

163 Sexually Transmitted Infections: Overview and Clinical Approach

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CLASSIFICATION AND EPIDEMIOLOGY

Worldwide, most adults acquire at least one sexually transmitted infection (STI), and many remain at risk for complications. Each year, for example, an estimated 14 million persons in the United States acquire a new genital human papillomavirus (HPV) infection, and many of these individuals are at risk for genital neoplasias. Certain STIs, such as syphilis, gonorrhea, HIV infection, hepatitis B, and chancroid, are most concentrated within “core populations” characterized by high rates of partner change, multiple concurrent partners, or “dense,” highly connected sexual networks—e.g., involving sex workers and their clients, some men who have sex with men (MSM), and persons involved in the use of illicit drugs, particularly crack cocaine and methamphetamine. Other STIs are distributed more evenly throughout societies. For example, chlamydial infections, genital infections with HPV, and genital herpes can spread widely, even in relatively low-risk populations.

In general, the product of three factors determines the initial rate of spread of any STI within a population: rate of sexual exposure of susceptible to infectious people, efficiency of transmission per exposure, and duration of infectivity of those infected. Accordingly, efforts to prevent and control STIs aim to decrease the rate of sexual exposure of susceptibles to infected persons (e.g., through individual counseling and efforts to change the norms of sexual behavior and through a variety of STI control efforts aimed at reducing the proportion of the population infected), to decrease the duration of infectivity (through early diagnosis and curative or suppressive treatment), and to decrease the efficiency of transmission (e.g., through promotion of condom use and safer sexual practices, through use of effective vaccines, and recently through male circumcision).



In all societies, STIs rank among the most common of all infectious diseases, with >30 infections now classified as predominantly sexually transmitted or as frequently sexually transmissible (Table 163-1). In developing countries, with three-quarters of the world's population and 90% of the world's STIs, factors such as population growth (especially in adolescent and young-adult age groups), rural-to-urban migration, wars, limited or no provision of reproductive health services for women, and poverty create exceptional vulnerability to disease resulting from unprotected sex. During the 1990s in China, Russia, the other states of the former Soviet Union, and South Africa, internal social structures changed rapidly as borders opened to the West, unleashing enormous new epidemics of HIV infection and other STIs. Despite advances in the provision of highly effective antiretroviral therapy worldwide, HIV remains the leading cause of death in some developing countries, and HPV and hepatitis B virus (HBV) remain important causes of cervical and hepatocellular carcinoma, respectively—two of the most common malignancies in the developing world. Sexually transmitted herpes simplex virus (HSV) infections now cause most genital ulcer disease throughout the world and an increasing proportion of cases of genital herpes in developing countries with generalized HIV epidemics, where the positive-feedback loop between HSV and HIV transmission is a growing, intractable problem. Despite this consistent link, randomized trials evaluating the efficacy of antiviral therapy in suppressing HSV in both HIV-uninfected and HIV-infected persons have not demonstrated a protective effect against acquisition or transmission of HIV. The World Health Organization estimated that 448 million new cases of four curable STIs—gonorrhea, chlamydial infection, syphilis, and trichomoniasis—occurred in 2005. Up to 50% of women of reproductive age in developing countries have bacterial vaginosis (arguably acquired sexually). All of these curable infections have been associated with increased risk of HIV transmission or acquisition.

TABLE 163-1 SEXUALLY TRANSMITTED AND SEXUALLY TRANSMISSIBLE MICROORGANISMS

Bacteria	Viruses	Other ^a
Transmitted in Adults Predominantly by Sexual Intercourse		
<i>Neisseria gonorrhoeae</i>	HIV (types 1 and 2)	<i>Trichomonas vaginalis</i>
<i>Chlamydia trachomatis</i>	Human T cell lymphotropic virus type 1	<i>Pthirus pubis</i>
<i>Treponema pallidum</i>	Herpes simplex virus type 2	
<i>Haemophilus ducreyi</i>	Human papillomavirus (multiple genital genotypes)	
<i>Klebsiella (Calymmatobacterium) granulomatis</i>	Hepatitis B virus ^b	
<i>Ureaplasma urealyticum</i>	Molluscum contagiosum virus	
<i>Mycoplasma genitalium</i>		
Sexual Transmission Repeatedly Described but Not Well Defined or Not the Predominant Mode		
<i>Mycoplasma hominis</i>	Cytomegalovirus	(?) Epstein-Barr virus
<i>Gardnerella vaginalis</i> and other vaginal bacteria	Human T cell lymphotropic virus type 2	Human herpesvirus type 8
Group B <i>Streptococcus</i>	Hepatitis C virus	<i>Candida albicans</i>
<i>Mobiluncus</i> spp.	(?) Hepatitis D virus	<i>Sarcoptes scabiei</i>
<i>Helicobacter cinaedi</i>	Herpes simplex virus type 1	
<i>Helicobacter fennelliae</i>		
Transmitted by Sexual Contact Involving Oral-Fecal Exposure; of Declining Importance in Men Who Have Sex with Men		
<i>Shigella</i> spp.	Hepatitis A virus	<i>Giardia lamblia</i>
<i>Campylobacter</i> spp.		<i>Entamoeba histolytica</i>

^aIncludes protozoa, ectoparasites, and fungi. ^bAmong U.S. patients for whom a risk factor can be ascertained, most hepatitis B virus infections are transmitted sexually.

In the United States, the prevalence of antibody to HSV-2 began to fall in the late 1990s, especially among adolescents and young adults; the decline is presumably due to delayed sexual debut, increased condom use, and lower rates of multiple (four or more) sex partners, as is well documented by the U.S. Youth Risk Behavior Surveillance System. The estimated annual incidence of HBV infection has also declined dramatically since the mid-1980s; this decrease is probably attributable more to adoption of safer sexual practices and reduced needle sharing among injection drug users than to use of hepatitis B vaccine, for which coverage among young adults (including those at high risk for this infection) initially was very limited. Genital HPV remains the most common sexually transmitted pathogen in this country, infecting 60% of a cohort of initially HPV-negative, sexually active Washington state college women within 5 years in a study conducted from 1990 to 2000. The scale-up of HPV vaccine coverage among young women has already shown promise in reducing the incidence of infection with the HPV types included in the vaccines and of conditions associated with these viruses.

In industrialized countries, fear of HIV infection since the mid-1980s, coupled with widespread behavioral interventions and better-organized systems of care for the curable STIs, initially helped curb the transmission of the latter diseases. However, foci of hyperendemic transmission persist in the southeastern United States and in most large U.S. cities. Rates of gonorrhea and syphilis remain higher in the United States than in any other Western industrialized country.

In the United States, the Centers for Disease Control and Prevention (CDC) has compiled reported rates of STIs since 1941. The incidence of reported gonorrhea peaked at 468 cases per 100,000 population in the mid-1970s and fell to a low of 98 cases per 100,000 in 2012. With increased testing and more sensitive tests, the incidence of reported *Chlamydia trachomatis* infection has been increasing steadily since reporting began in 1984, reaching an all-time peak of 457.6 cases per 100,000 in 2011. The incidence of primary and secondary syphilis per 100,000 peaked at 71 cases in 1946, fell rapidly to 3.9 cases in 1956, ranged from ~10 to 15 cases through 1987 (with markedly increased