Sexually Transmitted Diseases*

Committee on Adolescence

Major social and behavioral changes have occurred in the pediatric population since the Academy published its first statement more than 20 years ago concerning the pediatrician's role in the diagnosis and treatment of sexually transmitted diseases (STDs).† As we approach the year 2000, adaptation to these changes requires greater vigilance and expertise by the practitioners who care for children and adolescents. Of the 20 000 000 cases of STDs reported annually, one third occur in adolescents.² Although a few sexually transmitted diseases have been known since biblical times, the current recognized spectrum has expanded to more than 20 potential pathogens (Table).³ In the last 10 years the recognition of human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) has added even greater urgency to the need for pediatricians to address the management and prevention of STDs.

Asymptomatic STDs contribute to a reservoir of potential infection that allows unknowing transmission to a succession of partners, challenging the physician to be alert in history taking, to use appropriate diagnostic techniques, and to treat patients promptly and appropriately. Sexually transmitted diseases can be transmitted horizontally, ie, to sexual partners, or vertically, ie, from mother to infant.

WHAT ARE THE RISKS?

In addition to the few traditionally recognized STDs, the sexually active adolescent may now be faced with a multitude of other STDs that have serious long-term implications and are more resistant to treatment. These STDs include herpes simplex, which can result in recurrent painful episodes and subsequent neonatal infection; human papilloma virus (HPV) infection, which has led to an increased prevalence of cervical neoplasia in adolescents; hepatitis B and C, which can result in cirrhosis and carcinoma; and HIV infection, which can lead to AIDS.

Human immunodeficiency virus infection is usually a sexually transmitted disease. It can also be transmitted via contaminated blood and needles. The incubation period may be more than a decade. As the incidence of AIDS is increasing among the young adult population, it is inferred that many newly recognized cases were acquired during adolescence.

Prevalence studies among military recruits and job corps applicants have shown HIV seropositivity of 1.31 per 1000 to 3.6 per 1000, respectively.⁴ In a study of inner city adolescents, seropositivity has increased from 4.03 per 1000 to 19.44 per 1000 during the past 5 years.⁶ Although the virus can be transmitted via heterosexual vaginal intercourse, anal heterosexual or homosexual intercourse puts the adolescent at even greater risk. Thus, the specifics of sexual practices may be important in suggesting a diagnosis in those adolescents who are sexually active.

Sexually active adolescents are at risk for contracting hepatitis B if they have not been properly immunized. Since most children and teenagers have not received the currently recommended Academy schedule of three doses of hepatitis B vaccine, high-risk adolescent groups should receive the vaccine to prevent this disease. Gay youth, teenagers who abuse intravenous drugs, and those with multiple sex partners are at highest risk. However, more than one third of infected persons do not have a readily identifiable risk factor.

To accomplish universal vaccination most rapidly, immunization of all children during or before adolescence is necessary and recommended. If resources are insufficient to allow concurrent immunization of both infants and adolescents or preadolescents, infants should be preferentially immunized before all adolescents are routinely vaccinated. However, resources should be sought so that immunization of all children before or at adolescence can be accomplished. Immunization of adolescents can be accomplished by vaccination at an earlier age than 11 years, which has the advantage of less cost because of the lower recommended dose.

There has also been a recent resurgence of syphilis. Infection rates for 15- to 19-year-olds have risen from 15 per 100 000 in 1985 to 30 per 100 000 in 1990.⁷ Rates for African-Americans and Hispanics are higher than those for whites.⁸ The number of cases of congenital syphilis has risen as the number of cases of syphilis has increased in women of childbearing age. An increase in the number of syphilis cases also appears to be concomitant to the increase in sexually transmitted HIV infections.⁹

Human papilloma virus is now the most common sexually transmitted disease in the United States.¹⁰ Types 16, 18, 31, 33, and 35 have the highest potential for producing cervical cancer, and it is these serotypes that are most frequently found in adolescents.

* This statement has been approved by the Council on Child and Adolescent Health.

† The recommendations in this statement do not indicate an exclusive course of treatment or procedure to be followed. Variations, taking into account individual circumstances, may be appropriate.

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WHO IS AT RISK?

Half of all adolescents are sexually active by age 17 and are therefore at risk for STDs. It has been estimated that as many as 25% of adolescents may develop an STD before graduating from high school. Adolescents are more likely to have asymptomatic infections than adults and to suffer long-term consequences such as chronic infection, spontaneous abortions, and infected offspring. Sexually active adolescents have the highest rates of gonorrhea, syphilis, and pelvic inflammatory disease of any age group, and, the younger the teenager, the greater the risk of acquiring an STD. Pelvic inflammatory disease in adolescent women is a cause of chronic pelvic pain and infertility and is an important predisposing factor in the development of an ectopic pregnancy.

Behavioral and developmental differences that affect STD exposure and put adolescents at greater risk of disease acquisition include the following.

Immature Biological Defenses

The adolescent cervix, with its larger area of exposed columnar epithelium (ectropion), is especially susceptible to *Chlamydia trachomatis* and *Neisseria gonorrhoeae* invasion. In addition, the active squamous metaplasia at the transformation zone increases the susceptibility to HPV infection.

Limited Access to Services

Adolescents may be uncomfortable discussing sensitive issues of sexuality with pediatricians or other providers. Services for adolescents may not be "user friendly," which discourage some adolescents from seeking care. Financial and transportation barriers limit health care access for many poor teenagers.

Unprotected Sexual Intercourse

Unprotected sexual activity is clearly a risk factor for the development of an STD at any age. Programs aimed at promoting sexual abstinence may reduce STDs in adolescents. There is some evidence that comprehensive skills-based education on postponing sexual intercourse is most effective in younger adolescents, and may reduce risk-taking behaviors. For sexually active adolescents, correct and consistent use of latex condoms is recommended for STD prevention even though the protection is not absolute. Educational efforts at promoting responsible sexual decision making and more convenient availability of condoms for those who choose to engage in sexual intercourse,

Number of Partners

Age at first intercourse is variable and in early adolescence tends to be correlated with perceived norms of the peer group, gender (males still tend to engage in intercourse at an earlier age than do females), race, ethnicity, and socioeconomic status, although the influence of these demographic variables tends to disappear by late adolescence. Early onset of sexual activity leads to increased risk of multiple sexual partners and to decreased discrimination of partner selection, both of which contribute to a higher risk for acquiring an STD. Other risk behaviors such as alcohol and other drug experimentation, which impair judgment, can contribute to increased adolescent vulnerability to STDs. Adolescents at particularly high risk for STDs and AIDS include homosexual males, street youth, incarcerated adolescents, and teens engaged in prostitution. Pregnant adolescents are more likely to have an STD than are nonpregnant adolescents.

**TABLE 1. Sexually Transmitted Diseases in Adolescents**

<table>
<thead>
<tr>
<th>Agent</th>
<th>Clinical Syndrome</th>
</tr>
</thead>
<tbody>
<tr>
<td>A) Bacterial</td>
<td></td>
</tr>
<tr>
<td><em>Neisseria gonorrhoeae</em></td>
<td>Urethritis, prostatitis, epididymitis, cervicitis, PID, perihepatitis, disseminated gonococcal infections (DGI)</td>
</tr>
<tr>
<td><em>Chlamydia trachomatis</em></td>
<td>Urethritis, epididymitis, cervicitis, PID, perihepatitis, conjunctivitis, lymphogranuloma venereum</td>
</tr>
<tr>
<td><em>Treponema pallidum</em></td>
<td>Syphilis</td>
</tr>
<tr>
<td><em>Ureaplasma urealyticum</em></td>
<td>Urethritis</td>
</tr>
<tr>
<td><em>Mycoplasma hominis</em></td>
<td>PID</td>
</tr>
<tr>
<td><em>Haemophilus ducreyi</em></td>
<td>Chancroid</td>
</tr>
<tr>
<td><em>Gardnerella vaginalis</em></td>
<td>Bacterial vaginosis</td>
</tr>
<tr>
<td><em>Calymmatobacterium granulomatis</em></td>
<td>Granuloma inguinale</td>
</tr>
<tr>
<td>B) Viral</td>
<td></td>
</tr>
<tr>
<td>HIV</td>
<td>AIDS</td>
</tr>
<tr>
<td>Herpes simplex virus</td>
<td>Genital ulcers</td>
</tr>
<tr>
<td>Human papillomavirus (HPV)</td>
<td>Condylomata, cervical intraepithelial neoplasia</td>
</tr>
<tr>
<td>Hepatitis A</td>
<td>Acute hepatitis A</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Acute hepatitis B, chronic active hepatitis</td>
</tr>
<tr>
<td>Hepatitis C (non-A, non-B)</td>
<td>Non-A, non-B hepatitis</td>
</tr>
<tr>
<td>Cytomegalovirus</td>
<td>Mononucleosis-like syndrome</td>
</tr>
<tr>
<td>C) Protozoal</td>
<td></td>
</tr>
<tr>
<td><em>Trichomonas vaginalis</em></td>
<td>Vaginitis</td>
</tr>
<tr>
<td><em>Entamoeba histolytica</em></td>
<td>Gay bowel syndrome</td>
</tr>
<tr>
<td><em>Giardia lamblia</em></td>
<td>Gay bowel syndrome</td>
</tr>
<tr>
<td>D) Parasites</td>
<td>Scabies</td>
</tr>
<tr>
<td><em>Sarcoptes scabiei</em></td>
<td>Pediculosis pubis</td>
</tr>
</tbody>
</table>

**Limited Access to Services**

Adolescents are more likely to have asymptomatic infections than adults and to suffer long-term consequences such as chronic infection, spontaneous abortions, and infected offspring. Sexually active adolescents have the highest rates of gonorrhea, syphilis, and pelvic inflammatory disease of any age group, and, the younger the teenager, the greater the risk of acquiring an STD.
rather than postponing it, may foster greater and more consistent use of barrier contraception.

DIAGNOSIS

History

Teenagers are entitled to a confidential interview, and it is imperative to make the confidentiality explicit at the time the history is taken. In the United States, there are no legal barriers to confidentiality (except in situations of potential sexual abuse) in the diagnosis or treatment of any child or adolescent for an STD. A detailed sexual history is necessary, including information on gender preference, number and medical history of partners, frequency of intercourse, contraceptive and condom use, consensuality of the encounters, route of penetration, frequency of urination, and presence of any symptoms of pain, discharge, skin lesions, or pruritus. Adolescents who have exchanged sex for drugs or money, who have had anal intercourse, or have a history of previous STDs are particularly at risk for STDs.

More than one STD may be present in an individual patient at any time. The potential for reinfection should also be kept in mind during follow-up visits and interval history taking. Treatment of partners must be aggressively attempted to decrease the reinfection rate. The physician should be nonjudgmental while working to educate and correct misconceptions of the adolescent.

Physical Examination

When an STD is suspected, a complete examination of the adolescent is generally indicated. The entire body should be visualized. The provision of appropriate draping and the presence of a chaperone may add to the comfort of the patient. The skin should be carefully examined for rashes and bruises. Examination of the throat, joints, abdomen, genitalia, and rectal area may reveal evidence of an STD. When an STD is suspected, male genitalia should be examined by inspection, palpation, attempt at expression of urethral discharge, and notation of adenopathy or any visible lesions. A rectal examination should be done for evidence of prostatitis in symptomatic patients. Discharges collected by using a urethral swab can be microscopically examined, cultured on appropriate medium, or evaluated by indicated diagnostic tests. Unexplained abdominal pain in sexually active female adolescents requires a pelvic examination for appropriate assessment of possible pelvic inflammatory disease.

Even when sexually active adolescents do not complain of an infection, they should be routinely screened for STDs. The frequency of screening for STDs depends on the sexual practices of the individual and associated risk factors, such as a previous STD. Annual screening is recommended for all sexually active adolescents. Some high-risk teenagers may need more frequent examinations.

All sexually active males can easily be screened for the presence of gonorrhea or chlamydia urethritis by utilizing a urine leukocyte esterase analysis (urine dipstick for white blood cells). For sexually active females, the periodic examination includes a Papnicolaou (Pap) smear, screening tests for gonorrhea and chlamydia, and a microscopic examination of vaginal secretions.

Laboratory Assessment

The diagnosis of most STDs can be made by observing the infecting organism on a smear, culturing the organism, or by the use of newer diagnostic techniques such as enzyme immunoassay, DNA probes, and immunofluorescent antibody screening. Office-based pediatricians may need to determine specific testing techniques of their referral laboratory.

Gonorrhea

Gram-negative intracellular diplococci can be seen on an appropriately stained smear of the urethral discharge in males. Gram staining is a less accurate diagnostic test in females, because of the presence of Gram-negative diplococci in normal vaginal flora. Neisseria gonorrhoeae is a fastidious organism. Special culture media, therefore, such as Thayer-Martin or other appropriate media, and immediate placement of the culture plate in an oxygen-poor CO2-rich environment, are necessary. Sensitivities need to be obtained in order to determine the presence of penicillinase-producing N gonorrhoeae. Gen-Probe is a newer DNA probe assay test that indicates the presence of gonorrhea, but culture confirmation is required.

Chlamydia

Both culture and nonculture detection techniques for chlamydia are available. Culture remains the "gold standard," but direct fluorescent antibody tests, enzyme immunoassay, and DNA hybridization assays have acceptable sensitivity and specificity for use on clinical specimens. Yields are highest in high prevalence populations and in symptomatic subjects rather than asymptomatic carriers.

Human Papilloma Virus

Most HPV infections in women are demonstrated by direct visualization of lesions or dysplastic changes seen on the Pap smear. Human papilloma virus-DNA probes are being used more frequently to detect the presence of HPV infection. Specific probes are available, such as Virapap, that provide information regarding the presence of subtypes associated with cancerous transformation. Abnormal sites visualized on colposcopy may be associated with a high incidence of cancer-producing HPV subtypes. Human papilloma virus infections may also be suspected by finding warts on the vulva, vagina, penis, or perianal area.

Herpes Simplex Virus

Viral culture of the base of a new lesion is the definitive diagnostic method for herpes simplex virus. Older lesions can be diagnosed by monoclonal antibody staining. A Tzanck preparation (stained ulcer smear) may be examined for evidence of multinucleated giant cells, but is not a highly sensitive or
specific test. Serologic tests for herpes simplex virus are not generally helpful in acute disease diagnosis.

**Vaginitis**

Any vaginal discharge should be suspended in saline solution and examined under a microscope for the presence of trichomoniasis, bacterial vaginosis, or both. *Trichomonas* is diagnosed by the presence of motile pear-shaped flagellated organisms seen on the wet mount preparation. A greenish, frothy, foul-smelling discharge may be present.

Although not technically an STD, bacterial vaginosis is seen at greatly increased rates in sexually active adolescents. The diagnosis is made when the vaginal discharge has a pH > 4.5 and releases a fishy odor when mixed with 10% potassium hydroxide (KOH) (“whiff test”). “Clue cells” (epithelial cells dotted with adherent bacteria) are seen on saline wet mount.

Vaginal candidiasis is diagnosed when hyphae are seen on a slide prepared with a drop of KOH added to the discharge. However, approximately half of culture-positive candidiasis will not be detected by a wet mount preparation.

**HIV Infection/AIDS**

Human immunodeficiency virus infection is usually diagnosed serologically. In most laboratories the initial test, enzyme-linked immunosorbent assay, is followed by Western blot studies for confirmation. Tests for the presence of the specific virus are available in some research laboratories. Testing for HIV should be done with informed consent and appropriate counseling before and after testing. Any teenager diagnosed with an STD needs to be evaluated for HIV risk factors (multiple sex partners, intravenous drug abuse, homosexual contact, etc) and screening needs to be offered to those at risk or done on request.

**Hepatitis B**

Hepatitis is diagnosed by serologic patterns. Detection of the hepatitis B surface antigen indicates acute infection with hepatitis B or the chronic carrier state. Antibody to core antigen indicates previous infection. The presence of IgM core antibody indicates a recent infection. Antibody to surface antigen indicates recovery from infection or past immunization.

**Syphilis**

The chief serologic tests for syphilis remain the VDRL and RPR. Direct visualization of the treponema on dark field examination can be demonstrated by examining the fluid of primary ulcerated lesions. Confirmatory specific treponemal tests such as the FTA-ABS must be done after a screening serology is positive to eliminate false-positive results. An annual screening serologic test for syphilis is recommended for those who live in an endemic area, have had other STDs, have had more than one sexual partner in the last 6 months, have exchanged sex for drugs or money, or for males who have had sex with other males.

**Special Considerations**

In cases of suspected sexual abuse or rape, the practitioner must be careful to fulfill the state’s legal requirements for permissible court evidence. Many emergency departments have special rape kits available that assist in the proper collection of evidence. In general, for legal purposes, cultures are preferable to immunological detection methods for gonorrhea, chlamydia, and herpes. The presence of one STD should always alert the practitioner to the probable presence of other STDs.

**TREATMENT**

The Centers for Disease Control and Prevention guidelines and the current Report of the Committee on Infectious Diseases (Red Book) of the American Academy of Pediatrics are appropriate resources for the most recent treatment guidelines for an identified STD. It should be remembered, however, that optimal treatment of the child or adolescent may differ from that of the adult. The treatment of pelvic inflammatory disease in the adolescent is of special concern, because of their long reproductive period and the need to optimize future fertility. While many adults with pelvic inflammatory disease can be treated as outpatients, most adolescents with the disease should be hospitalized to ensure adequate therapy. The physician may also have to modify treatment in pubertal teenagers because of altered metabolism and excretion of a particular drug, which can affect dose and dose intervals.

Effective single-dose regimens are now available for the treatment of uncomplicated gonococcal and chlamydial genital infection and vaginitis. To improve compliance, single-dose treatment is preferred to multiple-dose regimens and, when possible, the drug is administered directly to the patient and partner(s) under supervision.

All drug treatment protocols require concurrent counseling appropriate to the cognitive developmental maturity of the child, adolescent, and parent, if indicated.

**CONCLUSION**

Sexually transmitted diseases are a critical public health concern, and adolescents are at particular risk. The pediatrician must play a primary role in the prevention, diagnosis, and treatment of STDs. Anticipatory guidance for all youth and explicit education on safer sex practices for sexually active adolescents are central principles for office management. Adolescents should be counseled that abstinence from sexual intercourse is the most effective way to prevent STDs. The importance of barrier contraceptives (eg, latex condoms) in the reduction of HIV transmission cannot be overemphasized. Physicians should actively promote condom use in their sexually active patients, not only for AIDS prevention but for prevention of all STDs and unintended pregnancy. Pediatricians should be active participants in collaborative community-based approaches to promote responsible sexual behavior and healthy life-style choices for all youth.
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