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Prevalence of other sexually transmissible infections in patients with newly diagnosed anogenital warts in a sexual health clinic

Elizabeth A. Sturgiss[A,D], *Fengyi Jin*[B], *Sarah J. Martin*[A,C], *Andrew Grulich*[B] *and Francis J. Bowden*[A,C]

[A]Canberra Sexual Health Centre, The Canberra Hospital, Yamba Drive, Garran, ACT 2605, Australia.
[B]National Centre in HIV Epidemiology and Clinical Research, University of New South Wales, Level 2, 376 Victoria Street, Sydney, NSW 2010, Australia.
[C]Academic Unit of Internal Medicine, The Australian National University Medical School, Canberra, ACT 2600, Australia.
[D]Corresponding author. Email: elizabeth.sturgiss@act.gov.au

Abstract. ***Background*:** Anogenital warts are a common initial presentation to the Canberra Sexual Health Centre. It is anticipated that the introduction of human papillomavirus vaccination will reduce the incidence of anogenital warts. The present study determines the prevalence of other sexually transmissible infections in patients newly diagnosed with warts who may not have presented for screening without the impetus of a genital lump. ***Methods*:** The prevalence of other sexually transmissible infections in new patients presenting to the Canberra Sexual Health Centre diagnosed with anogenital warts was determined from a retrospective clinical audit from 2002 to 2007. ***Results*:** A total of 1015 new patients were diagnosed with anogenital warts. Of this total cohort, 53 (5.2%) were found to be co-infected with either chlamydia and/or gonorrhoea. Only 13.2% of co-infected patients reported symptoms other than genital lumps. Of co-infected patients 11.3% reported contact with a partner with chlamydia and/or gonorrhoea. Not all patients were screened for other sexually transmissible infections: 762 (75.1%) were screened for chlamydia and 576 (56.7%) were screened for gonorrhoea. Of those tested, 6.8% of men and 6.9% of women were positive for chlamydia highlighting the importance of offering full sexually transmissible infection screening in those newly diagnosed with anogenital warts. Chlamydia was more common in younger patients who reported a higher number of sexual partners. ***Conclusions*:** It is anticipated that human papillomavirus vaccination will lead to a decline in anogenital wart incidence as well as other human papillomavirus associated disease. Although one opportunity for testing for other sexually transmissible infections may be lost in this population, the decrease in anogenital warts will leave clinicians with more time to pursue other screening programs. Education and screening campaigns should continue to focus on the asymptomatic nature of the majority of sexually transmissible infections.

Additional keywords: Australia, genital warts, human papillomavirus, vaccination.

Introduction

Anogenital warts caused by human papillomavirus (HPV) types 6 and 11[1] are one of the most common sexually transmissible infections (STIs) treated at the Canberra Sexual Health Centre (CSHC). Infection with one STI is an indicator that a patient is more likely to be infected with other STIs,[2] and because many STIs are asymptomatic or cause minimal symptoms, patients are frequently unaware that they have an infection.[3] Without the impetus of new genital lumps, patients may not present to a clinic to be tested.

The National HPV Vaccine Program commenced in Australia in April 2007 and provided free HPV vaccine (Gardasil; Merck Sharp & Dohme, CSL Biotherapies Pty Ltd, Parkville, Victoria, Australia) to all women and girls aged between 12 and 26. Gardasil is a quadrivalent human papillomavirus recombinant vaccine, providing immunity to the two types of HPV (16, 18) that cause 70% of cervical cancers in Australia as well as the two types (6 and 11) that cause over 90% of anogenital warts.[1] It is anticipated that over time the incidence of anogenital warts will decline dramatically in the vaccinated cohort.[4,5]

Data from the USA indicate that the decrease in genital warts would reduce the workload of sexual health clinics, without greatly affecting the diagnosis of other STIs.[6] In the present paper we determined how many patients initially presenting to CSHC with genital warts were diagnosed with another STI at the same visit.

Methods

A retrospective clinical audit was conducted of all new patient files at CSHC who presented between July 2002 and July 2007.

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CSHC is an urban outpatient clinic associated with a tertiary hospital. Patients are able to self-refer or may be referred by another practitioner. Only new patients were included in the study sample as they were identified as the group most at risk of not presenting for STI screening without the motivation of a genital lump.

Data were drawn from the standardised consultation form completed by clinicians for each patient visit. The provisional diagnosis at the initial visit of each new patient was assessed and any file that included a diagnosis of 'genital warts', 'perianal warts', 'anogenital warts', 'warts', or 'HPV' was included. The diagnostic criterion for genital warts was clinical with biopsy in cases where there was diagnostic doubt.

Characteristics of the patients were collated including age, gender, country of birth, sex of sexual partners, reported number of sexual partners and previous history of STI, STI screening tests and results.

Urine, vaginal swabs and rectal swabs were tested by polymerase chain reaction (PCR) for chlamydia and gonorrhoea (Roche CT/NG Cobas, Roche Diagnostics Systems, Brachberg, NJ, USA). Blood specimens were screened for hepatitis B virus surface antigen and surface antibody and HIV antibodies (Vitros ECI, Ortho Clinical Diagnostics, Johnson & Johnson, Amersham, Buckinghamshire, UK) and syphilis (Syphilis EIA No 1 to May 2004, No 2 thereafter, Newmarket Laboratories Ltd, Landwades, Kentford, UK). If clinically indicated, samples were tested for hepatitis A virus (VIDAS, BioMerieux, Durham, NC, USA) and HCV antibodies (Vitros ECI).

Statistical analyses were performed using STATA 10.0 (STATA Corporation, College Station, TX, USA). Differences in patients with and without other STIs were tested using *t*-test, χ^2 test and Mann–Whitney test as appropriate.

Patients who were positive for hepatitis C only were not included in the analysis for co-infected patients as the risk factors associated with hepatitis C acquisition are different to those for other STIs.[7]

This study was approved on 17 March 2008 by the Australian Capital Territory Health Human Research Ethics Committee.

Results

A total of 9425 new patients were seen over the 5-year period of which 10.8% were diagnosed with anogenital warts ($n = 1015$). A total of 577 (56.8%) of the group were male and 437 (43.1%) were female. The median age for the patients with anogenital warts was 25 years with a range of 14 to 73 years. Of the new cases 93.6% identified as heterosexual, ($n = 948$; 537 male and 411 female), 3.4% ($n = 34$), as male homosexual (men who have sex with men (MSM)) and 3.1% ($n = 31$; 14 male and 17 female) as bisexual. No women reported only having female partners.

Sexually transmissible infection screening was not completed in every patient (Table 1). A total of 75.1% of patients were tested for chlamydia with only 3.1% tested for rectal chlamydia. Testing for gonorrhoea was done in 56.7% of patients. Only 54.0% of patients underwent screening for HIV and syphilis. Regular blood donors and those that declined screening did not undergo testing.

As shown in Table 2, blood-borne virus (BBV) screening was completed more often for male patients, MSM, patients identifying as bisexual and those with a higher number of partners in the past 3 and 6 months. Testing for chlamydia was completed more often in those reporting a higher number of partners, but was not different in men and women or homosexual patients. Gonorrhoea testing was completed more often for male homosexual patients and those with a higher number of reported partners.

Table 1. Prevalence of testing for and diagnosis of another sexually transmissible infection (STI) among people diagnosed with anogenital warts at their first visit to Canberra Sexual Health Centre

	Tested		Tested positive	
	N	%	*n*	%
Chlamydia				
Female: urethral/cervical	333	76.2	23	6.9
Male: urethral	428	74.2	29	6.8
Rectal	31	3.1	1[A]	3.2
Gonorrhoea				
Female: urethral/cervical	260	59.5	2[B]	0.8
Male: urethral	311	53.9	1[C]	0.3
Pharyngeal	64	6.3	0	0.0
Rectal	34	3.4	0	0.0
HIV	548	54.0	0	0.0
Syphilis	548	54.0	0	0.0
Hepatitis B	460	45.3	0	0.0
Hepatitis C	303	29.9	17	5.6

[A]Positive rectal chlamydia in a male patient.
[B]One infection only confirmed on culture.
[C]Confirmed on culture.

Fifty-three (5.2% of all patients initially presenting with anogenital warts) patients were found to be co-infected with another STI, with three patients having both chlamydia and gonorrhoea. The overall prevalence of chlamydia in those tested was 6.8% in males (urethral samples) and 6.9% in females (urethral or vaginal samples). Only one male patient was found to have urethral gonorrhoea and this was confirmed on culture. Two female patients were positive for gonorrhoea on a vaginal swab via PCR; however, only one of these infections was confirmed on culture.

From 2000 to 2002 the clinic policy was to offer testing to all patients for the hepatitis C as part of BBV screening. After this period only patients with identified potential exposures were offered testing. A total of 29.9% of patients were tested for hepatitis C with 5.6% of these testing positive.

Individuals that tested positive for at least one other STI had an average age of 23.3 years, and those without an STI 27.9 years ($P < 0.001$, *t*-test) (Table 3). Those who were diagnosed with another STI reported significantly more sexual partners over the past 3 (3.1 ± 5.5) and 12 months (9.7 ± 20.6) than those without another STI (past 3 months 1.3 ± 1.7 and 12 months 2.7 ± 4.1, $P < 0.001$).

Seven of the 53 patients with another STI had self-reported symptoms other than genital lumps (13.2%). The symptoms included dysuria, urethral discharge and vaginal discharge. The one male patient positive for gonorrhoea had dysuria and the two female patients had dysuria and vaginal discharge. Six of the patients with another STI were contacts of a partner known to have chlamydia and/or gonorrhoea (11.3%), and only one of

Table 2. Characteristics of people diagnosed with anogenital warts at their first visit to Canberra Sexual Health Centre and screening for other sexually transmissible infections (STIs) and blood-borne viruses (BBVs)

	Screening not completed *n* (%)	Screening completed *n* (%)	*P*-value
BBV			
Gender			<0.001
Male	229 (52.4)	208 (47.6)	
Female	237 (41.1)	340 (58.9)	
Sex of sexual partners			<0.001
Heterosexual	451 (47.6)	497 (52.4)	
Homosexual	7 (20.6)	27 (79.4)	
Bisexual	7 (22.6)	24 (77.4)	
Number of partners past 3 months	1.2 ± 1.2	1.6 ± 2.6	<0.001
Number of partners past 12 months	2.2 ± 2.9	3.9 ± 8.1	<0.001
Gonorrhoea			
Gender			0.102
Female	176 (40.3)	261 (59.7)	
Male	262 (45.4)	315 (54.6)	
Sex of sexual partners			<0.001
Heterosexual	426 (44.9)	522 (55.1)	
Homosexual	2 (5.9)	32 (94.1)	
Bisexual	9 (29.0)	22 (71.0)	
Number of partners past 3 months	1.1 ± 0.9	1.6 ± 2.7	<0.001
Number of partners past 12 months	2.5 ± 5.6	3.5 ± 6.7	<0.001
Chlamydia			
Gender			0.499
Male	104 (23.8)	333 (76.2)	
Female	148 (25.7)	429 (74.4)	
Sex of sexual partners			0.024
Heterosexual	244 (25.7)	704 (74.3)	
Homosexual	3 (8.8)	31 (91.2)	
Bisexual	4 (12.9)	27 (87.1)	
Number of partners past 3 months	1.0 ± 0.7	1.5 ± 2.4	<0.001
Number of partners past 12 months	1.8 ± 1.8	3.5 ± 7.1	<0.001

these was symptomatic Information on other symptoms and known contact with an STI was not collected in patients with warts but without another STI (Table 3).

Discussion

Of the 1015 new patients with a diagnosis of anogenital warts, 762 (75.1%) were screened for chlamydia and 576 (56.7%) were screened for gonorrhoea. Fifty-three of the 1015 (5.2%) presenting with warts were found to be co-infected with one or both of these STIs. Three patients were positive for both chlamydia and gonorrhoea. Although the clinic policy is to screen all new patients for chlamydia, this was not performed in all cases. The low rates of rectal chlamydia screening reflect the clinic policy of only offering these tests to MSM and others practicing anal intercourse. Only 13.2% of the co-infected patients reported symptoms other than genital lumps. This is consistent with the known profile of chlamydia where asymptomatic infection is common.[3] 11.3% of the patients reported contact with a partner known to be positive for chlamydia or gonorrhoea. These patients were treated for infection at their initial visit pending confirmatory tests.

Taking into account the patients that had symptoms other than those related to anogenital warts, as well as those who were a known contact of an STI, it can be assumed that 41 of the 53 co-infected patients would not have presented to the clinic for screening if they had not had the impetus of new genital lumps (one patient was both a known contact as well as symptomatic). It is possible that co-infected asymptomatic patients would have developed symptoms over time that would prompt review; however, this lapse in time would increase the risk of transmission and complications.

There was a significant age difference in those with another STI with an average age of 23.3 years. This younger age group reflects the known prevalence of *Chlamydia trachomatis*, which is more common in the under 25 year age group. The number of notifications in this age group has steadily increased over recent years.[8–10]

In our sample the number of patients with genital warts who were tested and proved co-infected with chlamydia was high – 6.8% of men and 6.9% of women. These findings are similar to those seen in local priority populations tested during outreach services including MSM (chlamydia 8.7%), and young people at youth centres (chlamydia 4.8%).[11] The overall prevalence of

Table 3. Characteristics of people diagnosed with anogenital warts at their first visit to Canberra Sexual Health Centre with and without another sexually transmissible infection (STI) diagnosed at the same visit
MSM, men who have sex with men

	With another STI diagnosed at the same visit	Without another STI diagnosed at the same visit	*P*-value
Age	23.3 years	27.9 years	<0.001
Partners in past 3 months (mean, standard deviation)	3.1 ± 5.5	1.3 ± 1.7	<0.001
Partners in past 12 months (mean, standard deviation)	9.7 ± 20.6	2.7 ± 4.1	<0.001
Sex of sexual partners			0.449
Heterosexual	92.5%	93.7%	
MSM	1.9%	3.4%	
Bisexual	5.7%	2.9%	
Symptoms other than those related to warts reported by patient	13.2% ($n = 7$)	Not collected	
Known contact with a STI	11.3% ($n = 6$)	Not collected	

chlamydia in male patients seen at CSHC is 4.5% [95% confidence interval (CI) 3.7–5.4] for males, and in female patients 4.6% (95% CI 3.6–5.6).[12] This emphasises the importance of continuing to offer full STI screening in those with a diagnosis of anogenital warts.[13]

It is interesting to compare these results to the American cohort, where only 2% of men and 3% of women with warts were positive for chlamydia.[6] The study did not indicate the percentage of patients that were tested for other STIs, which may explain the lower rates of infection, as may cultural and social variations.

Just over half of the patient group were tested for HIV and syphilis. Blood-borne virus testing rates were less than expected. Some files indicated that the patient declined testing or had recently been screened elsewhere. Despite clinic policy to offer screening to all patients newly diagnosed with an STI, the low rate of blood testing may also reflect clinician risk assessment of a patient's reported behaviour with HIV and syphilis being most prevalent in the MSM community in Canberra.[9]

Only three patients over the 5-year period tested positive for *Neisseria gonorrhoeae* (one male and two female), all of whom had symptoms other than those related to warts. One of the female samples was positive on three consecutive PCR tests but was not confirmed on culture. The highest prevalence of gonorrhoea in the Canberra community is within the MSM population and the sample size only included a small proportion of MSM.[9] Screening of heterosexual people in Canberra for gonorrhoea is not cost effective and is no longer part of routine care.

Most patients with anogenital warts seen for the first time in the clinic reported heterosexual practices. However the clinic is accessed frequently by MSM. The low proportion seen in this sample may reflect that MSM attend the clinic on an initial visit for a reason other than warts, and so were under-represented in a sample of new patients. Anogenital warts are common in the male homosexual population. A Sydney based cohort of HIV-negative MSM found 20% had a history of anal warts and 10% had a history of genital warts.[14]

Of the patients who were screened for hepatitis C, 5.6% had evidence of current or previous infection, but no STI. This reasonably high prevalence reflects our current testing policy where only patients with risk factors are tested for hepatitis C.

As this was a retrospective clinical audit, limitations relate to the completeness and interpretation of the clinical file. The information for each patient was taken from standardised proformas, but it is possible that if a clinician did not include warts in their initial provisional diagnosis, the patient would not be included in the study.

Our data suggest that in our clinic population, one new case of chlamydia each month could be missed if genital warts are eradicated. This represents only a small proportion of the total number of cases of chlamydia diagnosed in the clinic each month. Although HPV vaccination may have the unintended consequence of removing a trigger for STI screening, we believe that this is unlikely to be of major importance to screening activities overall. A decline in symptomatic anogenital warts as well as other HPV-related disease would be welcomed by both clinicians and patients, and would provide opportunities for sexual health centres to develop further innovative strategies focussing on the asymptomatic nature of most STIs to increase the rate of screening in at risk groups.

Conflicts of interest

Andrew Grulich sits on the CSL Australia advisory board for the Gardasil quadrivalent HPV vaccine; and has received research funding from CSL Australia.

References

1 Garland SM, Hernandez-Avila M, Wheeler CM, Perez G, Harper DM, Leodolter S, *et al*. Quadrivalent vaccine against Human Papillomavirus to prevent anogenital diseases. *N Engl J Med* 2007; 356: 1928–43. doi:10.1056/NEJMoa061760

2 Handsfield HH. Principles of treatment of sexually transmitted diseases. In Holmes KK, Mardh P-A, Sparling PF, Lemon SM, Stamm WE, Piot P, *et al*., editors. Sexually Transmitted Disease. Third edn. New York: McGraw-Hill; 1999. pp. 711–22.

3 Bradford D. Testing for STIs and STI signs, symptoms and syndromes. In Bradford D, Hoy J, Matthews G, editors. HIV, viral hepatitis and STIs: a guide for primary care. Sydney: Australasian Society for HIV Medicine; 2008. pp. 80–9.

4 Adams M, Jasani B, Fiander A. Human papilloma virus (HPV) prophylactic vaccination: challenges for public health and implications for screening. *Vaccine* 2007; 25: 3007–13. doi:10.1016/j.vaccine.2007.01.016

5 May J. HPV vaccination: a paradigm shift in public health. *Aust Fam Physician* 2007; 36: 106–11.
6 Dempsey AF, Koutsky LA, Golden M. Potential impact of human papillomavirus vaccines on public STD clinic workloads and on opportunities to diagnose and treat other sexually transmitted diseases. *Sex Transm Dis* 2007; 34: 503–7.
7 Mapagu MC, Martin SJ, Currie MJ, Bowden FJ. Screening for hepatitis C in sexual health clinic attendees. *Sex Health* 2008; 5: 73–6. doi:10.1071/SH07034
8 Currie MJ, Bowden FJ. The importance of chlamydial infections in obstetrics and gynaecology: an update. *Aust N Z J Obstet Gynaecol* 2007; 47: 2–8. doi:10.1111/j.1479-828X.2006.00670.x
9 Currie MJ, Martin SJ, Soo TM, Bowden FJ. Screening for chlamydia and gonorrhoea in men who have sex with men in clinical and non-clinical settings. *Sex Health* 2006; 3: 123–6. doi:10.1071/SH05050
10 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
11 Sturrock CJ, Currie MJ, Vally H, O'Keefe EJ, Primrose R, Habel P, *et al*. Community-based sexual health care works: a review of the ACT outreach program. *Sex Health* 2007; 4: 201–4. doi:10.1071/SH07003
12 Currie M, Bowden FJ. An epidemic of infection, not just testing: chlamydia prevalence estimates in the Australian Capital Territory 1998–2004. *Aust N Z J Public Health* 2006; 30: 286–7. doi:10.1111/j.1467-842X.2006.tb00873.x
13 Mein J, Marshall L. Lumps and bumps. In Bourke S, editor. National Management Guidelines for Sexually Transmissible Infections. Melbourne: Sexual Health Society of Victoria, 2008. pp. 73–84.
14 Jin F, Prestage GP, Kippax SC, Pell CM, Donovan B, Templeton DJ, *et al*. Risk factors for genital and anal warts in a prospective cohort of HIV-negative homosexual men: the HIM study. *Sex Transm Dis* 2007; 34: 488–93.

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