Original article

# Effectiveness of patient delivered partner medication for preventing recurrent *Chlamydia trachomatis*

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**Objective:** To determine if providing *Chlamydia trachomatis* infected women with medication to deliver to their sex partner(s) could reduce recurrent chlamydia infections compared with the standard partner referral method.
**Study design:** A observational cohort study of 178 women, 14–39 years old attending a family planning clinic, diagnosed and treated for *C trachomatis* between October 1993 and December 1994 was conducted (43 received patient delivered partner medication (PDPM) and 135 received partner referral cards). Women were retested before or at their annual visit.
**Results:** The mean time of follow up was 17.7 months (SD 7.7). The PDPM group (n=43) was similar to partner referral group (n=135) for age, race, contraceptive method, history of an STD, and follow up time. The annual recurrent infection rate was lower among the PDPM group compared with the partner referral group (11.5% *v* 25.5%, p <0.05). After adjusting for age in logistic regression, women in the PDPM group were less likely than women in the partner referral group to have an incident *C trachomatis* infection (OR 0.37, 95% CI 0.15–0.97, p <0.05).
**Conclusion:** These findings suggest that patient delivered partner medication can protect women from recurrent *C trachomatis* infection compared with the standard partner referral approach. Prospective studies with larger sample sizes are under way.
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## Introduction

*Chlamydia trachomatis* is the most common bacterial infection in the United States, affecting millions of Americans each year and resulting in annual healthcare costs of billions of dollars.[1 2] Recurrent infections with *C trachomatis* among women can lead to pelvic inflammatory disease (PID), ectopic pregnancy, and tubal infertility.[3] It is estimated that there are over 400 000 cases of chlamydia related PID each year in the United States.[1]

Recent studies suggest that much of the tubal damage caused by *C trachomatis* may result from recurrent rather than single infections.[4 5] Therefore, untreated sex partners rather than newly acquired sex partners may be the most common source of reinfection among women. Several studies have shown that recurrence occurs early after initial infection[6 7] and Blythe *et al* found that 38% of recurrent cases reported no new sex partners.[6] In addition, since men frequently do not experience symptoms from a chlamydia infection, they may be less likely to be screened and to seek care.[8] It follows then that interventions which increase the rate of partner treatment should have a significant impact on *C trachomatis* related morbidity in women.

The most common current practice for the management of sex partners of women with chlamydia infection is referral of the partner(s) by the physician via the index women to a clinic for treatment.[9] Several studies suggest that this method is not very effective. Studies have demonstrated that only 25–40% of named partners were treated.[10 11] These partner treatment rates are similar to those found in international settings, where access to health care may be much more difficult.[12]

Another approach to partner treatment is partner notification by a healthcare worker. In the United States this is usually conducted by disease intervention specialists (DIS). While partner notification for syphilis has been generally accepted as efficacious,[13] it is still not clear whether this approach is helpful for chlamydia control. In addition, it is labour intensive and may be unacceptable to some ethnic groups.

Many clinicians prescribe and/or provide treatment for women to bring to their sex partner(s), but the efficacy of this type of treatment for reducing recurrent infections has never been studied in the United States. One ecological evaluation in Sweden suggests the effectiveness of the approach.[14]

The purpose of this study was to determine if providing infected women with the medication to deliver to their male sex partners would reduce recurrent *C trachomatis* compared with the standard procedure of partner referral in an urban US population.

## Methods

An observational cohort study of women aged 14–39 years, attending the New Orleans family planning clinic was conducted. Women who were diagnosed and treated for chlamydia infection between October 1993 and

*Table 1 Characteristics of the cohort by partner treatment type (n=178)*

| | *PDPM group (n=43)* | *Partner referral group (n=135)* | *p Value* |
|---|---|---|---|
| Age at enrolment | | | 0.16 |
| <22 | 60.5 | 71.9 | |
| ⩾22 | 39.5 | 28.1 | |
| Race | | | 0.43* |
| African American | 97.7 | 99.3 | |
| Other | 2.3 | 0.7 | |
| Age at sexual debut | | | 0.08 |
| <18 | 74.4 | 85.9 | |
| ⩾18 | 25.6 | 14.1 | |
| Contraceptive use | | | 0.56 |
| Oral contraceptives | 76.2 | 78.2 | |
| Depo-Provera | 4.8 | 11.3 | |
| Norplant | 2.4 | 1.5 | |
| Microbicide | 4.8 | 1.5 | |
| None | 7.1 | 3.8 | |
| Condoms | 4.8 | 3.8 | |
| Number of children | | | 0.32 |
| 0 | 72.1 | 64.9 | |
| 1 | 23.3 | 22.4 | |
| 2+ | 4.6 | 12.7 | |
| History *C trachomatis* | | | 0.18* |
| Yes | 16.3 | 9.7 | |
| No | 83.7 | 90.3 | |
| History *N gonorrhoeae* | 0 | 0 | 0.53* |
| Yes | 7.0 | 6.0 | |
| No | 93.0 | 94.0 | |
| History other STD† | | | 0.47* |
| Yes | 4.7 | 6.7 | |
| No | 95.3 | 93.3 | |

*Fisher's exact test; †includes human papillomavirus, herpes, and trichomonas.

December 1994 were eligible for the study (n=256). Those who returned for a follow up visit and were retested for chlamydia were included in the analysis (n=178). Women were tested for *C trachomatis* infection using a DNA probe test (GenProbe Pace 2, GenProbe Inc, San Diego, CA, USA) either at or before their annual visit. This was a pilot study to examine acceptability of patient delivered partner medication (PDPM) among the women attending the clinic to prepare for a larger cohort study. Women treated by one provider for *C trachomatis* were offered medication to deliver to their male sex partner(s). Women treated by other providers were given a referral card to deliver to their partner(s) (which was the standard of care). The card contained information about clinics that the partner could go to for testing and treatment. Women were randomly assigned to the providers. Both the index case and her partner(s) were given doxycycline (100 mg, twice daily for 7 days).

Forty three were given medication to deliver to their partner(s), while the remaining women (n=135) were given a referral card for their partner(s) to be treated at an STD clinic. There were fewer women on the PDPM arm because this provider worked fewer hours that the provider who was giving women partner referral cards. Medical charts were reviewed for demographic information, contraceptive use, and subsequent infection with *C trachomatis*. Follow up on the study ended 1 November 1996.

Annual *C trachomatis* infection rates were compared among the two groups using the $\chi^2$ statistic. Logistic regression analysis was used to determine age adjusted odds of acquiring an incident *C trachomatis* infection using SPSS for Windows statistical software.

## Results

Of the 256 eligible women, 178 returned for the follow up screening visit. Those who did not return were similar to those who did by the following characteristics: age <22 (73.4% *v* 69.5%, p <0.53), nulliparous (16.3% *v* 22.9%, p < 0.43), a history of *C trachomatis* (5.6% *v* 11.4%, p <0.12), a history of gonorrhoea (5.1% *v* 6.3%, p <0.73), history of other STDs (2.6% *v* 6.3%, p 0.22), and age <18 at sexual debut (74.7% *v* 83.6%, p<0.10). African American women were more likely to return than other women (98.9% *v* 88.6%, p <0.01).

Of the 178 women included in the analysis, the mean age was 20.7 years (SD 4.7), 98% were African American, the mean age at sexual debut was 15.6 (1.8), 76% used oral contraceptives, 66.7% had at least one child, and 6.2% reported a history of a sexually transmitted disease. Ages were grouped according to the mean age (that is, <22 *v* ⩾22). The PDPM group was statistically similar to the partner referral group with respect to age at the time of initial diagnosis, age of sexual debut, race, contraceptive use, number of children, and history of an STD (table 1). The mean time of follow up for the entire cohort was 17.7 months (SD 7.7). The mean follow up times were similar for the partner delivered group and the partner referral group (p <0.68). The majority of women were tested at their annual visit (84.8%). The PDPM group was equally as likely as the partner referral group to have been diagnosed with *C trachomatis* infection before the annual visit (14.8% *v* 16.3%, p <0.83).

The overall recurrence of *C trachomatis* infection was 22.1 per person year and did not vary by year of follow up for controls (41.4% in 1994 *v* 28.6 in 1995, p <0.25). Women who received PDPM were less likely than women who received partner referral cards to be reinfected with *C trachomatis* (11.5 *v* 22.1 per person year, unadjusted $\chi^2$, p <0.05). After adjusting for age in logistic regression, women in the PDPM group remained less likely than women in the partner referral group to have an incident *C trachomatis* infection (OR 0.37, 95% CI 0.15–0.97, p <0.05).

## Discussion

The results of our study, suggesting that PDPM can reduce *C trachomatis* recurrence, are consistent with the retrospective study conducted Sweden.[14] In Sweden, PDPM is more widely practised and, using existing databases, Ramstedt *et al* found that index women who were given medication to deliver to their partners had less recurrence at rescreening visits than those who were asked to refer their partner to an STD clinic.

Because this study was observational in nature, the potential for selection bias to the treatment arm was possible. There is evidence that this bias did not occur since several potentially confounding variables such as age and a history of sexually transmitted disease were similar between the two treatment groups. Since this study was retrospective in nature, and women were not tested for infection immediately after treatment (that is, the test of

cure), it is not possible to know if there were treatment failures. However, multiple studies have established that doxycycline is 90–95% effective for chlamydial endocervical infections. Furthermore, there is no reason to suspect that treatment failure rates differed between the two groups studied. There is also no reason to believe that either group had a different probability of using condoms or acquiring a new infection from a new partner.

Information about the patient's compliance with the medication was also not available. Katz *et al* [15] demonstrated that 63.4% of patients complied with medication, and a lack of compliance was associated with younger age. Since age was equally distributed between treatment groups, it is unlikely that compliance confounded these results.

A potential problem with PDPM is establishing legal responsibility for treatment of the partner. Though, to our knowledge, there is little medical/legal precedent for this, it seems logical that the physician originally treating the index case and providing the medication for the patient would be responsible for both the patient and her partner. The probability of a problem arising for the physician secondary to PDPM would seem to be small since the tetracycline and macrolide classes of antibiotics are well tolerated and allergic reactions are rare.[16] In the public health setting once PDPM protocols become established policy the responsibility would rest with a governmental agency. However, this issue is one of the reasons why the PDPM approach to the sex partners of chlamydia infected women needs careful prospective study in order to establish its benefit unequivocally.

Though doxycycline was used in this study, compliance potentially could be improved markedly if azithromycin 1 g by mouth were used instead. Azithromycin offers the opportunity to directly observe treatment of the infected woman and the woman (if she chooses) could also directly observe her partner's therapy. This would assure that more partners are treated. Furthermore, the PDPM approach is less labour intensive than partner notification approaches (that may ensue as a result of unsuccessful partner referral) and therefore less expensive per each successfully treated partner.

The recent development of DNA amplification technology for the diagnosis of *C trachomatis* which significantly expands screening options along with the availability of effective single dose therapy should greatly enhance chlamydia control programmes among women. However, in conjunction with these advances, innovative approaches to treat the infected male are needed to prevent reinfection in women. PDPM may be one of these approaches and this study provides some evidence that this approach is effective.

*Contributors:* All the authors participated in the conceptualisation, data collection, and design of the study, and Drs Martin, Farley, and Kissinger particpated in writing the paper.

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