American Academy of Pediatrics
New Jersey Chapter

New Jersey Pediatrics

Summer2019

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New Jersey Pediatrics is the Official Journal of the New Jersey Chapter, American Academy of Pediatrics

Rising Chlamydia and Gonorrhea Incidence among Adolescents and Young Adults Living in New Jersey

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Case Example

A 21-year-old young woman visits her physician for her annual exam. Since her visit last year, she has had one sexual partner, her previous boyfriend. She had a contraceptive implant placed last year, and reports using condoms most of the time. Her most recent vaginal intercourse was two months ago, and they did not use a condom at that time. She has no history of sexually transmitted infections (STIs) and no prior pregnancies. She reports no symptoms of abdominal pain, pelvic pain, urinary symptoms, dyspareunia, or vaginal discharge. On routine screening, the nucleic acid amplification test obtained by vaginal swab is positive for chlamydia. Her screening tests for gonorrhea and HIV are negative.

Health Effects of Chlamydia and Gonorrhea in Adolescents

Chlamydia trachomatis (*C. trachomatis*) is a gram-negative, intracellular bacterium which causes infections that are asymptomatic in 80% of women and 75% of men.[1-3] In adolescent girls, the cervix is the most common anatomic site of infection. The immature ectocervix of the adolescent genitalia is largely populated with columnar epithelium, which facilitates the attachment of microorganisms, as compared to the squamous cell epithelium of the adult cervix.[4] Clinical symptoms of cervicitis include vaginal discharge, intermenstrual bleeding, and post-coital bleeding. When the infection extends into the female urethra, symptoms can mimic that of a urinary tract infection, and present as dysuria or increased frequency of urination. Symptomatic males usually present with mucoid or watery urethral discharge and dysuria due to infection in their urethras. Discharge is usually minimal and only noted with milking of the urethra or seen in undergarments in the morning. Other clinical presentations in males include epididymitis (testicular pain and tenderness, hydrocele, and scrotal edema), prostatitis (pain with ejaculation and pelvic pain), and proctitis (rectal pain, diarrhea, rectal bleeding or mucus). While less common, both men and women can also present with conjunctivitis and reactive arthritis.[5] The incubation period of symptomatic chlamydial disease usually ranges from 7-14 days.[6] In a previous study, male-female and female-male transmission frequencies were equal (68%) using DNA sequences to examine *C. trachomatis* genotypes.[7] The efficient transmission between sexual partners in combination with the fact that the majority of infections are asymptomatic highlight the importance of routine screening for chlamydia in both men and women.

Neisseria gonorrhea (*N. gonorrhea*) is a gram-negative diplococcus which causes infections that are asymptomatic in the majority of men and women.[8] Clinical symptoms of cervicitis, urethritis, and prostatitis are similar to those of *C. trachomatis* infections, with urethral discharge that is typically more copious and purulent. If symptoms do occur, they usually appear more rapidly, as the organism has a shorter incubation period of 2-8 days. *N. gonorrhea* also frequently presents as pharyngitis secondary to oral sex. Other rare clinical manifestations of disseminated gonococcal infections include purulent arthritis, acute endocarditis, meningitis, and osteomyelitis.[5] Men and women infected with *N. gonorrhea* and *C. trachomatis* also have increased risk of acquiring *Human immunodeficiency virus* (HIV) due increased permeability of inflamed mucous membranes and the migratory immune response to inflammation.[9]

Pelvic inflammatory disease (PID) is a specific complication of STIs in women, occurring in 10-15% of untreated adolescent girls. PID occurs when the infection ascends to the upper reproductive tract causing inflammation of the uterus and fallopian tubes. Infection can then spread further to the capsule of the liver, causing perihepatitis, also known as Fitz-Hugh-Curtis Syndrome. Complications of untreated PID include risk of future infertility, chronic pelvic pain and ectopic pregnancies.[1,5] Finally, there is a reported association between PID and ovarian cancer.[10]

Practical Guidelines to Obtaining a Sexual History in Adolescents

Adolescence is a time of relatively good health, with most morbidity and mortality resulting from the consequences of high-risk behaviors, including sexual behaviors. Previous research has shown that concerns about confidentially may lead adolescents and young adults to forego or delay care, or limit communication with health care providers.[11] For instance, a previous study found almost all of the participating adolescents would consent to STI testing if their parents would not know about it, but only one-third would consent to testing if their parents might discover that it took place.[12] However, in an observational study, only 65% of adolescents had some discussion of sexual issues during an office visit, with the average amount of time spent discussing sexuality of 36 seconds.[13] Therefore, it is essential for pediatricians to have time alone with adolescents during which they may confidentially discuss potential health issues and counsel them regarding harm reduction.

A discussion of confidentiality should begin with a welcome letter regarding what both parents and adolescents should expect during a well adolescent visit, including the adolescents having time alone with the provider. During a confidential history, a provider can build rapport and trust with an adolescent patient with a discussion about school and extracurricular activities. Subsequently, a transition can then occur to obtain a sexual history by stating, *"I am going to ask a few questions about your sexual health. Everything we discuss is confidential. Do you have any concerns or questions about your sexual health?"* Pediatricians should focus on the positive aspects of sexuality and give examples of positive and respectful relationships.[14] It is important to create a safe environment, so adolescents feel comfortable in asking questions, including about sexual myths. Furthermore, it is important to remember that early adolescents' cognitive abilities are more concrete than those of older patients. For example, when asked if he or she is sexually active, the teenager might think the provider is asking if he or she is physically active during sex.

When obtaining a sexual history, it is important to not make assumptions about patient's sexuality. In the 2002 National Survey of Family Growth, 11% of 15 to 19-year-olds reported ever having "any same-sex contact".[13] A direct heteronormative approach such as asking a female, "So, do you have a boyfriend?" can cause the patient to feel embarrassed or insecure in her same-sex attraction. Examples of appropriate broad phrases include: *"Many people your age begin to have attractions physically or romantically. Have you thought about that?"* and *"Are you attracted to boys, girls, or both?"* or *"Are you thinking about becoming sexually active?"* Furthermore, same-sex sexual activity can be exploratory and does not necessarily predict a patient's sexual identity. A thorough sexual history should include prior sexual contact, number of recent sexual partners, contraceptive methods and frequency of use, history of STIs, and prior pregnancies (see Table 1). It is important to ask specifically about oral, vaginal, receptive anal and anal sex, as for example, a receptive anal participant will need rectal swabs when screening for infections. Always ask about the number of new sexual partners since the last visit rather than if the patient is in a current monogamous relationship.[14] Finally, it is important to screen for intimate partner violence and reproductive coercion as these affect STI risk.[15-16]

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Table 1. Sexual History Questions Specific to Adolescents

Are you currently dating anyone or have a romantic or sexual partner? Can you tell me about your relationship?
Are you attracted to men, women, or both?
Have you ever had sex?
In the past 12 months (or since your last visit), how many sex partners have you had?
Have you had sex with men, women or both?
In the past 12 months have you had Genital sex (penis in the vagina)? Anal sex (penis in the anus?) Oral sex (mouth on penis, vagina or anus?)
How often do you and your partner use condoms? What did you use at last sex to not get pregnant? Did you use a condom at last sex?
Have you ever been diagnosed with an STD?
Have you ever been tested for STDs such as chlamydia, gonorrhea or HIV?
Has your current partner ever been diagnosed or treated for an STD?

Adapted from ACOG Sexual Health[14]

The Health Insurance Portability and Accountability Act (HIPAA) privacy policy is applicable when a minor gives consent for health care services and parental consent is not required in New Jersey. Specifically, NJ law permits minors to consent to testing and treatment for STIs. Furthermore, NJ law allows, but does not require, a physician to inform a minor's parent that he or she is seeking STI services when doing so is in the minor's best interest.[11] Nonetheless, disclosure of confidential information to parents or guardians should be reserved for unique situations where the benefits justify potentially breaking trust with the adolescent. Further, an adolescent should be informed of what information will be shared with parents or guardians. Physicians should also be aware of legal requirements of reporting, such as suspected child abuse, reportable diseases under public health law, or if the patient is a potential harm to him- or herself or others.[11]

It is important for pediatricians to be aware of new challenges in confidentiality due to electronic medical records, billing practices, and patient portals. Recommendations for maintaining confidentiality include: obtaining a confidential phone number, setting up a private patient portal for the adolescent in systems, and using confidential billing codes to avoid breaking patient confidentiality through insurance explanation of benefits (EOBs). At the NJ state level, pediatricians should advocate that sending of EOBs should not be required when dependents obtain sensitive services, such as diagnosis and treatment of STIs, as such legislation has successfully passed in other states.[17]

Epidemiology: Rising rates of *C. trachomatis and N. gonorrhea*

According to the Centers for Disease Control and Prevention (CDC), the rates of STIs in the United States are increasing and are considered to be a public health crisis. Of the notifiable STIs, *C. trachomatis* and *N. gonnorhea* are the two most commonly reported infections, with the highest rates among adolescents and young adults. In 2017, men and women between the ages of 10-24 years accounted for over half (62%) of the 1.7 million reported chlamydia cases, and nearly half (45%) of the 0.5 million reported gonorrhea cases.[2] Based on the most recent CDC Surveillance Report, rates of chlamydial and gonorrheal infections have been increasing over the past five years. Over the past 5 years, chlamydia and gonorrhea infection rates increased by 8.8% and 24.1%, respectively.[2] A similar trend is also found for 15-24 year old males, with rates of chlamydia and gonorrhea infections having increased by 29.1% and 51.6%, respectively.[2] In New Jersey, the reported rate of chlamydia was 394 per 100,000 population and the reported rate of gonorrhea was 105.5 of 100,000 population.[2] The rate of increase for chlamydia and gonorrhea infections during 2013-2017 in New Jersey was 23.8% and 33.8%, respectively.[2] Pediatricians practicing in the following NJ counties should be aware of the high rates of chlamydia and gonorrhea where they practice, as these counties have a substantial portion of all reported NJ cases: Essex (17.8% of chlamydia cases, 25% of gonorrhea cases), Camden (9.1% of chlamydia cases, 14% of gonorrhea cases), and Passaic (7.8% of chlamydia cases, 7.7% of gonorrhea cases).[18]

Given the high prevalence of STIs in adolescents, ensuring their access to quality preventive care is an essential priority. As per the most recent Youth Risk Behavior Survey (YRBS) conducted in a US national sample of high school students, 39.5% reported ever having sex. Among currently sexually active students, only 53.8% reported that either they or their partner had used a condom during their last sexual act. Of concern, 7.4% of students reported that they were physically forced to have sexual intercourse when they did not want to, and the prevalence was higher amongst gay, lesbian, and bisexual students (21.9%) compared to heterosexual students (5.4%). The high prevalence of sexual activity and sexual violence in adolescents and young adults underscores the need for routine STI screening. Yet only 9.3% of students reported being tested for HIV, indicating a substantial need for improved STI screening.

Screening Guidelines and Tests

The US Preventive Services Task Force (USPSTF) is an independent panel of national experts in preventive and evidence-based medicine and has published screening guidelines for individuals considered at risk for STIs, including syphilis, gonorrhea, and chlamydia. The CDC has also published screening guidelines that address certain at-risk populations that are not specifically mentioned by the USPSTF but have been found to experience unique challenges. Other major professional organizations have also adapted screening policies for specific population groups, including the American Association of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) (see Table 2).

Table 2. Chlamydia and Gonorrhea Screening Guidelines for Sexually Active Adolescents and Young Adults

	USPSTF[21]	CDC[20]	AAP[23]
Female Male Screening Interval	Age ≤24 years No routine screening[a] New or persistent risk factors	Age ≤25 years High risk factors[b] OR MSM Annually[c]	
Rescreening Interval	CDC recommends all adolescents who tested positive be rescreened 3 months after treatment, regardless of symptoms or if partner has been treated. If rescreening at 3 months is not possible, it should be done at any point within the next 12 month period		
Screening Test[20]	Female	Vaginal, endocervical NAAT preferred. Alternative first catch urine NAAT	
	Male	First-catch urine or urethral swab NAAT	
	MSM	First-catch urine or urethral swab NAAT Rectal NAAT (if exposed) Pharyngeal NAAT GC only (if exposed)	

a. Special consideration to males age 20-24 with history of previous gonorrhea infection, other STIs, new or multiple sex partners, inconsistent condom use, or who engage in sex work or drug use[21]
b. Settings with high prevalence rates, such as jails or juvenile corrections facilities, national job training programs, STD clinics, high school clinics, and adolescent clinics for patients who have a history of multiple partners[20]
c. MSM: Screen every 3 to 6 months if high risk due to multiple or anonymous partners, sex in conjunction with illicit drug use, or having sex partners who participate in these activities[23]

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Both the USPSTF and CDC recommend that all sexually active females less than age 25 years be annually screened for chlamydia and gonorrhea.[20,21] Routine screening for young asymptomatic males is not recommended by the USPSTF, although the CDC recommends that screening be considered in groups at high risk for STIs (e.g., those with a history of previous STIs, intravenous drug use, or exposure to high STI prevalence settings, such as jails, juvenile correction facilities, national job training programs, or adolescent or STI clinics).[22] The CDC also recommends annual screening for men who have sex with men (MSM).[22] The AAP recommends screening individuals who have been exposed to gonorrhea or chlamydia in the past 60 days.[23] Both the AAP and ACOG recommend that all pregnant females under age 25 years be screened during their first trimesters, and rescreened during their third trimesters.[24] Due to the high risk of re-infection, all individuals who tested positive for STIs should be rescreened 3 months after treatment. The CDC recommends that all sexual partners in the preceding 60 days be evaluated, tested, and treated for STIs. Based upon the ability of partners to be linked to care, expedited partner treatment may be offered. The CDC recommends abstinence from sexual intercourse until asymptomatic and treatment is completed for those diagnosed with STI and their sexual partners.[22]

Both the USPSTF and the CDC recommend that nucleic acid amplification tests (NAATs) be used as screening or diagnostics tests for chlamydia and gonorrhea due to greater sensitivity and specificity when compared to other testing modalities.[20,21] Specimen sources include first-catch urine, and endocervical, vaginal, urethral, rectal, and oropharynx swabs (see Table 3). As per the CDC, NAATs obtained with a vaginal swab are preferred, and an endocervical swab can be obtained if a pelvic examination is being performed.[20] Vaginal swabs collected by physicians or self-collected by patients have been shown to be equally efficacious.[26] Alternatives include first catch urine, although it not the preferred method since it identifies 10% fewer infections in woman.[20] When screening males, a first-catch urine is recommended, given that it is equivalent to a urethral swab in detecting infection, and a more acceptable method of screening. For MSM, annual screening with urine is recommended, along with a rectal swab and/or oropharynx swab if they engage in receptive anal sex or oral sex.[23,25] A rescreening interval of every 3 to 6 months is indicated for MSM in the presence of high risk factors, including multiple or anonymous partners, sex in conjunction with illicit drug use, or having sex partners who participate in these activities.[23,25] Although the US Food and Drug Administration (FDA) has not approved the use of NAATs on rectal or pharyngeal specimens, laboratories that have met Clinical Laboratory Improvement Amendments (CLIA) requirements are permitted to validate NAATs with pharyngeal and rectal swabs NAAT to occur.[26]

Summary and Recommendations

The young woman in the case example was counseled regarding chlamydia cervicitis. Of note, she had a normal bimanual exam with no cervical motion tenderness, adnexal tenderness, or adnexal masses. She also had no evidence of cervicitis on inspection, which emphasizes the need for routine screening to diagnose and treat chlamydia prior to development of complications. She was treated with 1 gram of azithromycin as a single dose. An alternative treatment is 100mg of doxycycline twice daily for seven days. Her sexual partner was given a prescription for expedited partner treatment and counseled to follow up with his physician for evaluation and STI testing.[22] She reported no other sexual partners in the past 60 days. Extensive harm reduction counseling was conducted regarding condom use at every sexual encounter to decrease risk of STIs. The patient was no longer in a relationship with her previous partner. She denied feeling coerced not to use a condom during sex and denied intimate partner violence. She was tested for reinfection at her next appointment 3 months later and was negative for both gonorrhea and chlamydia. The majority of adolescents are asymptomatic for STIs, as in this case example. Given the increasing prevalence of both chlamydia and gonorrhea and their known health consequences, it is important for pediatricians to routinely screen adolescents in accordance with the current guidelines. Pediatricians are at the front line of ensuring the reproductive health of adolescents and young adults.

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Table 3. Gonorrhea and Chlamydia NAAT Diagnostic Accuracy by Specimen Source*

		Neisseria Gonorrhea			Chlamydia Trachomatis		
	Source	Sensitivity	Specificity *percent*	PPV	Sensitivity	Specificity *percent*	PPV
Female	First- Catch Urine	78.6 - 100	99.5 - 100	88.5- 100	72.0 - 98.2	99.0 - 100	92.5 - 100
	Endocervical Swab	90 - 100	99.5 - 100	84.0 - 100	86.4 - 97.1	97.5 - 100	86.9 - 100
	Self-collected Vaginal Swab	98 - 100	99.9 - 100	92.3 - 100	90.7 - 98.0	97.5 - 100	87.3 - 99.4
Male	First- Catch Urine	90.9 - 100	99.2 - 100	75 - 100	96.2 - 100	98.0 - 100	83.2- - 100
	Urethral Swab	100	97.1 - 100	73.3 - 100	86.1 - 98.9	97.5 - 99.8	85.5 - 97.8

*All data in the table adapted from Nelson et al[26]
PPV denotes Positive-Predictive Value

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