Genital Warts Incidence and Health Care Resource Utilisation in Australia

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MeSH words: condylomata acuminata; incidence; cost of illness; family practice; general practice

Word count – excluding title page, abstract, references, figure and tables: 2,594
ABSTRACT (251 words)

Objectives
To estimate for the first time the incidence and health care resource utilisation associated with genital warts (GW) in Australia prior to the HPV vaccination program.

Method
We analysed data from the nationally representative Bettering the Evaluation of Care and Health (BEACH) general practice cross sectional program and from the National Hospital Morbidity Database to estimate age-related incidence and community (non-hospital) and hospital-related costs (in 2009 Australian dollars) associated with medical treatment of genital warts.

Results
We estimated an annual incidence of 2.19 cases of genital warts per 1,000 Australians (95% CI: 1.88–2.49), with peak incidence in women aged 20–24 years at 8.61 cases per 1,000 and in men aged 25–29 years at 7.40 cases per 1,000. The estimated number of consultations per GW case was 2.9 (95% CI: 2.5–3.3) for women, and 2.8 (95% CI: 2.3–3.2) for men. Ablative treatments in general practice were more common in men (60% of consultations) than in women (37% of consultations). In contrast, more women (16% vs 8%) were referred to specialists and 75% of ablative procedures requiring hospitalisation were performed in women. The annual cost of management of GW is over A$14 million, with an estimated cost per treated case of A$251 for men and A$386 for women.

Conclusions
Genital warts impose a large health and cost burden on Australians. The national immunisation program with the quadrivalent human papillomavirus vaccine has the potential to greatly reduce this burden and future research measuring its impact is keenly anticipated.
INTRODUCTION

Assessments of the health and economic burden of genital warts (GW) are critical in evaluating the impact and cost-effectiveness of human papillomavirus (HPV) vaccination programs. While both licensed HPV vaccines protect women from oncogenic HPV types 16 and 18, which cause the majority of cervical cancers, the quadrivalent vaccine used in Australia also protects against HPV types 6 and 11 that cause approximately 90% of GW.[1] GW are one of the most common sexually transmitted viral infections with self-reported lifetime prevalence of approximately 4% in Australians aged 16–59 years,[2] 5.6% in Americans aged 18–59 years[3] and 11% in women aged 18–45 years in Nordic countries.[4] In the United Kingdom (UK), there has been a 29% increase in diagnoses of first episode genital warts reported between 1999 and 2008.[5]

In Australia, GW are primarily treated by general practitioners (GPs) (57%), with an additional 17% of people managed in sexual health clinics.[2] In this study we use data from a nationally representative general practice database and from the National Hospital Morbidity Database (NHMD), to estimate for the first time the incidence and health care resource utilisation associated with GW in Australia prior to introduction of the national HPV vaccination program.[6]

METHODS

Incidence of GW

Age-specific incidence of GW was estimated from the Bettering the Evaluation of Care and Health (BEACH) cross sectional database. Each year nationally representative random samples of approximately 1,000 practising GPs record details of 100 consecutive patient consultations.[7] Patient reasons for consultation, problems managed, therapeutic procedures, clinical treatments, referrals, pathology and imaging tests are classified using the International Classification of Primary Care – Version 2.[8] Medications are classified using the Anatomic Therapeutic Chemical (ATC) classification.[9]

From April 2000 to September 2006, consultations for female and male condylomata acuminata (ICPC-2 Codes X91 and Y76) were extracted. Incidence was estimated from the annualised consultation rate for ‘new’ GW problems (defined as those never managed by any doctor or a first medical consultation for a new episode of a recurrent problem, designated by GP at consultation), stratified by gender and age, extrapolated to the total annualised GP attendances over the same period,[10] and normalised to the corresponding 2004 Australian population.[11]

People with GW managed in sexual health clinics are not captured by BEACH. For every patient with GW managed by GPs, an estimated 0.298 are managed in sexual health clinics.[2] Therefore incidence rates were adjusted by multiplying by 1.298 to account for GW cases managed in sexual health clinics. Respondents not seeking medical treatment for GW are not accounted for in our estimates.

Health care burden of GW

We estimated two cost components: the cost per case of GW treatment by general practitioners and the cost per case of GW treatment in hospitals. The analysis is restricted to
direct medical costs incurred by government and/or patients. No additional societal costs are included. Costs are reported in 2009 Australian dollars. (On 6 November 2009, the A$ was worth approximately €0.61, £0.55, US$0.91 and C$0.97).

**General practice**

The annual national estimates of ‘new’ and ‘old’ GW cases were determined from BEACH. The average number of GP consultations per GW episode was obtained as the ratio: estimated annual total consultations for GW/estimated annual new consultations for GW.[12]

Costs of GP visits for GW were determined using the type of medical consultation reported in BEACH and its corresponding unit cost from the Medicare Benefits Schedule (MBS, August 2009; see appendix). Adjustments were made for Health Care Card (HCC) holders, where an additional reimbursement is paid to GPs for billing at the standard rate [13] and for non-HCC holders, where out-of-pocket expenses were included by multiplying the appropriate Medicare Benefit by a patient-billed relativity factor (1.59 for GP attendances).[14]

Full consultation costs were applied to the proportion of GP visits wherein only one problem was managed; if more problems were managed, the cost was divided by that number.

The rate of GP specialist referrals for GW was obtained from BEACH. The cost for an initial referred specialist consultation (appendix) was adjusted for out-of-pocket expenses for non-HCC holders as described above (patient billed relativity of 1.72).

The numbers and types of treatments prescribed, supplied or recommended for over-the-counter purchase for GW at consultations were obtained from BEACH. There is no additional reimbursement for ablative treatments performed as part of a GP consultation. Topical treatments unit costs were obtained from MIMS OnLine (appendix).[15]

Costs for sexual health clinic consultations were assumed to be equivalent to GP consultations.

Costs of pathology services could not be obtained from pathology orders data in BEACH and are excluded from this analysis.

**Hospital procedures**

Number and same-day status of hospitalisation episodes (public and private) for vulvovaginal, penile and anal warts (Australian Classification of Health Interventions (ACHI) procedure codes 35507, 36815, 32177 respectively) were determined from the National Hospital Morbidity Database (NHMD) from July 2000 to June 2007.[16]

Hospitalisation costs are reported for Australian Refined Diagnosis Related Groups (AR-DRG), which include multiple-day procedures. To estimate the costs of the GW procedures in public hospitals (appendix) the same-day Victorian cost weights for the DRG codes most closely related to each procedure (AR-DRG N09Z, M03B and G11B for vulvovaginal, penile and anal warts respectively)[17] [18] were applied to the average public hospitalisation cost for 2008–2009 (Public Weighted Inlier Equivalent Separation payment WIES15: $3,468). Costs in private hospitals were assumed to be equivalent to costs in public hospitals. A small
number of ablation treatments reimbursed as MBS items may be performed by specialists outside of hospital and hence have not been accounted for in our estimates.

Statistical analyses
BEACH is a cluster sample design with the GP as the primary sampling unit, and the GP-patient consultation as the unit of analysis. Robust 95% confidence intervals around the point estimates which account for the cluster sample design are reported, using procedures in SAS software (SAS version 9.1, SAS Institute, Cary, NC, USA). Non-overlapping 95% CIs indicate a statistically significant difference at $\alpha=0.05$.

RESULTS

National age-specific incidence of GW
From April 2000 to September 2006, data were available from 6,460 GPs for about 646,000 consultations (59% female, 41% male). GW were managed at 639 consultations (0.1%), with approximately 35% of these indicated as 'new problems'. Table 1 displays extrapolations from these data to estimate the annual number of new GW diagnoses in general practice and incidence rates. When adjusted for people presenting to sexual health clinics, there were approximately 43,900 (95% CI: 37,850–50,050) new cases of GW presenting annually (~23,350 female, 20,550 male), providing an annual incidence of 2.19 cases per 1,000 Australians (95% CI: 1.88–2.49).

Age and sex-specific rates of GW incident cases in Australia (BEACH adjusted for sexual health clinics) are presented in the Figure. GW incidence peaked in women aged 20–24 years at 8.61 cases per 1,000 and in men aged 25–29 years at 7.40 cases per 1,000.

Resource utilisation

General practice data
Extrapolating from the BEACH database from April 2000 to September 2006, we estimated 95,700 (95% CI 86,450 – 105,000) GP consultations per year for GW, 54% being with women (Table 1). The estimated number of consultations per GW case was 2.9 (95% CI: 2.5–3.3) for women and 2.8 (95% CI: 2.3–3.2) for men.

Most consultations (~75%) were Medicare standard consultations, with ~21% long and 1.2% prolonged consultations (Table 2). Women were significantly more likely than men to have a long consultation. Table 2 also shows the weighted average cost of a GP consultation by gender, unadjusted and when adjusted for number of problems managed. Approximately half the consultations involved one problem (48% women, 51% men); 36%/37% two problems, 12.5%/8.5% three problems and 3.5% of consultations with both women and men had four problems managed.
Table 1  National age-specific GW incidence extrapolated from BEACH data for all GPs and sexual health clinics

| Gender | Australian Population (2004) | Raw BEACH Data 2000-2006 | Extrapolation from BEACH to all Australian GPs | Adjusted for GW managed at sexual health clinics |
|--------|-----------------------------|--------------------------|-----------------------------------------------|-----------------------------------------------|
|        |                             | All GW consultations (n) | New GW consultations (n)                      | All GW consultations/ year (95% CI)           | New GW consultations/ year1 (95% CI)           | New GW consultations/ 1,000 persons2 (95% CI) | New GW cases/ 1,000 persons3 (95% CI) |
| Female | 10,100,991                  | 346                      | 120                                          | 51,850 (45,050–58,600)                        | 18,000 (14,650–21,300)                        | 1.78 (1.45–2.11)                           | 2.31 (1.88–2.74)                        |
| Male   | 9,990,513                   | 293                      | 106                                          | 43,950 (38,050–49,750)                        | 15,850 (12,750–19,000)                        | 1.59 (1.28–1.90)                           | 2.06 (1.66–2.47)                        |
| All    | 20,091,504                  | 639                      | 226                                          | 95,700 (86,450–105,000)                       | 33,850 (29,150–38,550)                        | 1.68 (1.45–1.92)                           | 2.19 (1.88–2.49)                        |

1 Based on rates of consultations for all/new GW problems extrapolated to national annual average (2000–06) of 99.45 million general practice consultations (http://www.medicareaustralia.gov.au/statistics/dyn_mbs/forms/mbsgtab4.shtml)
2 Calculation based on the 2004 Australian population
3 Adjusted to include GW treated in sexual health clinics (see Methods)
Table 2  GP consultations for GW

| GP consultations          | Women with GW |                         | Men with GW |                         |
|---------------------------|---------------|-------------------------|-------------|-------------------------|
|                           | Frequency (%) (95% CI) | Weighted Cost$^1$ (A$) | Frequency (%) (95% CI) | Weighted Cost$^1$ (A$) |
| Short GP consultations    | —             | —                      | 0.39        | (0.0 – 1.1)            |
|                          |               |                        | 0.09        |                         |
| Standard GP consultations | 71.57         | (66.5–76.6)            | 133.86      | (75.2–85.5)            |
|                          |               |                        | 39.38       |                         |
| Long GP consultations     | 24.92         | (20.0–29.8)            | 22.40       | (11.0–19.9)            |
|                          |               |                        | 14.39       |                         |
| Prolonged GP consultations| 0.96          | (0.0–2.0)              | 1.27        | (0.0–3.0)              |
|                          |               |                        | 2.11        |                         |
| Home visits               | 0.32          | (0.0–0.9)              | 0.26        | —                      |
|                          |               |                        | 0.00        |                         |
| Other items (%)           | 0.32          | (0.0–0.9)              | 0.15        | (0.0 – 1.1)            |
|                          |               |                        | 0.19        |                         |
| Health Care Card holders  | 30.63         | (25.5–35.8)            | 2.30$^2$    | (16.6–27.3)            |
| (Bulk billed)            |               |                        | 1.64$^3$    |                         |
| Weighted average cost of  |               |                        | 57.80       |                         |
| GP consultation           | —             | 60.24                  | —           |                         |
| Weighted average cost of  |               |                        | 42.89$^4$   |                         |
| GP consultation adjusted  |               |                        | 42.32$^5$   |                         |
| for single service        |               |                        |             |                         |

1  Weighted costs were calculated by multiplying the proportion of each type of consultation by the corresponding total cost excluding bulk billing fees which are presented separately = Proportion of patients with HCC x MBS consultation fee + Proportion of patients without HCC x MBS benefit x Patient billed relativity
2  MBS Item number 10990 and MBS Item 10991 were applied to 69% and 31% of HCC holders respectively, reflecting the Rural and Remote classification of the GW patient population
3  MBS Item number 10990 and MBS Item 10991 were applied to 70% and 30% of HCC holders respectively, reflecting the Rural and Remote classification of the GW patient population
4  Single service adjustment factor for women = 0.71, reflecting 1, 2, 3 and 4 problems being managed at 48%, 36%, 12.5% and 3.5% of consultations respectively
5  Single service adjustment factor for men = 0.73, reflecting 1, 2, 3 and 4 problems being managed at 51%, 37%, 8.5% and 3.5% of consultations respectively
Treatments used for GW in general practice are summarised in Table 3. Medications were prescribed, supplied or recommended for ~28% of all GW problems managed. Topical medications for GW, imiquimod or podophyllum resin based, were prescribed at similar rates in ~26% of consultations with women and 22% of consultations with men. Topical medications were prescribed more often in consultations for new GW problems (~27% vs 17% in subsequent consultations). The cost of topical medications per GW consultation was A$24 for women and A$20 for men.

Ablative treatments were performed significantly more often in men (~60% of consultations) than women (~37%, Table 3), with similar rates across initial and subsequent consultations. Women were significantly more likely to be provided counselling treatment (~28% vs 19% for men). The difference was most marked in initial GW consultations, in which counselling, advice or reassurance was recorded for 62% of women and 24% of men, reducing to 22% and 16% respectively in subsequent consultations.

Women were significantly more likely to be referred to a specialist (16% vs 8% for men, Table 3), translating to an additional cost per GP consultation of ~A$17 for women and ~A$8 for men.

Most pathology tests ordered were for sexually transmitted infections. Pap smears were performed in ~7% of GW consultations with women.
| Management Recorded             | Female GW patients | Male GW patients |
|--------------------------------|--------------------|------------------|
|                                | Rate per 100 genital warts (95% CI) | Weighted cost 1 ($A) | Rate per 100 genital warts (95% CI) | Weighted cost 1 ($A) |
| **Medication**^2               |                    |                  |                                |                      |
|                                | 30.35 (24.71–35.99) | —                | 26.28 (20.71–31.85)            | —                    |
|                                | 13.29 (9.60–16.99)  | 21.26            | 9.56 (5.95–13.16)             | 15.29                |
|                                | 13.01 (8.60–17.41)  | 2.66             | 12.97 (8.78–17.16)            | 4.69                 |
| **Non-pharmacological treatments** |                    |                  |                                |                      |
|                                | 74.28 (66.96–81.59) | —                | 79.18 (72.05–86.32)            | —                    |
| **Ablative treatments**^3      |                    |                  |                                |                      |
|                                | 37.28 (31.0–43.6)   | —                | 59.73 (53.3–66.2)             | —                    |
| **Counselling**^4              |                    |                  |                                |                      |
|                                | 29.2 (23.94–34.44)  | —                | 18.4 (13.96–22.90)            | —                    |
| **Referrals**^5                | 15.90 (11.81–19.99) | 16.58^6          | 7.85 (4.60–11.10)             | 8.43^6               |
| **Specialists**                | 14.16 (10.27–18.06) | (14.76)          | 6.83 (3.92–9.73)              | (7.34)               |
| **Pathology**                  | 30.35 (20.22–40.48) | —                | 18.43 (9.36–27.50)            | —                    |
|                                | 6.94 (4.22–9.66)    | —                | N/A                           | N/A                  |
| **Hepatitis serology**         | 4.34 (1.2–7.4)      | —                | 5.80 (2.1–9.5)                | —                    |
| **Chlamydia**                  | 4.34 (2.1–6.6)      | —                | 2.39 (0.6–4.2)                | —                    |
| **HIV**                        | 3.47 (1.6–5.4)      | —                | 3.07 (1.1–5.1)                | —                    |
| **Venereal disease**           | 2.60 (0.9–4.3)      | —                | 3.07 (0.9–5.3)                | —                    |
| **Total management cost per consultation** | — | **40.51** | — | **28.42** |

1 Weighted costs were calculated by multiplying the treatment rate by the corresponding treatment cost. For specialist referrals, treatment costs were estimated as = Proportion of
patients with HCC x MBS benefit + Proportion of patients without HCC x MBS benefit x Patient billed relativity

2 Includes medication prescribed, recommended or supplied
3 Includes excision/removal tissue/biopsy/destruction/debridement/cauterization
4 Includes counseling/problem; counsel/advice–STDs; advice/education; advice/education–medication; reassurance/support; counseling–psychological; and Excludes counsel/advice–smoking and counsel/advice–pregnancy
5 Includes referrals to specialists, hospital outpatient departments, and specialist clinics/clinics (eg. sexual health clinics)
6 Assigns total costs of initial attendance specialist, referred consultation, to all referrals

Table 4  Cost of GW management

|                                | Cost per woman with GW ($A) | Cost per man with GW ($A) |
|--------------------------------|------------------------------|---------------------------|
| GP management                  |                              |                           |
| Consultation costs (including management) | 83.40                        | 70.74                     |
| Number of consultations per case | 2.88                         | 2.77                      |
| GP management cost per case    | 240.19                       | 195.95                    |
| In-hospital ablative procedures | 145.47                       | 54.80                     |
| Total cost                     | 385.66                       | 250.75                    |
The total cost of a GP consultation for management of GW was estimated at A$83 for women and A$71 for men. As women and men had 2.9 or 2.8 consultations, total GP management costs were estimated at A$240 and A$196 per GW case respectively (Table 4). This extrapolates to yearly costs in the general practice setting of approximately A$5.6 million for the estimated 23,350 new GW cases presenting in women each year and approximately A$4.0 million for the estimated 20,550 new GW cases in men.

Hospital-based procedures for GW treatment

Between July 2000 and June 2007, there was an average of 2,501 hospitalisations recorded annually for GW procedures in women and 829 in men. In women, procedures were for destruction of vulval warts (57%), vaginal warts (25%) and anal warts (17%). Same-day hospitalisations were recorded for 93% of vulvovaginal wart and 88% of anal wart procedures. The average cost of ablative procedures for women was estimated at A$1,370, giving an annual cost of approximately A$3.4 million. Assuming 23,350 new female GW cases each year, in-hospital ablative procedures cost approximately A$145 per case (Table 4).

Most procedures in men were for destruction of anal warts (88%), or penile warts (12%). Same-day hospitalisations were recorded for 86% of anal wart and 96% of penile wart procedures. The average cost of ablative procedures for men was estimated at A$1,429 translating to a yearly cost of approximately A$1.1 million. Assuming 20,550 new male GW cases presenting annually, in-hospital ablative procedures cost approximately A$55 per male case (Table 4).

Therefore, the annual total cost of management of GW is over A$14 million, with an estimated cost per treated case of A$386 for women and A$251 for men (Table 4).

DISCUSSION

This study is the first to estimate Australian annual incidence and costs associated with clinician diagnosed GW. During 2000–2006, we found an annual incidence of GW of 2.19 per 1000 people. Costs of GW management were estimated at A$386 per case for women and A$251 for men.

Our estimated incidence is somewhat higher than recent reports from similar studies overseas using representative health claims data: 1.26 per 1000 in British Columbia [19] and 1.52 per 1000 in UK genitourinary clinics in 2008.[20] While acknowledging potential for misclassification of incident (‘new’) cases in our study, the similarity in the average number of consultations per GW case between our study (2.8–2.9) and that of Marra et al (2.7–2.8), [19] Insinga et al (3.1), [21] and Woodhall et al (2.5–3.1) [22] suggests that this is not the case. Hoy et al recently reported incidence of 1.2 per 1000 in United States (US) private health plans, but this is acknowledged as an underestimate as it does not capture cases managed through sexual health clinics.[23]

Peak ages for Australian GW patients seeking treatment from GPs (20–24 years in women and 25–29 years in men) are comparable to those attending sexual health clinics [24] and are similar to those in the US [21] and Canada [19], whereas in the UK and Nordic countries, 20–24 years is the peak age for both genders.[25, 4]

Ablative treatments in general practice are more common in men (60% of consultations) than in women (37% of consultations). In contrast, more women (16% vs 8%) are referred to
specialists and 76% of ablative procedures requiring hospitalisation are performed in women. This is consistent with a previous report on GP management of sexually transmitted infections based on an earlier analysis of the BEACH database [26], but contrasts with our previous research in sexual health clinics [24] where ablative treatments are performed in similar proportions of men and women, with very few patients referred on to other services (~1.5%), reflecting the specialised nature of such clinics. Patient purchased topical treatments for GW are prescribed or recommended in ~24% of GP consultations, with similar rates of prescription of imiquimod and podophyllum resin based treatments. Rates of topical treatment use are similar in sexual health clinics, but the cheaper podophyllum resin based option represents 79% of such treatments. [24]

Our study estimates approximately 3,300 hospitalisations per year for GW procedures. The number of hospitalisations as a percentage of GW cases (~7%) is consistent with Canadian data, reporting hospital management in 9% of GW episodes.[19] Similarly, 11% of patients with recurrent GW, and 19% of patients with resistant GW, are hospitalised in Germany.[28] In contrast, hospital management of GW was rarely encountered in US analyses of administrative claims from private health funds, possibly reflecting the study method.[21, 22]

Our estimated cost of A$386 per GW case in women is substantially higher than the A$251 estimated in men, reflecting higher rates of specialist referrals and hospitalisations. Treatment costs for women are also higher in Germany (€414 compared to €315 in men),[28], similar in Canada (C$207 vs C $176 in men) [19] and the UK (US$292 vs US$280 in men) [22] and appear to be reversed in the US (US$528 vs US$745 in men).[21, 23]

Our study has several limitations. As discussed above, the definition of ‘new’ in BEACH data may lead to overestimating the number of new cases by including recurrences, although as the number of visits per case is similar to other countries we think this unlikely. Also the adjustment to reflect 17% of cases managed in sexual health clinics is based on self-report.[2] In addition, we have assumed costs in sexual health clinics reflect GP costs, which may not be the case, given the differences in treatment patterns discussed above. This study assumed that all GP referrals of patients to specialists were acted upon, and all prescriptions were purchased, thus potentially slightly overestimating costs. However, as there are no data sources available to accurately quantify specialist follow-up of GW in Australia, the costs of management following referral are restricted to hospitalisation costs only and are thus likely underestimated. Although hospitalisation costs were based on relatively broad diagnosis related groups rather than on specific procedures, it is unlikely that they have been overestimated, as we have applied same-day costs to all hospitalisations.

Genital warts are an important issue in the Australian health care system, with high incidence in younger people and costs estimated to be over A$14 million annually. This monetary burden does not include the additional psychosocial implications, which can be significant.[29] Reductions in GW cases in young women presenting to sexual health clinics associated with the introduction of the HPV vaccination program have recently been reported.[30] The baseline data in this study lays the foundation for measuring the population impact of the HPV vaccination program in the general practice and hospital settings.
FIGURE LEGEND

Figure: Rates of incident genital wart cases (per 1,000 persons) stratified by age and gender

All consultations for female and male genital warts (ICPC-2 Codes X91 and Y76) from April 2000 to September 2006 were extracted from the BEACH database. Incidence was estimated from the annualised consultation rate for ‘new’ GW problems stratified by gender and age, extrapolated to the total annualised GP attendances over the same period, and normalised to the corresponding 2004 Australian population. The resulting incidence rates were adjusted to include GW treated in sexual health clinics (see Methods).
Acknowledgement
The authors wish to thank Jennifer Watts for her advice on same-day hospitalisation costs.

During the data period used in this study, the BEACH program was funded under research contracts with: the National Prescribing Service Ltd; the Australian Government Department of Health and Ageing; AstraZeneca Pty Ltd (Australia); Janssen-Cilag Pty Ltd; Merck, Sharp and Dohme (Australia) Pty Ltd; Roche Products Pty Ltd; Sanofi-Aventis Australia Pty Ltd; the Australian Government Department of Veterans’ Affairs; and the Department of Employment and Workplace Relations.

Statement of interests
Dr E. Lynne Conway and Dr Alicia Stein are employed by CSL Limited and own stock in CSL Limited.
Professor Suzanne Garland has received advisory board fees and grant support from CSL Biotherapies and GlaxoSmithKline, and lecture fees from Merck and GSK. SG has received funding through her institution to conduct HPV vaccine studies for MSD and GSK.
CSL Biotherapies Pty Ltd commissioned reports on the general practice management of genital warts from BEACH (Associate Prof Helena Britt and Mr Christopher Harrison).

Ethics
Ethics approval for the BEACH program and its secondary analyses was obtained from the Human Ethics Committee of the University of Sydney and the Ethics Committee of the Australian Institute of Health and Welfare.

Funding
CSL Biotherapies Pty Ltd commissioned reports on the general practice management of genital warts from BEACH (Associate Prof Helena Britt and Mr Christopher Harrison).

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MP contributed to interpretation of the data, drafting the article and revising it critically for important intellectual content.
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ELC contributed to the conception and design of the study, interpretation of the data, drafting the article and revising it for important intellectual content.
HB provided access and contributed to interpretation of the BEACH data and revised the manuscript for important intellectual content.
CH performed the analysis and contributed to the interpretation of the BEACH data and revised the manuscript for important intellectual content.
SMG contributed to conception, design, interpretation of data, and revising the manuscript for important intellectual content.
All authors approved the final version of the manuscript.

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**Key messages**

1. During 2000–2006, the annual incidence of genital warts in Australia was 2.19 per 1,000 people.
2. The costs of managing genital warts in Australia were estimated at A$386 per case for women and A$251 for men.
3. The peak ages for Australians to present for treatment to general practitioners with genital warts are 20–24 years in women and 25–29 years in men.
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### GP / Specialist consultation costs

| MBS Item number | Description of service               | MBS Fee ($A) | Patient-billed cost ($A) |
|-----------------|--------------------------------------|--------------|--------------------------|
| 3               | Short consultation                   | 15.35        | 24.42                    |
| 23              | Standard consultation                | 33.55        | 53.38                    |
| 36              | Long consultation                    | 63.75        | 101.44                   |
| 44              | Prolonged consultation               | 93.80        | 149.25                   |
| 24              | Home visits                          | 57.05        | 90.78                    |
| 23              | Other–assume standard consultation   | 33.55        | 53.38                    |
| 104             | Initial attendance specialist, referred consultation | 79.05 | 115.38 |
| 10990           | HCC / Bulk Billing Rebate            | 6.50         | NA                       |
| 10991           | Non capital city HCC / Bulk billing rebate | 9.80 | NA                       |

### Prescription Costs

| Brand name            | Generic name            | MIMS August 2009 ($A) |
|-----------------------|-------------------------|-----------------------|
| Aldara                | Imiquimod               | 159.52                |
| Podophyllum resin topical 0.5% | Podophyllum resin      | 10.46                 |
| Condyline paint       | Podophyllotoxin         | 54.80                 |
| Posafillin            | Podophyllum resin       | 10.46                 |
| Wartec cream          | Podophyllotoxin         | 60.25                 |
| Wartec solution       | Podophyllotoxin         | 55.00                 |

### Hospitalisation costs

| VIC-DRG | Related Procedures                  | Public Hospital Same-day Costs ($A) |
|---------|-------------------------------------|-------------------------------------|
| G11B    | 32177-Removal of anal warts         | 1,306                               |
| N09Z    | 35507-00/ 35507-01 Destruction of vaginal or vulval warts | 1,383                               |
| M03B    | 36815-Destruction of penile warts   | 2,304                               |

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1. MBS = Medicare Benefits Schedule August 2009
2. Patient billed costs are calculated as MBS benefit x Patient billed relativity
3. Costs of treatments obtained from MIMS Online August 2009 [15]
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*Sex Transm Infect* published online December 3, 2009

Updated information and services can be found at: [http://sti.bmj.com/content/early/2009/12/02/sti.2009.040188](http://sti.bmj.com/content/early/2009/12/02/sti.2009.040188)

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