# High rates of chlamydia in patients referred for termination of pregnancy: treatment, contact tracing, and implications for screening

Sally Rose, Beverley Lawton, Selina Brown, Felicity Goodyear-Smith, Bruce Arroll

## Abstract

**Aims** To determine the rate of chlamydia and other sexually transmitted infections (STIs), and to describe treatment and factors associated with chlamydia in patients presenting for a termination of pregnancy (TOP).

**Methods** A retrospective audit of patients attending one of two TOP clinics from 1 February 2003. (Clinic A, n=500; Clinic B, n=501). Age, ethnicity, marital status, previous pregnancies, contraception, STIs, and treatment were recorded.

**Results** Ten percent of patients tested positive for an STI. Chlamydia was most commonly detected, in 7.7% of all patients. Higher rates of chlamydia were observed at clinic B (10.2% vs 5.2%, p=0.005) and in under 25 year olds (11.2% vs 3.6%, p<0.001). Rates of chlamydia in Pacific women were 18.6%, in Maori 12.9%, in Asian 7.3% and 4.4% in New Zealand European women. All patients testing positive for chlamydia were treated prior to TOP but only 41% of partners were treated. Other infections detected included 18 cases of human papillomavirus (HPV), three cases of trichomoniasis, one case of gonorrhoea, and one case of syphilis.

**Conclusions** There is a high rate of chlamydia in women presenting for TOP, particularly in under 25 year olds, Pacific, and Maori women. There is an immediate need for policymakers to respond to this increasing burden of chlamydia by instigating targeted education, guidelines, and mandatory chlamydia screening and contact tracing for pregnant women.

The number of termination of pregnancy (TOP) procedures carried out annually in New Zealand is steadily rising, with patients aged 25 years and younger accounting for half (50.7%) of women in whom terminations were carried out in 2002.¹ In sexual health terms, women seeking a termination constitute an ‘at risk’ group that is vulnerable to sexually transmitted infection (STI).² The most commonly diagnosed bacterial STI is *Chlamydia trachomatis*,³ with an estimated 91 million new cases diagnosed worldwide in 2001.⁴ In New Zealand, the prevalence of this infection has risen by 65.5% in sexual health clinics over the past 5 years.⁵

The majority of patients presenting for TOP in New Zealand are referred by a general practitioner. TOP clinics require that the referrer test for the presence of STIs prior to the patient’s presentation to the clinic. However there is currently no national written protocol detailing the type of screening or treatment that must be carried out, nor are there any formal strategies for contact tracing or follow-up of TOP patients who test positive for an STI.

Untreated chlamydia is associated with significant post-abortal morbidity, including endometritis, salpingitis,⁶ and pelvic inflammatory disease (PID).⁷ Untreated PID can
cause chronic pelvic pain, dyspareunia, infertility, and ectopic pregnancy. The risk of ascending upper-genital-tract infection during the surgical termination procedure is increased in the presence of untreated chlamydia. Testing for chlamydia and treating it prior to a TOP is therefore essential and (reportedly) cost-effective.

Internationally, rates of chlamydia detected in patients attending TOP clinics have varied. In the United Kingdom, rates range from 3.6% to 7.5% with up to 11.2% of patients under the age of 25 years testing positive for chlamydia. A two-clinic study of TOP patients in China showed 4.8% of 2020 patients were chlamydia-positive (mean age was 28 years). Higher rates have been reported the United States where 9.3% of 210 patients tested positive for chlamydia, and 11.7% of 1193 patients presenting to a Norwegian TOP clinic tested positive. Australia reports lower rates of chlamydia, with only 2.8% of 1175 patients testing positive for chlamydia.

The prevalence of STIs in women seeking a TOP in New Zealand is not known. A recent study in the New Zealand Medical Journal reported high rates of chlamydia in pregnant women, but that sample did not include terminated pregnancies. The study showed that only 37.5% of 6614 women had antenatal tests for chlamydia (4.8% testing positive overall), with higher rates in Maori (15.2%), Pacific (12.5%), and women under 25 years old (12.2%). Despite these high rates, New Zealand does not have guidelines advocating antenatal screening for chlamydia. Antenatal screening for chlamydia is current practice in the United States, and will be offered to pregnant women under the age of 25 attending antenatal clinics as part of the roll out of a national screening program in the United Kingdom.

This paper reports the outcome of a retrospective audit carried out in two demographically diverse TOP clinics with the following aims: to determine the rates of chlamydia and other STIs; to describe characteristics associated with chlamydia; and to describe treatment and contact tracing. This study will provide the first estimates of chlamydia rates in TOP patients, and will be an important step towards obtaining a more complete picture of chlamydia in pregnancy. The data can also be used to inform the development of a national screening program in New Zealand.

Methods

Records for 1001 consecutive patients presenting to one of two New Zealand TOP clinics from 1 February 2003 were audited. Two clinics were involved: Clinic A (n=500) is a fee-paying clinic and clinic B (n=501) is a free Government-funded clinic.

De-identified retrospective data were entered into a Microsoft Access database by staff at each clinic. Data collected included age, self-reported ethnicity, marital status, previous pregnancies, termination procedure, sexually transmitted infections, and treatment, and self-reported use of contraception at the time of conception.

Determination of the presence of an STI was taken directly from laboratory test results present in patient notes. The laboratories used the Polymerase Chain Reaction (PCR) test (Amplicor CT/NG, Roche Diagnostics) to routinely detect C. trachomatis in both urine and swab samples. T. vaginalis and N. gonorrhoea were reported from endocervical or high vaginal swabs, and syphilitic serology used to test for syphilis. Data were analysed using Epi Info 2000 and Yates corrected Chi-squared tests for significance.

The local ethics committees deemed this an audit not requiring approval.
Results

The age range of patients was 13 to 48 years, (mean 25.5 years, SD 6.84, median 24 years). Patients did not differ by age between clinics, but differed significantly by ethnicity, marital status, and parity (see Table 1).

At Clinic A, over half (60%) of the patients were Asian (300/500); 57% of the patients were non-New Zealand residents (287/500), and 70% (202/287) of the non-residents were under 25 years of age. Residential status was not noted for Clinic B in this audit, but a subsequent check during a 3-month period at Clinic B revealed that less than 10% of attendees were non-New Zealand residents. Due to the differences observed in patient characteristics between clinics, data are presented separately for each clinic in Tables 1–3.

Rate of sexually transmitted infections—Overall, 10% (100/1001) of patients had an STI, with a higher rate among under 25 year olds (14.2% vs 5.2%, p<0.001). Chlamydia was the most commonly detected STI (77 cases); 18 cases of HPV were recorded, three cases of Trichomoniasis, one case of gonorrhoea, and one case of syphilis. No patients were diagnosed with multiple infections. The overall rate of infection differed significantly between clinics, with 13.4% of patients presenting with an STI at Clinic B (67/501), and 6.6% (33/500) of patients at Clinic A (p<0.001).

Overall, 42% (421/1001) of patients reported having used contraception at conception. Condoms were the most frequently reported form of contraception; with 60% (254/421) of patients who said they had used contraception reporting condom use.

Factors associated with chlamydia infection—The overall rate of chlamydia was significantly higher in patients presenting to Clinic B (10.2% vs 5.2%, p=0.005). Data presented in Table 2 show that younger age and self-reported ethnicity were significantly associated with chlamydia infection. Compared with New Zealand European, Maori and Pacific women had significantly higher rates of infection (p<0.001). Pairwise comparisons revealed that the higher rate of infection in Pacific women was not statistically higher than the rate observed in Maori women. Although Asian women appeared to have a higher rate of chlamydia infection than New Zealand European women, this difference did not reach statistical significance.

Having had a previous termination was associated with a significantly lower rate of chlamydia (p<0.05). Overall, a higher proportion of those who had previously undergone a termination were over the age of 25 years, so the lower rates of infection associated with previous TOP are likely to be explained age, as over 25 year olds have lower rates of chlamydia.

No association was observed between parity and rate of chlamydia infection (p>0.05). Marital status showed a significant association with chlamydia infection (p<0.05), with lower rates in women who reported being married or in a de facto relationship.

Data relating to treatment of those testing positive for chlamydia are presented in Table 3.
### Table 1. Characteristics of patients presenting for termination of pregnancy (TOP) at one of two New Zealand clinics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total sample (n=1001)</th>
<th>Clinic A (n=500)</th>
<th>Clinic B (n=501)</th>
<th>Test for significance between clinics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand European</td>
<td>385</td>
<td>38.5</td>
<td>151</td>
<td>30.2</td>
</tr>
<tr>
<td>Maori</td>
<td>170</td>
<td>17.0</td>
<td>25</td>
<td>5.0</td>
</tr>
<tr>
<td>Pacific</td>
<td>70</td>
<td>7.0</td>
<td>13</td>
<td>2.6</td>
</tr>
<tr>
<td>Asian</td>
<td>343</td>
<td>34.3</td>
<td>300</td>
<td>60.0</td>
</tr>
<tr>
<td>Other</td>
<td>28</td>
<td>2.8</td>
<td>10</td>
<td>2.0</td>
</tr>
<tr>
<td>Unknown</td>
<td>5</td>
<td>0.5</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td><strong>Age band</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 25 years</td>
<td>535</td>
<td>53.4</td>
<td>266</td>
<td>53.2</td>
</tr>
<tr>
<td>25 years and older</td>
<td>466</td>
<td>46.6</td>
<td>234</td>
<td>46.8</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/never married</td>
<td>550</td>
<td>54.9</td>
<td>251</td>
<td>50.2</td>
</tr>
<tr>
<td>Married</td>
<td>152</td>
<td>15.2</td>
<td>93</td>
<td>18.6</td>
</tr>
<tr>
<td>Defacto</td>
<td>215</td>
<td>21.5</td>
<td>133</td>
<td>26.6</td>
</tr>
<tr>
<td>Separated/divorced</td>
<td>66</td>
<td>6.6</td>
<td>17</td>
<td>3.4</td>
</tr>
<tr>
<td>Widowed</td>
<td>4</td>
<td>0.4</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td>Not stated</td>
<td>14</td>
<td>1.4</td>
<td>3</td>
<td>0.6</td>
</tr>
<tr>
<td><strong>Procedure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical TOP</td>
<td>46</td>
<td>4.6</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Surgical TOP</td>
<td>952</td>
<td>95.1</td>
<td>500</td>
<td>100</td>
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<tr>
<td><strong>Referrer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>General practitioner</td>
<td>800</td>
<td>79.9</td>
<td>373</td>
<td>74.6</td>
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<tr>
<td>Family planning</td>
<td>149</td>
<td>14.9</td>
<td>94</td>
<td>18.8</td>
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<tr>
<td>Midwife</td>
<td>1</td>
<td>0.1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Other</td>
<td>41</td>
<td>4.1</td>
<td>33</td>
<td>6.6</td>
</tr>
<tr>
<td>Not known</td>
<td>10</td>
<td>1.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nulliparous</td>
<td>633</td>
<td>63.2</td>
<td>366</td>
<td>73.2</td>
</tr>
<tr>
<td>One child</td>
<td>140</td>
<td>14.0</td>
<td>55</td>
<td>11.0</td>
</tr>
<tr>
<td>Two or more children</td>
<td>228</td>
<td>22.8</td>
<td>79</td>
<td>15.8</td>
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<tr>
<td><strong>Previous TOP</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>670</td>
<td>66.9</td>
<td>349</td>
<td>69.8</td>
</tr>
<tr>
<td>One or more</td>
<td>331</td>
<td>33.1</td>
<td>151</td>
<td>30.2</td>
</tr>
<tr>
<td><strong>Contraception use</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Condoms</td>
<td>252</td>
<td>25.2</td>
<td>128</td>
<td>25.6</td>
</tr>
<tr>
<td>Other</td>
<td>152</td>
<td>15.2</td>
<td>82</td>
<td>16.4</td>
</tr>
<tr>
<td>None</td>
<td>580</td>
<td>57.9</td>
<td>290</td>
<td>58.0</td>
</tr>
<tr>
<td>Unknown</td>
<td>17</td>
<td>1.7</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*Use of contraception at the 'time of conception’ was the only data available from patient notes at the clinic.
Table 2. Rates of chlamydia and factors associated with infection in women presenting for termination of pregnancy (TOP)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Clinic A</th>
<th>Clinic B</th>
<th>Total sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>All patients</td>
<td>26 5.2 %</td>
<td>51 10.2 %</td>
<td>77 7.7 %</td>
</tr>
<tr>
<td>Age-band</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under 25 years</td>
<td>21 7.9 %</td>
<td>39 14.5 %</td>
<td>60 11.2 %</td>
</tr>
<tr>
<td>25 years and older</td>
<td>5 2.1 %</td>
<td>12 5.2 %</td>
<td>17 3.6 %</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Zealand European</td>
<td>4 2.6 %</td>
<td>13 5.6 %</td>
<td>17 4.4 %</td>
</tr>
<tr>
<td>Maori</td>
<td>1 4.0 %</td>
<td>21 14.5 %</td>
<td>22 12.9 %</td>
</tr>
<tr>
<td>Pacific</td>
<td>0 - 13 %</td>
<td>13 22.8 %</td>
<td>13 18.6 %</td>
</tr>
<tr>
<td>Asian</td>
<td>21 7.0 %</td>
<td>4 9.3 %</td>
<td>25 7.3 %</td>
</tr>
<tr>
<td>Other/not stated</td>
<td>0 - 11 %</td>
<td>0 - 22 %</td>
<td>0 - 33 %</td>
</tr>
<tr>
<td>Previous TOP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>22 6.3 %</td>
<td>39 12.1 %</td>
<td>61 9.1 %</td>
</tr>
<tr>
<td>One or more</td>
<td>4 2.7 %</td>
<td>12 6.7 %</td>
<td>16 4.8 %</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/never married/widowed or divorced</td>
<td>17 6.3</td>
<td>42 12.0</td>
<td>59 9.5</td>
</tr>
<tr>
<td>Married or De facto</td>
<td>9 4.0 %</td>
<td>8 5.7 %</td>
<td>17 4.6 %</td>
</tr>
<tr>
<td>Not stated</td>
<td>0 - 3 %</td>
<td>1 9.1 %</td>
<td>1 7.1 %</td>
</tr>
</tbody>
</table>

*Chi-squared test for significance compared infection rates in the total sample for each of the variables listed

Table 3. Treatment of patients who tested positive for chlamydia on referral for termination of pregnancy (TOP)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Clinic A (26 cases)</th>
<th>Clinic B (51 cases)</th>
<th>Total sample (77 cases)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n %</td>
<td>n %</td>
<td>n %</td>
</tr>
<tr>
<td>Treated for chlamydia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>26 100 %</td>
<td>49 96.1 %</td>
<td>75 97.4 %</td>
</tr>
<tr>
<td>Not recorded</td>
<td>- -</td>
<td>2 3.9 %</td>
<td>2 2.6 %</td>
</tr>
<tr>
<td>Treatment type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Azithromycin</td>
<td>21 80.8 %</td>
<td>46 90.2 %</td>
<td>67 87.0 %</td>
</tr>
<tr>
<td>Other</td>
<td>5 19.2 %</td>
<td>2 3.9 %</td>
<td>7 9.1 %</td>
</tr>
<tr>
<td>Not recorded</td>
<td>- -</td>
<td>3 5.9 %</td>
<td>3 3.9 %</td>
</tr>
<tr>
<td>Treated by</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOP clinic</td>
<td>11 42.3 %</td>
<td>30 58.8 %</td>
<td>41 53.2 %</td>
</tr>
<tr>
<td>General practitioner</td>
<td>13 50.0 %</td>
<td>19 37.3 %</td>
<td>32 41.6 %</td>
</tr>
<tr>
<td>Family planning</td>
<td>1 3.8 %</td>
<td>- -</td>
<td>1 1.3 %</td>
</tr>
<tr>
<td>Other</td>
<td>1 3.8 %</td>
<td>- -</td>
<td>1 1.3 %</td>
</tr>
<tr>
<td>Not recorded</td>
<td>- -</td>
<td>2 3.9 %</td>
<td>2 2.6 %</td>
</tr>
<tr>
<td>Partner treated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>16 61.5 %</td>
<td>16 31.4 %</td>
<td>32 41.6 %</td>
</tr>
<tr>
<td>Not recorded</td>
<td>10 38.5 %</td>
<td>35 68.6 %</td>
<td>45 58.4 %</td>
</tr>
</tbody>
</table>
Discussion

Overall, 10% of the patients included in this audit tested positive for an STI, with 13.4% of patients at Clinic B testing positive for an infection. As expected, chlamydia was the most commonly detected STI, with the burden of disease carried by under 25 year olds, Maori, and Pacific women. Treatment for chlamydia was documented in all except two patients prior to termination, but there was no evidence of partner treatment in over half of those cases. Together with data from an audit of chlamydia in pregnancy, these data point to the need for routine antenatal chlamydia testing. Pregnant women are an easily targeted group for whom undetected infection has potentially serious health consequences. These data also highlight the need to target resources and education towards high-risk groups if the rates of sexually transmitted infection are to decrease in the foreseeable future.

The overall rate of chlamydia in this audit is comparable with international rates in TOP clinics, but is markedly higher than the rate reported in an audit of completed pregnancies in New Zealand (7.7% vs 4.8%). This is consistent with the view that women with an unwanted pregnancy are at greater risk for infection. A direct comparison between rates obtained in audits of completed and terminated pregnancies has limitations including data collection at different time periods; older average age (30.6 years) and incomplete testing for women with completed pregnancies (37.5%). Despite these limitations, the high rate of chlamydia in both groups of pregnant women in New Zealand is disturbing, and points to the need for routine testing for the infection in pregnancy. An audit that involves all TOP clinics, as well as all antenatal data would be useful in providing a complete picture of chlamydia in pregnancy in New Zealand.

The overall rate of chlamydia at Clinic B was approximately twice that of Clinic A. Clinic B is a Government-funded clinic that performs approximately 17% of all terminations in New Zealand. By contrast, Clinic A is a fee-paying clinic that performs approximately 9% of the total terminations, and had a disproportionately higher number of Asian patients than Clinic B. Results from Clinic A might therefore be less generalisable to women attending TOP clinics nationally.

Asian women have not previously been identified as an at-risk group in New Zealand—rates of chlamydia for Asian women were 14 times higher in this audit than in the audit of completed pregnancies. This finding is disturbing and raises further questions about the reasons behind the high rates of infection. Risk factors that were not identified in this audit, such as socioeconomic variables, number of (new) partners, and patterns of contraceptive use might contribute to the marked difference in infection rates observed between age- and ethnic groups.

Treatment for chlamydia infection occurred in all but two cases in which details regarding treatment were not documented in the patient’s notes. Eighty percent of patients were referred for TOP from primary care by general practitioners (GPs), but only 42% of those patients testing positive for chlamydia were treated by the GP. Details regarding treatment of sexual partners were not routinely noted, with less than half of patient records indicating that partner treatment had occurred. Contact tracing and treatment of all sexual partners is essential to prevent re-infection, particularly because of the asymptomatic nature of the disease.
Inadequate resourcing, a lack of clarity regarding responsibility for contact tracing, or incomplete recording of partner treatment by clinic staff may be factors that explain the low rate of partner treatment. These findings highlight the urgent need for a protocol between referring health professionals and TOP clinics that clearly outlines responsibilities for the detection, treatment, contact tracing, and follow-up of women and their partners.

In the United Kingdom, the need to combat rising rates of chlamydia saw the introduction of pilot screening programs that are now being rolled out nationally. By contrast, policy makers in New Zealand have been slow to respond to the rising rate of chlamydia, with no national guidelines or screening programs in place. Data presented here can be used to inform the development and implementation of a national guideline for the management of chlamydia infection, as well as a screening program that includes pregnant women as a target population.

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References:


