

Characteristics of Women with Repeat Infections with *Chlamydia trachomatis* in New York State, outside New York City

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Background

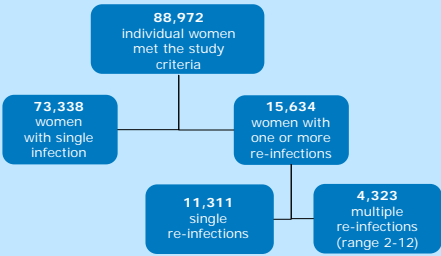
- Chlamydia ranks as the number one communicable disease reported nationally and in New York State (NYS) (1, 2).
- Chlamydia trachomatis* infection is frequently asymptomatic and one of the leading causes of infertility among women of childbearing age (3).
- Repeat infections are associated with an increased risk for long term sequelae (3).
- A high prevalence of Chlamydia has been observed in individuals previously treated for *C. trachomatis* infection (3).
- Re-infection rates and risk factors for repeat infection among NYS residents are not well defined.
- The goals of this study were to determine the incidence of Chlamydia re-infection among women in NYS, excluding New York City (NYC), and to identify predictors of re-infection.

Methods

- Data Source**
- Chlamydia has been a reportable disease in NYS since August 2000. Electronic surveillance data collected on Chlamydia cases reported to the 57 NYS counties outside of NYC were analyzed for this study.
- Study Design**
- A retrospective cohort of 10 to 44 year old women reported with a *C. trachomatis* infection that was diagnosed between January 1, 2006 and December 31, 2010 were used for these analyses.
- Repeat infections were defined as any diagnosis that occurred at least 22 days after appropriate antimicrobial treatment for the preceding infection.
  - Gonorrhea co-infection at the time of initial Chlamydia diagnosis was defined as a case of gonorrhea reported within seven days of the initial Chlamydia diagnosis date.
- Statistical Analyses**
- Predictors of re-infection were assessed using bivariate analysis and logistic regression models comparing women who had one re-infection and women who had two or more re-infections to those who did not have a re-infection during the study period. Statistical analyses were performed using SAS version 9.1.3.

Results

Figure 1. Number of Initial Chlamydia Infections and Re-infections



Results (continued)

Table 1. Characteristics of women with initial infection and re-infection					
Characteristic		All women	Women with 1 or more re-infections	Risk Ratio	95% Confidence Interval
Age Group	10-14	1,606	607	6.0	5.4, 6.7
	15-19	34,361	8,424	3.9	3.5, 4.2*
	20-24	32,508	4,789	2.3	2.1, 2.5*
	25-29	12,210	1,280	1.6	1.5, 1.8*
	30-44	8,287	534	Referent	
Race/ Ethnicity	Hispanic	10,624	1,771	1.1	1.0, 1.1**
	Black, non-Hispanic	26,532	7,391	1.8	1.7, 1.8*
	Other, non-Hispanic	5,234	1,051	1.3	1.2, 1.3*
	Mixing/Unknown	18,471	979	0.3	0.3, 0.4*
	White, non-Hispanic	28,111	4,442	Referent	
Provider Type	Private physician	37,157	5,722	0.8	0.7, 0.8*
	Institutionalized	1,147	175	0.8	0.7, 0.9*
	Health Center	9,723	2,112	1.1	1.0, 1.2*
	Military	496	27	0.3	0.2, 0.4*
	Planned Parenthood	15,113	2,575	0.9	0.8, 0.9*
	Hospital	12,981	3,213	1.3	1.2, 1.3*
	Missing/Unknown	5,164	409	0.4	0.4, 0.5*
	Health Department	7,191	1,401	Referent	
Exam Reason	Other	19,493	3,461	1.1	1.0, 1.1*
	Referred	2,263	402	1.1	1.0, 1.2
	Symptomatic	14,595	3,268	1.4	1.3, 1.4*
	Missing/Unknown	1,823	84	0.4	0.3, 0.5*
	Screening	50,798	8,419	Referent	
Gonorrhea Co-infection	Yes	4,039	1,122	1.6	1.5, 1.7*
	No	84,933	14,512	Referent	

\*p<0.001; \*\*p<0.05

Bivariate Analysis (see Table 1)

- Age at initial infection was the strongest predictor of re-infection:
- 10-14 year old women were **6.0 times** as likely to experience a re-infection,
  - 15-19 year old women were **3.9 times** as likely to experience a re-infection and
  - 20-29 year old women were **2.3 times** as likely to experience a re-infection, compared with women 30-44 years

Of the race-ethnicity groups assessed:

- Black, non-Hispanic women were **1.8 times** as likely to experience a re-infection, compared to white, non-Hispanic women

Women co-infected with gonorrhea at time of the initial visit were **1.6 times** as likely to experience a re-infection compared to women with *C. trachomatis* infection only

Multivariate Analysis (see Table 2)

- 10-14 year old women were:
- 7.5 times** as likely to experience one re-infection and
  - 18.9 times** as likely to experience two or more re-infections, compared to 30-44 year old women

Results (continued)

Multivariate Analysis (continued)

- Black non-Hispanic women were:
- 1.9 times** more likely to experience one re-infection and
  - 2.7 times** as likely to experience two or more re-infections, compared with white, non-Hispanic women

Women who were co-infected with gonorrhea at time of initial visit were:

- 1.4 times** more likely to experience one re-infection and
- 1.7 times** more likely to experience two or more re-infections, compared to women diagnosed with *C. trachomatis* infection only

Table 2. Adjusted odds ratios and 95% confidence intervals for predictors of Chlamydia re-infection					
Characteristic		Model comparing women with single infection and 1 re-infection		Model comparing women with single infection and 2 or more re-infections	
		aOR*	95% CI**	aOR	95% CI
Age Group	10-14	7.5	(6.5, 8.7)	18.9	(14.2, 24.9)
	15-19	4.6	(4.1, 5.0)	9.8	(7.7, 12.4)
	20-24	2.6	(2.3, 2.8)	4.3	(3.4, 5.4)
	25-29	1.7	(1.5, 1.9)	2.0	(1.5, 2.6)
	30-44	Referent		Referent	
Race/Ethnicity	Hispanic	1.3	(1.2, 1.4)	1.6	(1.4, 1.8)
	Black, non-Hispanic	1.9	(1.8, 2.0)	2.7	(2.5, 3.0)
	Other, non-Hispanic	1.3	(1.2, 1.4)	1.5	(1.3, 1.8)
	White, non-Hispanic	Referent		Referent	
Provider Type	Private Physician	1.1	(1.1, 1.2)	1.1	(1.0, 1.2)
	Institutionalized	0.7	(0.6, 0.8)	0.5	(0.4, 0.7)
	Health Center	1.1	(1.1, 1.2)	1.4	(1.3, 1.6)
	Military	0.4	(0.2, 0.6)	0.1	(0.1, 0.5)
	Planned Parenthood	1.0	(1.0, 1.1)	0.9	(0.8, 1.0)
	Hospital	1.4	(1.3, 1.5)	1.5	(1.3, 1.7)
Health Department		Referent		Referent	
Exam Reason	Other	1.1	(1.0, 1.1)	1.1	(1.0, 1.2)
	Referred	1.0	(0.8, 1.1)	0.9	(0.8, 1.2)
	Symptomatic	1.4	(1.3, 1.4)	1.6	(1.5, 1.8)
	Screening	Referent		Referent	
Gonorrhea Co-infection	Yes	1.4	(1.3, 1.5)	1.7	(1.5, 1.9)
	No	Referent		Referent	

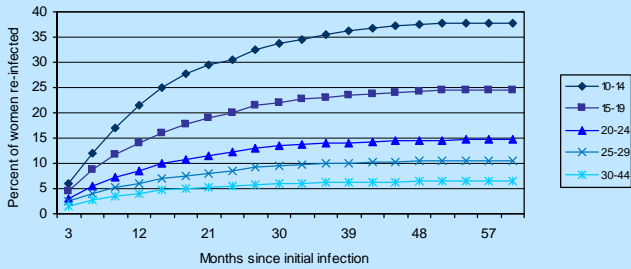
\*adjusted Odds Ratio; \*\* Confidence Interval

Time to Re-infection

- 22% of 10-14 year old women were re-infected within 1 year versus 4% of 30-44 year old women (see Figure 3).
  - 18% of re-infections occurred within 3 months.<sup>†</sup>
  - 38% occurred within 6 months.<sup>†</sup>
  - 60% occurred within 1 year of the initial diagnosis.<sup>†</sup>
  - median time to first re-infection was 270 days (range 22 to 1,766 days).<sup>†</sup>
- <sup>†</sup>Data not shown

Results (continued)

Figure 3. Incidence of Chlamydia re-infection by age group, New York State 2006-2010



Conclusions

- This study found that 18% of women became re-infected with Chlamydia during the study period which is similar to literature reports indicating between 15-24% of women become re-infected (4-6).
  - Young age and gonorrhea co-infection at initial *C. trachomatis* infection and black race were found to be predictors of re-infection in this study.
  - Federal recommendations to re-screen infected individuals three months after treatment is an important strategy to detect re-infection.
  - In NYS, regulations for expedited partner therapy (EPT) for Chlamydia were implemented in October 2010. Future analysis of re-infection rates will be important to assess the impact of this partner management strategy.
  - A primary strength of this study was the large sample size coming from statewide population-based surveillance.
- Limitations:**
- The potential for underestimating the number of re-infections in women who moved out of state.
  - The name-based matching algorithm may have missed re-infections among women who changed names.
  - The possibility that a portion of the “initial” infections identified were recurrent infections, with the initial infection having occurred prior to 2006.

Bibliography

- New York State Department of Health, Bureau of Sexually Transmitted Disease Prevention and Epidemiology.
- Centers for Disease Control and Prevention. STD Surveillance, 2010. Atlanta, GA: U.S. Department of Health and Human Services; November 2011.
- Centers for Disease Control and Prevention. STD Treatment Guidelines, 2010. MMWR 2010; 59(No. RR-12):2.
- Xu F, Schillinger JA, Markowitz LE, et al. Repeat *Chlamydia trachomatis* infection in women: Analysis through a surveillance case registry in Washington state, 1993-1998. Am J Epidemiol 2000; 152: 1164-1170.
- Hillis SD, Nakashima A, Marchbanks, PA, et al. Risk factors for recurrent *Chlamydia trachomatis* infections in women. Am J Obstst Gynecol 1994; 170:801-806.
- Magnus M, Schillinger JA, Fortenberry JD, et al. Partner age not associated with recurrent *Chlamydia trachomatis* infection, condom use, or partner treatment and referral among adolescent women. J Adolesc Health 2006; 39: 396-403.