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# Screening for Syphilis in Cases of Suspected Gonorrhea and Chlamydia Infections

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## Abstract

**Background.** In all cases of suspected sexually transmitted infections (STIs), it has been routine practice to screen for syphilis with a blood sample. The incidence of syphilis seems to be lower than that of commonly screened STIs. **Objective.** The objective of our study was to determine whether it is cost-effective to screen for syphilis with serological testing in cases of suspected gonorrhea and chlamydia infections. **Hypothesis.** Our hypothesis is that it is not cost-effective to screen for syphilis in cases of presumed gonorrhea and chlamydia infections. **Methods.** Our study is a New York Medical College institutional review board–approved retrospective study. During the period January 2004 to August 12, 2006, the laboratory work of all patients tested for gonorrhea and chlamydia in our emergency department was reviewed. The charts were reviewed for the following tests: gonorrhea DNA probe, chlamydia DNA probe, and syphilis IgG (immunoglobulin G)/RPR (rapid plasma reagin). The results of these tests were obtained and analyzed. **Results.** The total number of patients screened for gonorrhea and chlamydia during this period was 196. Seventy-eight patients tested positive for gonorrhea and chlamydia. All these 78 patients, tested negative for syphilis. The overall prevalence of positivity for STIs was 39.8% (78/196). The prevalence of chlamydia alone was 85.9% (67/78) and gonorrhea alone was 7.69% (6/78). The prevalence of combined both chlamydia and gonorrhea was 6.4% (5/78). **Statistics.** We used online SILICO 2 × 4 Fisher exact test. By comparing positive and negative results of serology RPR, GC, and chlamydia trap, the resultant 2-tailed *P* value is <.0001, which is statistically significant. **Conclusions.** Per our study, the yield of syphilis testing was negligible. It may not be cost-effective to screen for syphilis in cases of STIs such as gonorrhea and chlamydia.

## Keywords

infectious diseases, emergency medicine, adolescent medicine

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## Introduction

Our study is a New York Medical College institutional review board–approved retrospective study. In all the cases of suspected sexually transmitted infection (STI), it is mandated by New York State to test for syphilis in addition to testing for gonorrhea and chlamydia. In fact, it is customary practice to draw a blood sample for syphilis for all sexually active adolescents who come for routine annual physical examination.<sup>1</sup> The prevalence of syphilis seroreactivity in the general population is believed to be low (0.71%).<sup>2</sup> Our study aims to determine whether it is cost-effective to screen for syphilis in cases of suspected gonorrhea and chlamydia.

## Materials and Methods

The emergency department charts from January 2004 to August 2006 were reviewed for the following test results: gonorrhea DNA probe, chlamydia DNA probe, and syphilis IgG (immunoglobulin G)/RPR (rapid plasma reagin).

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**Table 1.** Data Summary.

Total # Charts Reviewed	RPR Positive	RPR Negative	Chlamydia Positive, Alone Probes	Gonococci Positive, Alone Probes	Combined GC and Chlamydia Positive Probes
196	0	78	67	6	5

## Results

A total of 196 patients were screened for gonorrhea, chlamydia, and syphilis during the above-mentioned period. Seventy-eight patients tested positive for gonorrhea and/or chlamydia. All these 78 patients tested negative for syphilis. The overall prevalence of combined gonorrhea and chlamydia was 39.8% (78/196). Among positive testings, the prevalence of chlamydia alone was 67/78 (85.9%), and that of gonorrhea alone was 6/78 (7.69%). The combined prevalence of both gonorrhea and chlamydia in patients was 5/78 (6.4%). The total number of patients screened for gonorrhea, chlamydia, and syphilis during the above-mentioned period was 196. All 196 patients tested negative for syphilis; Of 196 tested, 78 patients tested positive for gonorrhea and chlamydia either combined or alone was 39.8%(78/196). The combined prevalence of gonorrhea and chlamydia was 3% (6/196), whereas that of chlamydia alone was 67/196 (34%; and gonorrhea alone was 6/196 (3.06%) see Table 1 and Figure 1).

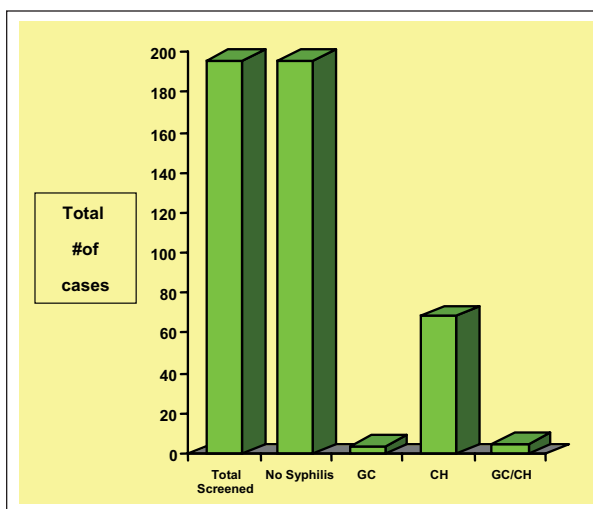
## Statistics

We used online SILICO 2 × 4 Fisher exact test. By comparing positive and negative results of serology RPR, GC, and chlamydia trap, the resultant 2-tailed *P* value is <.0001, which is statistically significant.

## Discussion

According to the World Health Organization, there are 12 million new cases of syphilis annually worldwide. Most patients who have syphilis are asymptomatic, and serological testing is required to make a diagnosis. Per the Centers for Disease Control and Prevention (CDC), US syphilis rates declined to an all-time low in 2000 (2.2 cases per 100 000 cases). Marion County, Indiana, had the highest incidence with 37.1 cases per 100 000 population. The incidence of gonorrhea is declining (113.5 cases per 100 000), whereas the incidence of chlamydia (319.6 per 100 000) is rising per the CDC November 2005 data.

The CDC reports increased incidence of syphilis in black men (7.7 cases per 100 000 in 2004), and the incidence of syphilis among women remained the same at 0.8 cases per 100 000. The CDC also reported that the

**Figure 1.** Data summary.

incidence of chlamydia cases was 3.3 times higher among women than men in 2004.

The US Preventive Services Task Force (USPSTF) concluded the following: No direct evidence exists that screening for syphilis infection leads to improved health outcomes in persons at increased risk. Routine screening of asymptomatic persons is not recommended in patients not at increased risk for syphilis infection. There is no evidence supporting routine screening for syphilis in patients diagnosed with other sexually transmitted diseases. The potential harm of screening (cost, false-positive tests, and stigma) in a low incidence population outweighs the benefits.<sup>3</sup>

The USPSTF does not recommend routine screening for syphilis in asymptomatic low-risk individuals. But according to the USPSTF, persons diagnosed with chlamydia, gonorrhea, or genital herpes are at higher risk for acquiring syphilis and they recommend screening for syphilis in these individuals.

Per authors Swygard et al, screening for syphilis is recommended for commercial sex workers, persons in correctional facilities, persons diagnosed with another STD, men who have sex with men who engage in high-risk behavior, and all pregnant women at the first prenatal visit.<sup>4</sup>

According to Risser et al, the syphilis rate in southern states is 4.3 cases per 100 000 persons. Rates per

100 000 persons for syphilis in 2006 were 4.9 among African American; 0.8 among Hispanic women, and 0.3 among white women; these rates were in 2020, respectively, 24.5, 4.0, and 1.5, that is, 13 time greater than the Healthy People.<sup>5</sup>

According to the CDC, during 1998 to 2002, the number of syphilis cases among 16 men who have sex with men (MSM) in San Francisco increased from 8 to 512 per 100 000 MSM.<sup>6</sup>

Syphilis testing is not cost-effective in detecting syphilis in HIV-negative blood donors. Each year 18 million dollars is spent on serological tests for syphilis, with another extra cost of 3.9 20 million dollars spent on discarding specimens.<sup>7</sup>

Wangnapi et al reported, in pregnant women in Papua, New Guinea, that the prevalence of *Chlamydia trachomatis* was 11.1%, *Neisseria gonorrhoeae* 9.7%, and *Trichomonas vaginalis* 21.3%. Risk factors included having a partner at perceived risk of infection, maternal extramarital intercourse, early sexual debut, lack of formal education, urban residence, smoking, and women not using condoms.<sup>8</sup>

Kenyon et al found out that in most populations, antenatal syphilis prevalence (ASP) dropped to under 1% before 1960. In Zimbabwe and black South Africans, ASP was high in the pre-penicillin period, dropped in the post-penicillin period, but then plateaued at around 6% until the end of the 20th century.<sup>9</sup>

Ballah and colleagues indicated that strengthening current surveillance systems for syphilis is important to track and monitor disease burden. Usage of routinely collected laboratory information to generate surveillance was proposed in South Africa; annually for the period from 2003 to 2012 there was an approximate 14% reduction of syphilis seroprevalence.<sup>10</sup>

Smith and Angarone reported that STIs remain a significant burden on public health in the United States. Primary prevention counseling with early diagnosis and treatment remain the best methods to decrease the incidence of STIs. Smith and Angarone conclude that through significant public health interventions, the incidence of gonorrhea, chlamydia, and trichomonas is decreasing, but surprisingly the incidence of primary and secondary syphilis is increasing.<sup>11</sup>

Nuñez-Forero et al tried to determine the diagnostic accuracy of tests developed for use at the point of care for *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG), and syphilis in women having symptoms of lower urinary tract infection. According to the authors, rapid tests studies are not useful for screening for NG at the point of care. But, in pregnant women, rapid tests has been recommended for chlamydia and syphilis. In the case of CT, a recommendation about their use in

routine care should be supported by a cost-effectiveness analysis. In screening populations, such as people at high risk of STIs or pregnant women, the RTs for syphilis were recommended.<sup>12</sup>

The National Profile STD Surveillance summarizes that the national rate of syphilis cases reached an historic low in 2000 and 2001, but has increased almost every year since then. This increase was largely attributable to an increase among men, and among MSM. However, during 2013 to 2014, rates increased among both men and women in every region of the country. Rates of reported congenital syphilis cases also increased in every region of the country during 2013 to 2014.

MSM continued to account for most P&S (primary and secondary) syphilis cases in 2014. Nationally, the highest rates of P&S syphilis in 2014 were observed among men aged 20 to 24 years and 25 to 29 years, among men in the West and in the South, and among black men.<sup>13</sup>

The CDC in their 2014 Surveillance report has reported that cases of chlamydia, gonorrhea, and syphilis have increased for the first time since 2006. In 2014, there were 350 062 reported cases of gonorrhea (a rate of 110.7 per 100 000) and 19 999 reported cases of P&S syphilis (for a rate of 6.3 per 100 000). Sexually transmitted diseases continue to affect young people—particularly women—most severely, but increasing rates among men contributed to the overall increases in 2014 across all 3 diseases. To reduce Sexually transmitted diseases, Americans must take steps to protect themselves. For sexually active individuals, testing and treatment according to CDC's recommendations, using condoms consistently and correctly, and limiting the number of sex partners are all effective strategies for reducing the risk of infection and consequences to health.<sup>14</sup>

Our study concurs with recommendations in other studies. Even though syphilis is on the rise in certain populations and USPSTF recommends serological tests for syphilis, it is evident from our study that the yield is poor or negligible and hence it is not a cost-effective screening procedure.

## Limitations

The limitation of our study is the small sample size.

## Conclusions

Per our study, the yield of syphilis testing was negligible. It was not cost-effective to screen for syphilis (\$4 per test for RPR) in all cases of suspected gonorrhea and chlamydia.

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## Author Contributions

KVN: Contributed to conception and design; contributed to analysis; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

KC: Contributed to conception and design; contributed to analysis; drafted the manuscript; critically revised the manuscript; gave final approval; agrees to be accountable for all aspects of work ensuring integrity and accuracy.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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