing 16–19-year-olds with 20–24-year-olds.

^EComparing 16–19-year-olds with 25–29-year-olds.

^FComparing all years.

^GLocation is based on clinic postcode and is classified according to the Australian Standard Geographical Classification Remoteness Areas.

Discussion

Mathematical modelling suggests that achieving a minimum annual chlamydia testing level of 30% among young people in Australia could halve the prevalence of chlamydia within a decade.⁶ In this study, we found that annual testing rates were approximately one-third of this benchmark. Over half of clinic attendees with an initial negative test reattended in 9–15 months, but only 10% were retested. This suggests that not only is the chlamydia testing rate low in young people attending GP clinics but there are many missed opportunities for regular testing, as recommended in Australian guidelines for general practice.¹⁰ Considerable work is needed to reach the 30% target to reduce chlamydia prevalence in young people. Strategies to introduce testing opportunistically when young people reattend as well as more proactive strategies to encourage young people to attend more regularly should be investigated.

Although reattendance and retesting rates were low, reattendance and retesting was higher among females than males. The higher retesting rate for females is consistent with chlamydia testing patterns in Australia^{11,16} and the United Kingdom.¹⁷ Several Australian studies have suggested that healthcare seeking behaviour is lower in males than females in both general practice and sexual health service settings,^{11,18} and females are more likely to attend for sexual or reproductive health concerns.¹⁹ GPs therefore have more opportunities to test females, whereas consultations for males are often unrelated to sexual health.^{20,21} Additionally, GP guidelines during the study

period only recommended annual screening among sexually active females,²² potentially reducing the frequency of chlamydia testing in males.

This study has some limitations. There may be bias in annual analyses of testing rates: those testing positive previously may be preferentially retested by either the GP or because of the patients' own health seeking behaviour. Retesting rates may be underestimated if people received a retest at another service; young people are less likely to have a regular GP than older people,²³ although this is unlikely to account for the overall low level of retesting observed. We also excluded annual retesting in those with an initial positive test among those without adequate follow-up time, potentially underestimating the retesting level. In addition, our analysis is based on GP clinics that may be proactive in sexual health, given their involvement in ACCESS; however, testing rates were similar to national GP chlamydia testing data.¹³

In conclusion, testing and retesting rates by GPs are inadequate and need to improve considerably to reduce chlamydia prevalence in Australia. Several opportunities for chlamydia screening in patient re-attendances were missed, and strategies are needed to promote regular attendance and testing to both patients and clinicians.

Conflict of interest

None declared.

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References

- 1 Department of Health and Ageing (DoHA). Number of notifications of chlamydial infections, Australia, 2012 by age group and sex. National Notifiable Diseases Surveillance System. Canberra: DoHA; 2012.
- 2 Low N. Current status of chlamydia screening in Europe. *Eurosurveillance* 2004; 8: 5.
- 3 Haggerty CL, Gottlieb SL, Taylor BD, Low N, Xu F, Ness RB. Risk of sequelae after *Chlamydia trachomatis* genital infection in women. *J Infect Dis* 2010; 201: S134–55. doi:10.1086/652395
- 4 Hocking JS, Walker J, Regan D, Chen MY, Fairley CK. Chlamydia screening – Australia should strive to achieve what others have not. *Med J Aust* 2008; 188: 106–8.
- 5 Nelson HD, Helfand M. Screening for chlamydial infection. *Am J Prev Med* 2001; 20: 95–107. doi:10.1016/S0749-3797(01)00253-7
- 6 Regan DG, Wilson DP, Hocking JS. Coverage is the key for effective screening of *Chlamydia trachomatis* in Australia. *J Infect Dis* 2008; 198: 349–58. doi:10.1086/589883
- 7 Shaw K, Stephens N, Coleman D, O'Sullivan M. Role of the general practitioner in testing for genital *Chlamydia trachomatis* infection: an analysis of enhanced surveillance data. *Sex Health* 2009; 6: 208–12. doi:10.1071/SH09010
- 8 Turner KME, Homer PJ, Trela-Larson L, Sharp M, May M. Chlamydia screening, retesting and repeat diagnoses in Cornwall, UK 2003–2009. *Sex Transm Infect* 2013; 89: 70–5. doi:10.1136/sextrans-2012-050696
- 9 US Preventive Services Task Force. Screening for chlamydial infection. Rockville, MD: US Preventive Services Task Force; 2007. Available online at: <http://www.uspreventiveservicestaskforce.org/uspstf/uspstf.htm> [verified 3 July 2014].
- 10 The Royal Australian College of General Practitioners (RACGP). Guidelines for preventive activities in general practice, 8th edn. Melbourne: RACGP; 2012.
- 11 Bowring AL, Gouillou M, Guy R, Kong FYS, Hocking J, Pirota M, *et al*. Missed opportunities – low levels of chlamydia retesting at Australian general practices, 2008–2009. *Sex Transm Infect* 2012; 88: 330–4. doi:10.1136/sextrans-2011-050422
- 12 Bowring AL, Gouillou M, Guy R, Kong FYS, van Gemert C, Goller JL *et al*. Chlamydia repeat testing and positivity rates at general practices and family planning clinics in Australia, 2008–2009. In The Royal Australasian College of Physicians, editors. Proceedings of the 2011 Australasian Sexual Health Conference; 28–30 September 2011; Canberra. Canberra: Australasian Sexual Health Conference; 2011; Abstract no. 468
- 13 Kong FY, Guy RJ, Hocking JS, Merritt T, Pirota M, Heal C, *et al*. Australian general practitioner chlamydia testing rates among young people. *Med J Aust* 2011; 194: 249–52.
- 14 Low N, Forster M, Taylor SN, Nsuami J. Repeat chlamydia screening among adolescents: cohort study in a school-based programme in New Orleans. *Sex Transm Infect* 2013; 89: 20–4. doi:10.1136/sextrans-2011-050469
- 15 Guy RJ, Kong F, Goller J, Franklin N, Bergeri I, Dimech W, *et al*. A new national chlamydia surveillance system in Australia: evaluation of the first stage implementation. *Commun Dis Intell Q Rep* 2010; 34: 319–28.
- 16 Sawleshwarkar S, Harrison C, Britt H, Mindel A. Chlamydia testing in general practice in Australia. *Sex Health* 2010; 7: 484–90. doi:10.1071/SH09110
- 17 Kufeji O, Slack R, Cassell JA, Pugh S, Hayward A. Who is being tested for genital chlamydia in primary care? *Sex Transm Infect* 2003; 79: 234–6. doi:10.1136/sti.79.3.234
- 18 Guy R, Wand H, Franklin N, Fairley CK, Chen MY, O'Connor CC, *et al*. Re-testing for chlamydia at sexual health services in Australia, 2004–08. *Sex Health* 2011; 8: 242–7. doi:10.1071/SH10086
- 19 Bayram C, Britt H, Kelly Z, Valenti L. Male consultations in general practice in Australia 1999–00. General practice series no. 11. Canberra: Australian Institute of Health and Welfare; 2003.
- 20 Merritt TD, Durrheim DN, Hope K, Byron P. General practice intervention to increase opportunistic screening for chlamydia. *Sex Health* 2007; 4: 249–51. doi:10.1071/SH07033
- 21 McNulty CA, Freeman E, Bowen J, Shefras J, Fenton KA. Barriers to opportunistic chlamydia testing in primary care. *Br J Gen Pract* 2004; 54: 508–14.
- 22 The Royal Australian College of General Practitioners (RACGP). Guidelines for preventive activities in general practice (8th edn). Melbourne: RACGP; 2012.
- 23 McRae I, Yen L, Gillespie J, Douglas K. Patient affiliation with GPs in Australia – who is and who is not and does it matter? *Health Policy* 2011; 103: 16–23. doi:10.1016/j.healthpol.2010.09.002