Incidence of Infections with *Chlamydia trachomatis* among High School Students

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**Abstract**

**Background:** Infections with *Chlamydia trachomatis* are highly prevalent among adolescents, but their incidence has not been well studied.

**Objectives:** To determine the incidence of *C. trachomatis* infections in an initially chlamydia-free high school student population.

**Methods:** Between 1995 and 2007, 7990 students in an urban US high school district were tested for *C. trachomatis* more than once in an annual school-wide screening using urine DNA amplification tests. Students testing positive were treated with 1g azithromycin orally under direct observation. Incidence rates were calculated among 7292 students (Females: 3506; Males: 3786) aged 14 to 19 at their first participation in screening.

**Results:** The average annual cumulative incidence was 5.6% among males and 8.9% among females (p<.0001). The average incidence rate was 6.5/100 person-years (p-yr) for males and 11.4/100 p-yr for females (p<.0001). The incidence rate was 8.2/100 p-yr among students whose test result at first participation was negative compared with 30.3/100 p-yr among students whose test result at first participation was positive (p<.0001). Among students whose test result at first participation was negative, the median incidence time from the date of their initial negative test was 11.4 months for males and 8.7 months for females. Among students whose test result at first participation was positive, the median incidence time from the date of treatment was 6.2 months for males and 6.2 months for females.

**Conclusions:** While these incidence rates, cumulative incidence, and incidence times support current recommendations for annually screening female adolescents of chlamydia, they also provide strong evidence in support of annual chlamydia screening for male adolescents.

**Results**

**Table 1.** Cumulative incidence, incidence rates, and incidence times

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total*</td>
<td>16.8</td>
<td>13.8</td>
<td>16.8</td>
</tr>
<tr>
<td><strong>Cumulative incidence:</strong></td>
<td>5.6</td>
<td>9.9</td>
<td>7.2</td>
</tr>
<tr>
<td>First test (+)</td>
<td>6.2</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>First test (+)/Retested after a (+) test</td>
<td>12.0</td>
<td>14.8</td>
<td>13.9</td>
</tr>
<tr>
<td>All</td>
<td>5.6</td>
<td>9.9</td>
<td>7.2</td>
</tr>
<tr>
<td>Retest rates (per 100 person-yr)</td>
<td>8.2</td>
<td>9.2</td>
<td>8.8</td>
</tr>
<tr>
<td>First test (+)</td>
<td>9.9</td>
<td>10.7</td>
<td>10.3</td>
</tr>
<tr>
<td>First test (+)/Retested after a (+) test</td>
<td>29.8</td>
<td>31.8</td>
<td>30.8</td>
</tr>
<tr>
<td>All</td>
<td>9.9</td>
<td>11.4</td>
<td>10.6</td>
</tr>
</tbody>
</table>

**Setting and Design**

- **Objective:** To determine time to re-infection among students with an initial positive chlamydia test result or among students previously treated for chlamydia.

**Methods**

- **Timing and Design:** Among selected high schools in a New Orleans public school district were offered a school-based screening for chlamydia and gonorrhea using DNA amplification tests in urine specimens.
- **Screening Protocol:** The screening was first implemented in the school district during the school year 1995-1996 and was offered each subsequent school year until the school year 2006-2007.
- **Testing:** All students in the participating schools were eligible for testing if they had parental consent. Consent was sought from all students each year, regardless of prior participation.
- **Consent:** Consent was obtained in writing or verbally by telephone from parents/guardians of all students under the age of 18.
- **Students 18 years old or older provided their own consent in writing.**

**Screening Protocols**

- **During the testing period, entire classes of students were escorted to the designated testing area (a vacant classroom, an auditorium).**
- **Each eligible student was counseled individually regarding the opportunity to participate in the testing.**
- **Students whose parents have not provided consent were sent back to their classroom without being tested.**
- **Students having consent and willing to participate were given a urine collection cup and asked to collect the first 30 ml of the urine stream.**
- **Specimens were delivered to the laboratory on the same day for testing using a DNA amplification assay.**
- **Students with a positive test result were considered infected.**

**Treatment and Counseling**

- **Using standing orders, treatment was provided to infected students by a nurse/physician under direct observation with azithromycin 1g orally for chlamydia and ciprofloxacin 500mg orally for gonorrhea (cefixime 400mg was used before its production and marketing were discontinued).**
- **Infected students were counseled as to seek additional STD examination and HIV testing with their physicians or at the city STD clinic.**
- **They were also asked to refer their sex partners to the city STD clinic for treatment.**
- **Partners enrolled in the same school could obtain treatment at school from the nurse/physician.**

**Conclusions**

- In this high school student population, there is a high incidence of chlamydia among both males and females.
- The incidence among females is approximately twice that among males.
- There are no significant differences in re-infection rates between males and females.
- Within a year of testing negative for chlamydia, more than half of males and females acquired an incident infection with chlamydia in the school district.
- Within six months following treatment for a positive chlamydia test, approximately one half of males and females had a repeat positive test in the school district.
- Although some of the repeat positive tests may represent treatment failures, most are true re-infections from untreated and/or new sex partners.
- Adolescents treated for chlamydia as part of high school screening programs should be retested periodically and school-based STD screening programs must explore means to enhance partner treatment and other partner management services to maximize population benefits of these programs.
- Recommendations for annually screening sexually active adolescent females for chlamydia have been developed, but no recommendations for screening males have been developed.
- The rate at which an incident chlamydia infection was acquired in both males and females in this sample of a general population indicates that in areas of high prevalence of STDs, annual screening for chlamydia for adolescent males may be indicated.