

27. Screening for Gonorrhea— Including Ocular Prophylaxis in Newborns

RECOMMENDATION

Routine screening for *Neisseria gonorrhoeae* is recommended for asymptomatic women at high risk of infection (see *Clinical Intervention*). All high-risk women should be screened during pregnancy. There is insufficient evidence to recommend for or against screening all pregnant women or screening asymptomatic men. Recommendations to screen selected high-risk young men may be made on other grounds (see *Clinical Intervention*). Routine screening is not recommended for the general adult population. Ocular antibiotic prophylaxis of all newborn infants is recommended to prevent gonococcal ophthalmia neonatorum.

Burden of Suffering

Nearly 420,000 *N. gonorrhoeae* infections were reported in the U.S. in 1994;¹ the actual number of new infections is estimated to be closer to 800,000 per year, due to incomplete reporting.² Between 10% and 20% of untreated gonococcal infections in women lead to pelvic inflammatory disease (PID), which may require hospitalization or surgery.³ PID is an important cause of chronic pelvic pain, ectopic pregnancy, and infertility; approximately one out of four women with a prior history of PID is unable to conceive.⁴ Pregnant women with gonococcal infections are at increased risk for obstetric complications (e.g., stillbirth, low birth weight).^{5,6} Infected women can give birth to infants with gonococcal conjunctivitis (ophthalmia neonatorum), a condition that often produces blindness if not treated.⁵ Gonococcal infections produce urethritis, epididymitis, and proctitis in men, but few long-term complications. Disseminated gonococcal infection can cause tenosynovitis, septic arthritis, endocarditis, and meningitis, especially in persons with complement disorders.

The overall incidence of gonorrhea has steadily declined in the U.S. since 1975,^{1,7} but rates of infection have remained very high in some groups of young men and women.⁸ Over 60% of gonococcal infections occur in persons under age 25;⁷ adolescents (ages 15–19) have rates of in-

fection comparable to young adults (ages 20–24). A number of demographic and behavioral characteristics are associated with higher reported rates of gonorrhea: being unmarried, urban residence, low socioeconomic status, early sexual activity, multiple sex contacts, and a prior history of gonorrhea.^{10,11} Rates of gonorrhea are highest in poor, minority communities in large cities and in the rural Southeast. Black male and female adolescents have a 10–20-fold higher rate of infection than their Hispanic or white counterparts.^{7,8,11} Geographic variation is substantial, with the highest rates of infection in the Southeastern states.^{1,7} Since most data come from public health clinics, the demographics of reported disease may not be entirely representative of the true distribution of infection.

Up to 80% of women infected with gonorrhea are asymptomatic,¹² and asymptomatic men and women comprise an important reservoir for new infection. Nearly half of all male partners of infected women, and over three quarters of female partners of infected men, are infected.^{13,14} While the majority of infected men eventually develop symptoms, initial asymptomatic periods may last up to 45 days.¹⁵ The prevalence of asymptomatic gonorrhea in high-risk communities is generally higher in women (4–5%)^{16,17} than in men (1.5–2.5%).^{15,18,19} Asymptomatic gonorrhea was uncommon, however, among women at a university health clinic (0.4%),¹⁷ private practice patients in Montreal (0.4%),²⁰ and non-Medicaid patients in Boston (<1%).²¹ Among asymptomatic male adolescents screened at urban teen clinics or detention centers, up to 5% are infected with *N. gonorrhoeae*.^{22–25}

The majority of pharyngeal infections are asymptomatic, but infection may be transmitted to genital sites through oral sex²⁶ or progress to disseminated gonococcal infection.²⁷ Pharyngeal gonorrhea, however, usually occurs in association with anogenital infection, and it responds to usual treatment regimens for anogenital gonorrhea (i.e., broad-spectrum cephalosporins and fluoroquinolones).⁹ Persons with gonorrhea may be infected with other sexually transmitted diseases (chlamydia, syphilis, HIV); up to 50% of persons with gonorrhea have a coexistent chlamydial infection.¹²

The frequency of antibiotic-resistant *N. gonorrhoeae* has steadily increased in the U.S. Recent surveillance data estimate that 32% of gonorrhea isolates nationwide are resistant to penicillin or tetracycline.²⁸ These organisms are currently sensitive to broad-spectrum cephalosporins such as ceftriaxone and several other antibiotics, but the emergence of new resistance remains a concern.⁹

Accuracy of Screening Tests

The most sensitive and specific test for detecting gonococcal infection in asymptomatic persons is direct culture from sites of exposure (urethra, en-

docervix, throat, rectum). Under quality-controlled conditions, the sensitivity of culture is high for both male and female anogenital gonorrhea, and for pharyngeal gonococcal infections. In women, a single endocervical culture is estimated to have a sensitivity of 80–95%.^{29,30} Sensitivity of cultures may be limited by inadequate clinical specimens, improper storage, transport or processing, and inhibition of growth by antibiotics in selective culture mediums.³¹

Microscopic examination of Gram-stained urethral or cervical specimens can detect infection with *N. gonorrhoeae*. The sensitivity of Gram-stained urethral specimens is higher in symptomatic men (90–95%) than in asymptomatic men (70%).³¹ The Gram stain is less sensitive for cervical infections in women (30–65%), and it is not useful for diagnosing pharyngeal or rectal infections. The specificity of stained smears is high in men (97–99%), but lower in women (90–97%), due to presence of vaginal flora.³¹

In clinical settings where handling and storage of culture medium is difficult, other methods of testing have become increasingly popular. DNA probes and enzyme immunoassays (EIA) are currently the most widely used nonculture diagnostic tests. Compared to culture, the sensitivity, specificity, and positive predictive value (PPV) of EIA are generally high using urethral specimens from symptomatic men (>95%).^{32,33} Accuracy of EIA is significantly lower in endocervical specimens, however: sensitivity 60–100%, specificity 70–98%, and PPV 78–85%.^{32–35} Among patients in sexually transmitted disease (STD) clinics (prevalence of gonorrhea 9–10%), a DNA probe had a very high sensitivity and specificity (97–99%) and high PPV (>90%) and was more sensitive than a single culture.^{36,37} The accuracy of nonculture tests has not been adequately studied in an asymptomatic, primary care population, however. Among asymptomatic persons, in whom the prevalence of gonorrhea is often very low, a substantial proportion of positive EIA or DNA probe results may be false positives.^{32,34} Serology is neither sufficiently sensitive nor specific for use in screening. None of the nonculture tests provides information on antibiotic susceptibility.

Screening for gonorrhea in asymptomatic men has been limited by the discomfort and inconvenience of obtaining urethral specimens.²⁴ EIA using urine specimens produces accurate results in symptomatic men,³⁸ but when used to screen a low-prevalence population, the majority of positive EIA results have been false positives.³⁹ Urine dipstick for leukocyte esterase (LE) is an inexpensive, rapid, and noninvasive test for urethritis in men. Among asymptomatic high-risk young men (ages 15–25, prevalence of infection 3%), urinary LE had a sensitivity of 46–60% and a specificity of 93–96% for gonorrhea.^{24,25} The PPV of LE in an asymptomatic popula-

tion is low (30–43%), although some false-positive results may be due to other infections that require treatment (e.g., chlamydia).

Information from the sexual history and clinical examination have been used to improve screening strategies. In one study of 1,441 women in Boston undergoing routine pelvic examinations, five factors were independently associated with gonococcal infection: partners with gonorrhea or urethral discharge, endocervical bleeding induced by swab, age at first intercourse less than 16, payment by Medicaid (a proxy measure for low socioeconomic status), and low abdominal or pelvic pain.²¹ The prevalence of infection among women with one or more risk factors was 2.5%, compared to 0.2% for women with no risk factors. In a second study, young age (under 20), vaginal discharge, or a sex partner suspected of having gonorrhea identified all infected women in a low-income, urban population (prevalence of gonorrhea 3%).¹⁷

Effectiveness of Early Detection

Early detection and treatment of gonococcal infection in asymptomatic persons offers the potential benefits of preventing future complications of infection, reducing transmission to uninfected partners, and identifying sexual contacts who are likely to be infected. Due to ethical considerations that preclude placebo-controlled trials of treatment, the benefits of early detection are based largely on indirect evidence: the effectiveness of antibiotic treatment and the high morbidity of untreated gonorrhea. The decline in the reported incidence of gonorrhea over the last two decades and decline in hospitalizations for PID may also indicate a benefit of current screening strategies, but other factors (increased use of condoms) have presumably had an impact as well.⁷ Due to high rates of reinfection among those at greatest risk, screening may be of little benefit to some individuals unless it is accompanied by measures to prevent future infections. Early detection and treatment of gonorrhea during pregnancy has the potential to decrease morbidity from the obstetric complications of gonococcal infections, although this benefit has never been tested in a controlled trial.

Ocular Prophylaxis of Newborn Infants

Between 30% and 50% of infants exposed to gonococci will develop ophthalmia in the absence of treatment.⁴⁰ Gonococcal ophthalmia can cause severe conjunctivitis and lead to corneal scarring, abscess, eye perforation, and permanent blindness.⁴¹ Blindness due to ophthalmia neonatorum declined dramatically with the institution of widespread prophylaxis of in-

infants with silver nitrate. Studies of ocular prophylaxis in developing countries, using historical controls, report reductions of 80–90% in the transmission of gonococcal ophthalmia neonatorum with prophylaxis with silver nitrate, tetracycline or erythromycin.^{42,43} In a U.S. study, failure rates were similar after prophylaxis with silver nitrate, erythromycin, or tetracycline (0.03–0.1%).⁴⁴ A recent controlled trial in Kenya reported that povidone-iodine, erythromycin, and silver nitrate were each effective in preventing conjunctivitis due to *N. gonorrhoeae*.⁴⁵ Tetracycline-resistant strains of gonorrhea have been reported in the U.S. and other countries.⁴⁵ The optimal prophylactic agent against penicillinase-producing strains of *N. gonorrhoeae* (PPNG) has not been determined.

Recommendations of Other Groups

The Canadian Task Force on the Periodic Health Examination advises against routine screening for gonorrhea in the general population but recommends screening of high-risk patients: individuals under 30 years, particularly adolescents, with at least two sex partners in the previous year; prostitutes; sexual contacts of individuals known to have an STD; and persons under age 16 years at first intercourse.⁴⁶ The Centers for Disease Control and Prevention (CDC) recommends screening asymptomatic women in the following priority groups: all pregnant women, sexually active adolescents, and women with multiple sex partners.^{9,12} The American Academy of Family Physicians recommends screening prostitutes, persons with multiple sex partners or whose sex partner has multiple sex contacts, sexual contacts of persons with culture-proven gonorrhea, or persons with a history of repeated episodes of gonorrhea.⁴⁷ These recommendations are under review. Bright Futures,⁴⁸ the American Medical Association Guidelines for Adolescent Preventive Services (GAPS),⁴⁹ and the American Academy of Pediatrics (AAP)⁵⁰ recommend annual screening of sexually active adolescents. The AAP recommends dipstick urinalysis for leukocytes in all adolescents.⁵¹ An expert panel convened in 1994 by the Institute of Medicine, National Academy of Sciences, is developing recommendations for public health strategies to control STDs, including gonorrhea.

The American College of Obstetricians and Gynecologists (ACOG) recommends obtaining endocervical cultures in pregnant women during their first prenatal visit only if they are in one of the high-risk categories for gonorrhea.¹⁰ ACOG and CDC recommend repeating culture late in the third trimester for high-risk women.^{10,12} ACOG recommends that all cases of gonorrhea should be diagnosed or confirmed by culture to facilitate antimicrobial susceptibility testing.¹⁰ The American Academy of Pediatrics,⁵² American Academy of Family Physicians,⁴⁷ and CDC² recommend

administering ointment or drops containing tetracycline, erythromycin, or 1% silver nitrate solution to the eyes of all infants shortly after birth (within 1 hour). In the absence of universal prenatal screening for gonorrhea, the Canadian Task Force also recommends universal ocular prophylaxis with any of these antibiotic agents.⁴⁶

Discussion

Gonorrhea remains an important public health problem and a major source of morbidity for women. Although definitive proof (e.g., controlled trials) that screening reduces future morbidity is not available, selective screening of high-risk women can be justified by the substantial prevalence of asymptomatic infection, the availability of accurate screening tests and effective treatments, and the high morbidity of untreated gonorrhea in women. Early identification and treatment of asymptomatic individuals is also likely to reduce transmission of gonorrhea. The benefits of early detection may be reduced by the high likelihood of reinfection unless effective measures are taken to identify and treat sex partners.

Performing routine cultures for gonorrhea on all sexually active adults would be inefficient due to the low prevalence of infection in the general population and the wide variation in the rates of gonorrhea in different communities. Clinicians must base their decision to screen for gonorrhea on both individual risk factors and the local epidemiology of disease, realizing that sexual history is often an unreliable indicator of actual risk of infection. Therefore, routine screening of all sexually active young women may be more effective in communities where gonorrhea is prevalent, while more selective screening is appropriate when the rate of infection is known to be low.

In men, the prevalence of asymptomatic infection and the morbidity from gonorrhea is much lower than in women. Asymptomatic men, however, represent an important reservoir for transmitting infection, and opportunities to identify and treat infected men are often limited. Screening asymptomatic men with currently available urine tests may generate a large proportion of false-positive results. As more reliable, noninvasive methods for testing men become available (e.g., polymerase or ligase chain reaction assays of urine), screening young men may help reduce the incidence of gonorrhea in high-risk communities. The effectiveness of such a strategy, however, deserves to be tested in a prospective study.

The primary rationale for screening all pregnant women has been the prevention of ophthalmia neonatorum. Due to the low prevalence of gonorrhea in average-risk pregnant women, and the efficacy of universal ocular prophylaxis with antibiotic ointment, the benefits of screening for gonorrhea in all pregnant women are uncertain. Screening pregnant

women at high risk for gonorrhea, however, may also help prevent other complications associated with gonococcal infection during pregnancy.

CLINICAL INTERVENTION

Routine screening for gonorrhea is recommended for asymptomatic women at high risk of infection (“B” recommendation). High-risk groups include commercial sex workers (prostitutes), persons with a history of repeated episodes of gonorrhea, and young women (under age 25) with two or more sex partners in the last year. Actual risk, however, will depend on the local epidemiology of disease. Clinicians may wish to consult local health authorities for guidance in identifying high-risk populations in their community. In communities with high prevalence of gonorrhea, broader screening of sexually active young women may be warranted. Clinicians should remain alert for findings suggestive of cervical infection (e.g., mucopurulent discharge, cervical erythema or friability) during routine pelvic examinations.

Screening is recommended at the first prenatal visit for pregnant women who fall into one of the high-risk categories (“B” recommendation). An additional test in the third trimester is recommended for those at continued risk of acquiring gonorrhea. There is insufficient evidence to recommend for or against universal screening of pregnant women (“C” recommendation). Erythromycin 0.5% ophthalmic ointment, tetracycline 1% ophthalmic ointment, or 1% silver nitrate solution should be applied topically to the eyes of all newborns as soon as possible after birth and no later than 1 hour after birth (“A” recommendation).

There is insufficient evidence to recommend for or against screening high-risk men for gonorrhea (“C” recommendation). In selected clinical settings where asymptomatic infection is highly prevalent in men (e.g., adolescent clinics serving high-risk populations), screening sexually active young men may be recommended on other grounds, including the potential benefits of early treatment for preventing transmission to uninfected sex partners. Screening men with urine LE dipstick is convenient and inexpensive, but requires confirmation of positive results. Routine screening of men or women is not recommended in the general population of low-risk adults (“D” recommendation). The optimal frequency of screening has not been determined and is left to clinical discretion.

Culture of endocervical specimens is the preferred method for screening asymptomatic women. When EIA or DNA probe tests are used for initial screening, verification of positive results may be necessary, depending on the underlying risk in the patient and potential adverse consequences of a false-positive result. Treatment should employ regimens effective against penicillin- and tetracycline-resistant organisms and should include

treatment for co-infection with chlamydia and treatment of sex partners.⁹ All sexually active individuals should be counseled about effective means of preventing STDs (see Chapter 62). Clinicians should follow local gonorrhea disease-reporting requirements.

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