

Management rates of sexually transmissible infections by Australian general practitioners, 2000–2012

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Abstract. **Background:** In Australia, general practitioners (GPs) manage the majority of sexually transmissible infections (STIs). Most STIs are diagnosed and treated by GPs as a result of symptom recognition or risk identification. We aimed to determine how frequently six common STIs were managed by GPs, the characteristics of the GPs and patients, and any changes over time. **Methods:** Data from the Bettering the Evaluation and Care of Health (BEACH) program for April 2000–March 2012 were analysed. BEACH is a national study of GP activity. The overall management rates of genital herpes (herpes simplex virus, HSV), genital warts, HIV, chlamydia (*Chlamydia trachomatis*), gonorrhoea (*Neisseria gonorrhoeae*) and syphilis were calculated. **Results:** In total, 11 784 GPs recorded details of 1 178 400 patient encounters. These included: 115 cases of genital HSV per 100 000 encounters, 92 of genital warts, 67 of HIV, 39 of chlamydia, 6 of gonorrhoea and 7 of syphilis. Higher management rates occurred among patients who were male, 15–24 years old, more socially advantaged, Aboriginal or Torres Strait Islander, resident in a major city or of English-speaking background. GPs who were female and those aged under 60 years had higher STI management rates than their counterparts. **Conclusions:** HSV and warts were the most common STIs managed. Lower management rates for the other STIs may reflect lower incidence or lower testing rates, because these other STIs are frequently asymptomatic. It is important to determine whether existing approaches effectively target the most at-risk communities and what barriers to presentation exist.

Additional keywords: BEACH program, general practice, health services, primary care, public health.

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Introduction

In Australia, a large proportion of sexually transmissible infections (STIs) are managed (i.e. diagnosed, treated or otherwise dealt with) in general practice.¹ General practitioners (GPs) are the main providers of primary healthcare services, including sexual health, with 85% of the Australian population attending GPs in any one year.² GPs are also the gatekeepers to government-subsidised care by other health professionals. They are in a position to initiate discussions on sexual health and encourage targeted testing for people they consider to be at risk, thus reducing the pool of undiagnosed and untreated STIs in the community. The role of GPs is supported and made clear by the Second National Sexually Transmissible Infections Strategy 2010–2013.³

Australia has a network of publicly funded sexual health services (PFSHS), but the majority of STIs are diagnosed and treated in general practice as a result of symptom recognition or identification of risk.^{4,5} Recent data indicate that PFSHS

diagnosed only about a quarter of total diagnosed notifiable STIs in New South Wales.¹ This included 25% each for syphilis and gonorrhoea (*Neisseria gonorrhoeae*), and 14% of diagnosed chlamydia (*Chlamydia trachomatis*) infections.¹ Despite this, tests to diagnose or exclude specific STIs are seldom ordered by GPs and symptomatic management is common.⁶

In a study by Johnston and colleagues over the period 1998–2001, researchers found that, at 303 000 GP–patient encounters, GPs managed only 521 STI problems.⁷ The most frequently managed STIs were viral, including genital herpes (herpes simplex virus (HSV); 80 per 100 000 encounters) and genital warts (70 per 100 000 encounters); bacterial and protozoal STIs were rarely managed. Additionally, the 521 patients who had an STI managed were mostly female (63.1%), had problems previously managed by a medical practitioner (67.2%) and had been previously seen at the practice (88.1%), and a minority (6.3%) came from a non-English speaking background. They also found that,

compared with their colleagues, GPs managing STIs were more likely to be young, female, Australian graduates and working in urban practice. They were likely to have been in practice for a shorter period, to work fewer sessions per week and to work in larger practices.^{6,7}

There have been significant changes both in the diagnostic technologies available and in the epidemiology of STIs in the last decade or so. An evidence-based approach is required to determine priorities for GP workforce development, population-based health promotion, access to medical care and health service planning strategies.

This study therefore aimed to determine: (a) how frequently six common STIs (chlamydia, genital HSV, genital warts, gonorrhoea, HIV/AIDs and syphilis) were managed by GPs; and (b) the characteristics of the GPs and patients at these encounters. These STIs were chosen because they have public health implications.

Methods

Data from the Bettering the Evaluation and Care of Health (BEACH) program collected from April 2000 to March 2012 inclusive were analysed. BEACH methods have been previously described in detail.² In summary, BEACH is a continuous, paper-based national study of GP activity in Australia. Each year, as part of a national rolling random sample of 1000 GPs, each GP provides information on 100 consecutive GP–patient encounters (including consultations, GP–patient phone discussions, prescription requests etc.) with consenting, unidentified patients. BEACH collects GP and practice characteristics and, for each encounter, patient characteristics, patient reasons for encounter (up to three), problems managed (up to four) at the encounter and the management actions undertaken for each problem managed (any problem dealt with at the encounter by the GP). The management rate of a specified problem is the average number of these problems recorded per 100 000 encounters. Management actions include any medications, referrals, tests and investigations ordered; clinical treatments given (e.g. counselling, advice or education) and procedures undertaken at the encounter.

Problems managed at encounters are coded with the Australian general practice ‘Plus’ terminology,⁸ automatically

classified to the International Classification of Primary Care (2nd edition) (ICPC-2).⁹

The six STIs were defined as follows using the three digit ICPC-2 codes or, where necessary, the six digit PLUS codes:¹⁰ (genital) HSV (X90 and Y72), genital warts (X91 and Y76), HIV/AIDS (B90), chlamydia (X92, Y99018 and U72010), gonorrhoea (X71 and Y71) and syphilis (X70 and Y70).

For each problem, the management rate per 100 000 encounters was separately calculated for each of the two 6-year periods: April 2000–March 2006 (Period 1) and April 2006–March 2012 (Period 2). These periods were then compared in terms of:

- the patient characteristics (sex, age, social advantage, self-identified Aboriginal or Torres Strait Islander (Indigenous) status, rurality and self-identified non-English speaking background) of those who were managed for one or more STIs; and
- the GP characteristics (sex, age and country of graduation) of those GPs who had managed at least one STI problem among the 100 patient encounters recorded in BEACH.

Further analyses were performed on the combined data of the full 12-year time span April 2000 – March 2012.

Social advantage was defined using the Australian Bureau of Statistics’ Index of Relative Socioeconomic Advantage and Disadvantage, applied to the patient’s residential postcode. This is one of four indexes that comprise the Socioeconomic Indexes for Areas.¹¹ Values 6 to 10 inclusive were considered to be more advantaged and values 1 to 5 inclusive were considered to be less advantaged.¹¹

The BEACH study uses a single-stage cluster design, with a cluster of 100 encounters around each GP. In all analyses, we adjusted for this cluster using survey procedures in SAS ver. 9.3 statistical software (SAS Institute Inc., Cary, NC, USA). The statistical significance of difference was determined by nonoverlapping 95% confidence intervals (CIs). It is a more conservative estimate of significant difference than the 5% level because it reduces the risk of Type I error but increases the risk of Type II error.

The BEACH program is approved by the University of Sydney Human Research Ethics Committee and the Australian Institute of Health and Welfare Ethics Committee.

Table 1. The problem management rate per 100 000 general practitioner (GP)–patient encounters for each sexually transmissible infection (STI)

	Period 1 April 2000–March 2006	Period 2 April 2006–March 2012	Total April 2000–March 2012
Encounters (<i>N</i>)	596 000	582 400	1 178 400
	Rate per 100 000 encounters (95% CI)	Rate per 100 000 encounters (95% CI)	Rate per 100 000 encounters (95% CI)
Herpes	96.1 (87.6–104.6)	133.6 (123.2–144.0) [^]	114.6 (107.9–121.4)
Genital warts	99.3 (89.8–108.9)	84.0 (74.8–93.1)	91.7 (85.1–98.4)
HIV/AIDS	52.9 (19.5–86.2)	81.7 (39.0–124.4)	67.1 (40.1–94.2)
Chlamydia	23.8 (19.3–28.3)	55.3 (48.6–62.0) [^]	39.4 (35.3–43.4)
Gonorrhoea	7.6 (5.0–10.1)	4.5 (2.3–6.6)	6.0 (4.4–7.7)
Syphilis	4.0 (2.0–6.1)	9.1 (5.8–12.4)	6.5 (4.6–8.5)
Total of all six STIs above combined	283.7 (243.1–324.3)	368.1 (318.0–418.2)	325.4 (293.3–357.6)

[^]Significant difference between periods. CI, confidence interval.

Results

From April 2000 to March 2012, 11 784 GPs took part in the BEACH study, collectively recording the details of 1 178 400 patient encounters. There were 3835 of the selected STIs managed at these encounters, a management rate of 325 STIs per 100 000 encounters. This included 115 management occasions of HSV per 100 000 encounters, 92 of genital warts, 67 of HIV, 39 of chlamydia, 6 of gonorrhoea and 7 of syphilis per 100 000 encounters. From Period 1 to Period 2, there were significant increases in the management rate of HSV (from 96.1 to 133.6 per 100 000 encounters) and of chlamydia (from 23.8 to 55.3 per 100 000). There were no significant changes in management rates of the other selected STIs between Periods 1 and 2 (Table 1).

The two 6-year periods were compared in terms of the characteristics of the patients with STIs managed and of the GPs who managed them. There were no significant differences in the characteristics of these patients between Period 1 and Period 2, except for a higher proportion of patients in the 45- to 64-year-old age group in Period 2 (27.8%, 95% CI: 24.6–31.0) than in Period 1 (18.5%, 95% CI: 15.9–21.2) and a lower proportion in the 25- to 44-year-old age group in Period 2 (47.0%, 95% CI: 44.5–49.5) versus Period 1 (52.7%, 95% CI: 50.0–55.4). There were no significant differences in the GP characteristics between Period 1 and Period 2, except for a higher proportion of GPs in the 60 years or over age-group in Period 2 (17.7%, 95% CI: 15.6–19.8) than in Period 1 (13.6%, 95% CI: 11.5–15.6).

As the two 6-year periods were otherwise similar in the characteristics of these patients and GPs, they were combined into a single 12-year time span (April 2000–March 2012) for the purpose of calculating the patient and GP characteristic-specific STI management rates (Table 2). STIs were managed significantly more often at encounters with males, 15- to 24-year-olds, more socially advantaged patients, those self-identifying as Indigenous, those resident in a major city and those of English-speaking background. Female GPs and GPs aged less than 60 years had higher STI management rates than their counterparts.

Figure 1 illustrates the annual management rates of each of the six specified STIs for each of the 12 BEACH years (April to March inclusive). The increases in the rates of management of genital HSV and of chlamydia are demonstrated here. Figure 2 shows the annual rates of management of all six specified STIs combined for each of the 12 BEACH years.

Discussion

This study has provided problem management rates of STIs in general practice in Australia over the 12-year study period. It has shown that Australian GPs manage the six selected STIs at a rate of 325 STIs per 100 000 encounters, which is relatively infrequent when compared with, for example, nearly 1700 nonvenereal lower urinary tract infections per 100 000 encounters in 2011–12.² The overall management rate for all six identified STIs combined did not change significantly over the 12-year study period, but there were variations in the management rates of individual STIs.

Table 2. The univariate problem management rate of all six specified sexually transmissible infections (STIs) combined per 100 000 general practitioner (GP)–patient encounters for each patient or GP characteristic

The six specified STIs are herpes, genital warts, HIV, chlamydia, gonorrhoea and syphilis. CI, confidence interval; ATSI, Aboriginal or Torres Strait Islander; NESB, non-English speaking background

	Management rate per 100 000 GP–patient encounters (95% CI)
Total	325.4 (293.3–357.6)
Analysis period	
1: April 2000–March 2006	283.7 (243.1–324.3)
2: April 2006–March 2012	368.1 (318.0–418.2)
Patient sex	
Male	416.1 (341.7–490.5)
Female	267.1 (253.0–281.2)
Patient age group	
0–14 years	22.8 (14.4–31.2)
15–24 years	814.5 (752.9–876.2)
25–44 years	674.2 (597.2–751.3)
45–64 years	280.9 (232.0–329.8)
65+ years	34.3 (27.2–41.4)
Patient social advantage	
Less advantaged	201.2 (183.4–219.0)
More advantaged	379.2 (336.2–422.2)
Patient ATSI status	
ATSI	570.0 (436.7–703.2)
Not ATSI	335.4 (298.3–372.4)
Patient residence	
Major city	365.5 (321.6–409.5)
Not a major city	236.0 (217.6–254.3)
Patient NESB status	
English-speaking	335.7 (301.6–369.9)
NESB	230.7 (171.3–290.2)
GP sex	
Male	272.5 (238.8–306.2)
Female	420.0 (353.7–486.3)
GP age group	
0–39 years	402.2 (353.4–451.0)
40–59 years	342.4 (296.1–388.7)
60+ years	209.5 (158.6–260.3)
GP country of graduation	
Australia	336.4 (296.2–376.7)
Not Australia	297.3 (247.0–347.7)

In Australia, the major bacterial STIs (gonorrhoea, syphilis and chlamydia), as well as HIV, are notified by laboratories to the State or Territory Departments of Health to the National Notifiable Diseases Surveillance System maintained by the Commonwealth Department of Health and Ageing in partnership with the Kirby Institute for Infection and Immunity in Society. Each of these infections shows a different pattern of notifications over time¹² and this is reflected in the management rates for STIs in the BEACH database.

Regarding individual STIs, GP management rates of chlamydia and HSV increased significantly in Period 2 compared with Period 1. This is consistent with the known

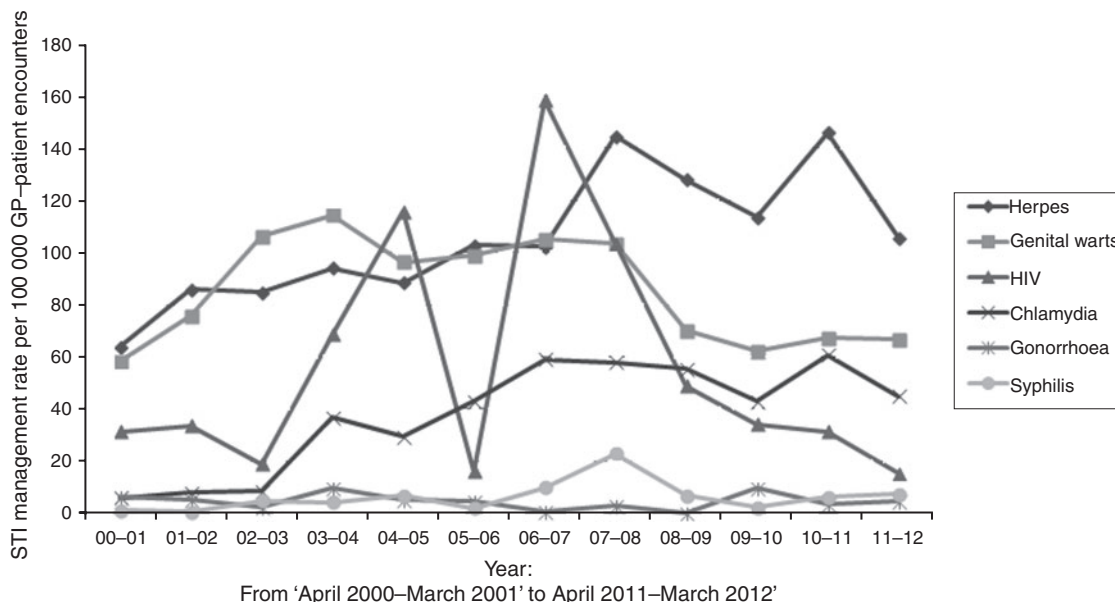


Fig. 1. Sexually transmissible infection (STI) problem management rate.

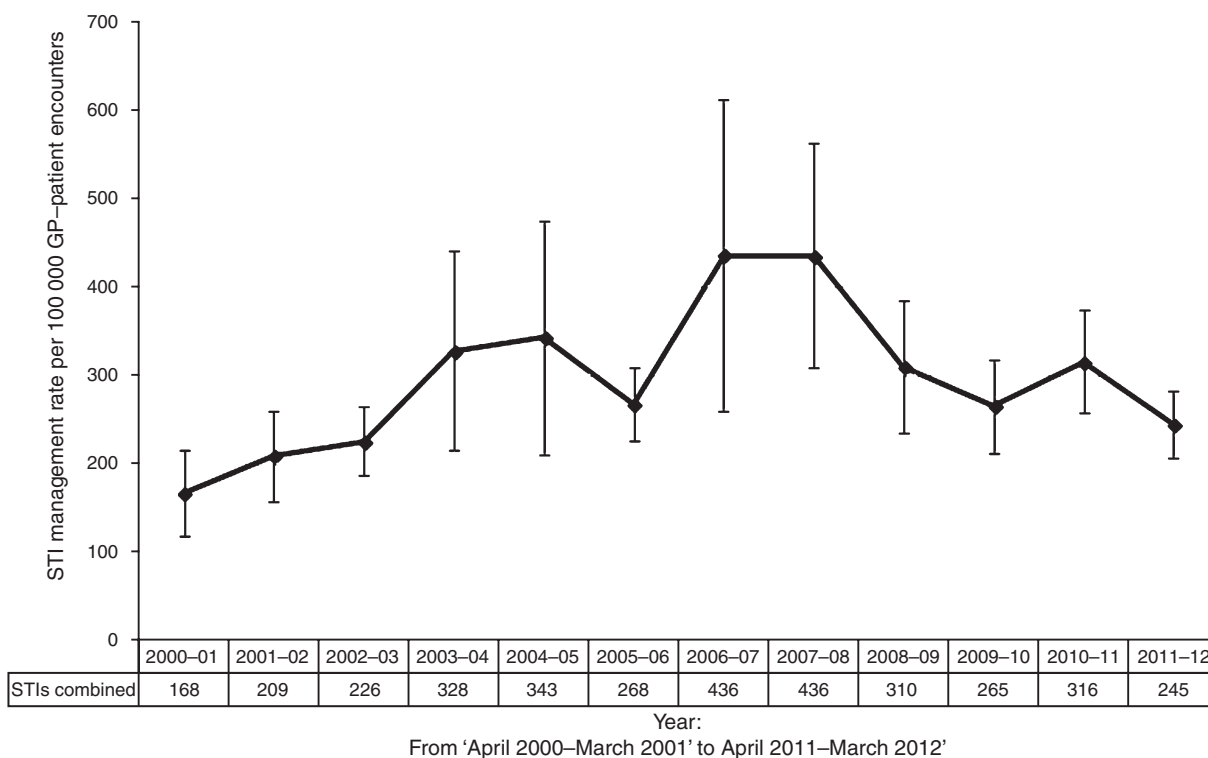


Fig. 2. Management rate of all six specified sexually transmissible infections combined. Bars indicate 95% confidence intervals.

increase in chlamydia incidence from other studies, particularly in young people (15- to 29-year-olds).¹² Furthermore, between 2001 and 2011, the notifications of chlamydia infection more than tripled, from 130 to 435 per 100 000 population.¹² Our study has similarly shown an increase in chlamydia management rates in the BEACH encounters over the same period (Fig. 1).

A recent study, which reported that only 14% of chlamydia diagnoses were made in the PFSHS, suggests that GPs have a major role in chlamydia management.¹ The increase in chlamydia notifications may be due both to an increased true incidence and to increased testing for chlamydia by healthcare providers. A recent paper from Ali *et al.* concluded that caution

is needed in interpreting chlamydia notification trends without knowledge of the numbers tested, as most of the increase in notifications may be attributable to increased testing. This paper reported a 111.5% increase in Medicare-rebated chlamydia testing (as a measure of general practice test orders) from 2005 to 2010, compared with only a 43% increase in prevalence as measured by national notification rates over the same period.¹³

Infection with HSV is not notifiable in Australia. Based on data collected in 2000, ~1 in 8 Australians aged 25 years and over has serological evidence of Type 2 infection and furthermore, three out of four Australians also have Type 1 infection, which may cause anogenital symptoms.¹⁴ Our study has shown that genital HSV was the most frequently managed of our six identified STIs and that its management rate significantly increased over time. Most individuals who are seropositive to HSV rarely, if ever, develop clinical disease and it is not clear why GPs should be managing more cases.

Possible explanations include: higher infection rates, more frequent symptomatic disease, management of HSV-like symptoms in unconfirmed cases leading to overdiagnosis, or an increased tendency to test due to the wider availability of HSV antibody testing.

There were no overall changes in the BEACH management rates for other STIs during the study period. However, the management rate of genital warts declined in the more recent 6-year period. This finding is consistent with the decreased prevalence of genital warts reported by sexual health clinics after the introduction of prophylactic human papillomavirus vaccination for females in 2007 in Australia.^{15–17} The expansion of the vaccine program to males in 2013 is likely to reinforce this trend and to lead to a continued reduction in cases of genital warts managed by GPs.

Although there have been marked increases in the rates of syphilis and gonorrhoea nationally during the study period, this is not reflected in this study's management rates in general practice.¹⁸ Syphilis and gonorrhoea are largely diagnosed in men who have sex with men, who may be more likely to present to PFSHS than to GPs.¹ Any reduction in PFSHS would therefore need to be associated with mechanisms to facilitate these men's access to GPs.

National data indicate that there was a 58% increase in the number of new HIV diagnoses in Australia, from 719 in 1999 to 1137 in 2011.¹⁹ Our BEACH management rates for HIV showed considerable variation over the study period, with spikes in 2003–04 and 2006–07. These spikes could be due to sampling effects, such as the random inclusion of a small number of GPs in each of the two 6-year samples who managed HIV at a much higher than average rate.

We found no significant changes over time in the characteristics of patients at STI encounters, except that a greater proportion of patients were aged 45–64 years and a lesser proportion was aged 25–44 years, in the later 6-year timeframe. This is consistent with the overall aging of patients at GP encounters in Australia.²⁰

Female GPs and GPs aged less than 60 years had higher STI management rates than their counterparts. This aligns with our previous findings that younger GPs are more likely (than older GPs) to manage patients with STIs and sexual health

problems, and to test patients for chlamydia and HIV.^{6,7} The higher proportion of GPs who were in the 60 years or over age group in Period 2 compared with Period 1 is consistent with the aging of the practising GP population in Australia over time, which is reflected in the representative GP samples drawn each year in BEACH.²⁰

The strengths of this study are that: (a) BEACH is an encounter-based database, reflecting the true clinical workload of general practice; (b) the random sampling of GPs, with weighting of data in analyses where appropriate, ensures that BEACH data are representative of the activities of all practising GPs in Australia;² and (c) the relatively large number of encounters sampled (over 1 million) improves the precision of the results compared with smaller studies. The statistical correction for the cluster effect produces robust 95% CIs.

The weaknesses of this study include: (a) the lack of longitudinal information about each patient's condition and management; (b) the potential lack of data regarding any relevant comorbidities that might not be managed at the encounter; (c) the reality that GP diagnoses are not necessarily based on laboratory confirmations; and (d) the fact that some STIs, particularly syphilis and gonorrhoea, are more geographically concentrated than others, so there is potential in an individual year of BEACH data for under- or over-representation of some high-risk populations such as rural and remote Indigenous populations.

Each selected STI managed by a GP in this study may be a new problem or may be a previously diagnosed problem (managed at a follow-up encounter). Therefore, viral conditions such as HSV and genital warts, which typically require multiple attendances for management and control, are managed at higher rates per 100 encounters than the bacterial STIs, which typically require fewer attendances for management and control.

PFSHS are increasingly focussed on providing free, open-access specialised services for complex cases and for the marginalised who would not otherwise be able to obtain care. It is increasingly recognised that the diagnosis and management of STIs, including HIV, need to be offered in more settings than are currently available, and the development of point-of-care and rapid testing could accelerate this trend. General practice potentially has an important role in these developments; however, GPs may require greater resources and training to ensure that the majority of STIs are effectively managed in primary care. Future studies are needed to examine independent predictors of HSV and chlamydia management rates, as well as the higher rate of management in urban areas. Ultimately, this will result in a more cost-effective and efficient general practice in Australia and, most importantly, an enhancement of the sexual health of the Australian population.

Conflicts of interest

None declared.

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