

# Universal Prenatal Screening and Testing and *Chlamydia trachomatis* Conjunctivitis in Infants

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**Abstract:** We retrospectively reviewed all infant *Chlamydia trachomatis* eye cultures submitted to the Chlamydia Research Laboratory from 1986 to 2002. The positivity rate was 15.6% during the period before the implementation of universal prenatal screening (1986–1993) compared with 1.8% during the screening period (1994–2002).

*Chlamydia trachomatis* remains the most frequently reported, notifiable infectious disease in the United States and is the most common sexually transmitted, bacterial infection.<sup>1</sup> Women of childbearing potential (aged 15–44 years) compromised 97.4% of the cases reported in females, approximately 1 million cases. Perinatal exposure to the infected cervix during vaginal delivery poses a 5% to 75% risk of transmission to the neonate resulting in conjunctivitis, pneumonia and asymptomatic nasopharyngeal infection.<sup>2</sup> The Centers for Disease Control and Prevention (CDC) first recommended prenatal screening of pregnant women in 1993.<sup>3</sup> The US Preventative Services Task Force currently recommends chlamydia screening for all pregnant women younger than 25 years at their first antenatal visit and in older women who are at an increased risk for infection.<sup>4</sup> Although a number of studies have evaluated the efficacy of antibiotic treatment of *C. trachomatis* infection in pregnant women, these studies did not look at the impact on perinatal chlamydial infections in infants born to these women.<sup>5</sup> *C. trachomatis* was responsible for 20% to 40% of cases of neonatal conjunctivitis based on studies from 1980s to 1990s.<sup>2</sup> There are no epidemiologic studies of *C. trachomatis* eye infections in infants in the United States that evaluated the effect of universal screening and treatment of pregnant women as recommended by the CDC in 1993. However, we observed that the rate of neonatal chlamydial ophthalmia at our institution has dramatically decreased over the last 2 decades, presumably because of successful systematic maternal screening and treatment.

The aim of this study was to determine the impact of universal screening and treatment of pregnant women on the incidence of chlamydial conjunctivitis in infants in the population served by our medical center.

This was a retrospective study of all *C. trachomatis* eye cultures from infants submitted to the Chlamydia Research Laboratory at SUNY Downstate Medical Center from 1986 to 2002. Infants through 1 month of age with conjunctivitis were referred to the Chlamydia Research Laboratory at SUNY Downstate

Medical Center. All infants were examined and cultured by one of the authors (M.R.H.) or the research nurse. *C. trachomatis* cultures were done at the time of testing by immediate inoculation of samples onto cell culture, incubation at 37°C, and staining with a species-specific fluorescein-conjugated antibody followed by fluorescence microscopy to identify the characteristic intercytoplasmic inclusions, as previously described.<sup>6</sup> All eye culture samples submitted to the laboratory and culture reports from 1986 to 2002 were reviewed using the laboratory logbook and analyzed according to calendar year and time period (prescreening period, 1986–1993; postscreening period, 1994–2002). During this period, the Chlamydia Research Laboratory was the only facility performing chlamydia cultures at our medical center. The frequency of positive cultures and total number of samples submitted for evaluation of infant conjunctivitis were determined for each time period (calendar year). The  $\chi^2$  test was used to analyze categorical variables: culture result in the prescreening versus postscreening periods. During the study period, a total of 880 samples obtained from infants with signs and symptoms of conjunctivitis were submitted for *C. trachomatis* culture. The sample positivity rate declined after the formal CDC recommendation to implement screening in 1993. Ninety-nine (15.6%) of 636 conjunctival cultures obtained during the prescreening period (1986–1993) were positive compared with 4 (1.8%) of 228 obtained during the postscreening period (1994–2002;  $P < 0.001$ ,  $\chi^2$  test).

These data demonstrate that infant conjunctivitis caused by *C. trachomatis* significantly decreased in the study population since the implementation of routine screening and treatment of pregnant women in the United States in 1993. The current rate of chlamydial infection among pregnant women in our population was similar to the rates seen in this population in the prescreening period when the rates of neonatal chlamydial conjunctivitis were high.<sup>6</sup> The overall prevalence rates of maternal *C. trachomatis* infection in our population in 1985 to 1987 were 8% and 14% in women 18 years or younger.<sup>6</sup> The decrease in perinatal chlamydial infection is also supported by a subsequent serological study in children in our population.<sup>7</sup> As part of that study, Bannietts et al.<sup>7</sup> also conducted an audit of charts from women attending the prenatal clinic at the University Hospital of Brooklyn from April 2016 to August 2017. Compliance rates with screening during pregnancy were >95% overall and 97% for women younger than 25 years. The overall prevalence of *C. trachomatis* infection was 5.6%; 11.8% in women 25 years or younger compared with 3.5% in women older than 25 years. No cases of perinatal chlamydial infection, including conjunctivitis, were seen during this period. Neonatal ocular prophylaxis does not prevent chlamydial conjunctivitis.<sup>6</sup> Population-based data on the prevalence of *C. trachomatis* conjunctivitis in infants in the United States are limited. Kreisel et al.<sup>8</sup> reviewed all cases of chlamydia-positive eye or conjunctival specimens in infants younger than 1 year in the United States reported to the CDC from 2010 to 2015. They identified 521 chlamydial infections, giving overall rates ranging from 1.6 to 2.7 cases per 100,000 live births. Using the data from the ocular prophylaxis study by Hammerschlag et al.,<sup>6</sup> we calculated an

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estimated rate of neonatal *C. trachomatis* conjunctivitis in 1985 through 1987, before the implementation of screening, of 191/100,000 live births compared with an estimated rate for the period after the implementation of screening (1994–2002) of 7/100,000 live births. These rates have continued to fall; the estimated rate in our population for 2016 to 2017 was 0/100,000.

This study has some limitations. It was a retrospective review of cultures done in our laboratory, not prospective follow-up of infants; thus, we may have missed infants who had chlamydial conjunctivitis. However, we were the only facility performing *C. trachomatis* culture during the prescreening period as well as the only facility testing infants in the postscreening period. We were actively requesting referrals of these infants from pediatricians in our institutions. These results suggest that prenatal screening and treatment of pregnant women may have prevented perinatal chlamydial infection in our population.

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