

## Review Article

# Comprehensive Review on Venereal Diseases Transmission: Transmission Routes, Diagnosis, Treatment, Prognosis, Future Medications, and Recommendations

*Abouelhag H. A.*

Department of Microbiology and Immunology, National Research Centre, Dokki, Giza, Egypt, 12622.

**Corresponding author:** Abouelhag H. A. (Email: [drabouelhag5@gmail.com](mailto:drabouelhag5@gmail.com))

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## Abstract

Sexually Transmitted Infections (STIs) are among the most common communicable conditions worldwide, affecting the health and lives of people globally. The World Health Organization estimates that over one million new STI infections occur daily among adults aged 15-49. This comprehensive review aims to provide an in-depth analysis of venereal disease transmission routes, modern diagnostic methods, available treatment options, future prognosis, emerging medications, and preventive recommendations. This review covers major diseases such as Chlamydia, Gonorrhea, Syphilis, Human Papillomavirus (HPV), Human Immunodeficiency Virus (HIV), Genital Herpes, and other sexually transmitted infections. It also discusses recent advancements in molecular diagnostics, antimicrobial resistance, new preventive strategies, vaccinations, and future therapies. The findings emphasize the importance of early diagnosis, prompt treatment, and partner management in controlling the spread of these diseases. Recent data indicate that over 2.4 million cases of Syphilis, Gonorrhea, and Chlamydia were diagnosed and reported in the United States in 2023, underscoring the continuous need for comprehensive prevention and treatment strategies.

**Keywords:** Sexually Transmitted Infections, Venereal Diseases, Transmission Routes, Diagnosis, Treatment, Prevention, Antimicrobial Resistance

## Transmission Routes

Sexually Transmitted Infections (STIs) are primarily transmitted from person to person through unprotected sexual contact, which includes vaginal, anal, and oral intercourse (CDC, 2021). However, some STIs can be transmitted through non-sexual means, making an understanding of transmission mechanisms crucial for prevention and control. Transmission routes can be categorized into several main types:

### 1. Direct Sexual Contact

Direct sexual contact is the most common mode of transmission for most STIs. This occurs when mucous membranes or bodily fluids (such as semen, vaginal secretions,



and blood) from an infected person come into contact with the mucous membranes or open wounds of an uninfected person. Diseases transmitted this way include:

**Chlamydia and Gonorrhea:** These bacteria are primarily transmitted through vaginal, anal, and oral sexual contact. They can affect the genitals, rectum, and throat (CDC, 2021).

**Syphilis:** Syphilis is transmitted through direct contact with syphilitic sores (chancres) that appear on the genitals, anus, rectum, lips, or mouth (CDC, 2021).

**Herpes Simplex Virus (HSV):** Herpes virus is transmitted through direct contact with herpes sores or the fluids they exude, even in the absence of visible sores (CDC, 2021).

**Human Papillomavirus (HPV):** HPV is transmitted through direct skin-to-skin contact, usually during sexual activity. It can cause genital warts and certain types of cancer (CDC, 2021).

**Human Immunodeficiency Virus (HIV):** HIV is primarily transmitted through unprotected sexual contact (vaginal or anal) where blood, semen, or vaginal secretions from an infected person enter the bloodstream of an uninfected person. It can also be transmitted through oral sexual contact, although this is less common (CDC, 2021).

## 2. Mother-to-Child Transmission (Vertical Transmission)

Some STIs can be transmitted from an infected mother to her child during pregnancy, childbirth, or breastfeeding. This type of transmission can cause serious health complications for the infant, including birth defects, infections, and even death (CDC, 2021). Diseases transmitted vertically include:

**Congenital Syphilis:** Syphilis bacteria can be transmitted from an infected mother to the fetus during pregnancy, leading to congenital syphilis, which can cause severe health problems for the infant (CDC, 2021).

**Human Immunodeficiency Virus (HIV):** HIV can be transmitted from mother to child during pregnancy, childbirth, or breastfeeding. However, the risk of transmission can be significantly reduced through antiretroviral therapy for the mother during pregnancy and childbirth, and by avoiding breastfeeding (CDC, 2021).

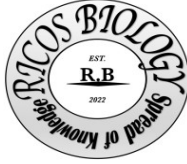
**Chlamydia and Gonorrhea:** These bacteria can be transmitted to the infant during birth, causing eye or lung infections (CDC, 2021).

**Genital Herpes:** If the mother has active herpes sores during childbirth, the virus can be transmitted to the infant, causing a serious, potentially life-threatening infection (CDC, 2021).

## 3. Blood Contact

Some STIs can be transmitted through contact with contaminated blood. This typically occurs through:

**Sharing Needles:** Sharing needles or syringes contaminated with blood is a common route of transmission for HIV and viral hepatitis (B and C) among injecting drug users (CDC, 2021).



**Blood Transfusion and Organ Transplantation:** Although now very rare in developed countries due to rigorous screening of blood and organs, it still represents a potential risk (CDC, 2021).

**Needlestick Injuries:** Healthcare workers can be at risk of bloodborne infection through accidental needlestick injuries (CDC, 2021).

#### 4. Other (Less Common) Transmission Routes

**Direct Non-Sexual Contact:** In rare cases, some STIs can be transmitted through close skin-to-skin or mucous membrane contact, even without full sexual intercourse. For example, oral herpes can be transmitted through kissing (CDC, 2021).

**Contaminated Instruments:** Although rare, improperly sterilized medical or surgical instruments can be a vehicle for the transmission of some STIs (CDC, 2021).

Understanding the various transmission routes highlights the importance of safe sexual practices, regular screening, and preventive interventions such as vaccinations (e.g., HPV vaccine) in curbing the spread of STIs (CDC, 2021).

### Diagnosis

Early and accurate diagnosis of Sexually Transmitted Infections (STIs) is crucial for preventing serious health complications and curbing the spread of infection. Diagnostic methods vary depending on the type of infection and include a wide range of laboratory tests and clinical examinations (CDC, 2021).

#### 1. Diseases Characterized by Genital, Anal, or Perianal Ulcers

These diseases include Syphilis, Genital Herpes, Lymphogranuloma Venereum (LGV), and Granuloma Inguinale (Donovanosis). Diagnosis relies on clinical observation and laboratory tests:

**Syphilis:** Syphilis is definitively diagnosed through darkfield microscopy or molecular tests (PCR) to detect *Treponema pallidum* directly from lesion exudate or tissue. Presumptive diagnosis relies on two serologic tests: a nontreponemal test (VDRL or RPR) and a treponemal test (TP-PA, EIAs, CIAs, immunoblots, or rapid treponemal assays). Nontreponemal tests can yield false-positive results and are used to monitor treatment response, while treponemal tests remain positive for life even after successful treatment (CDC, 2021).

**Lymphogranuloma Venereum (LGV):** Definitive diagnosis of LGV requires LGV-specific molecular testing (e.g., PCR-based genotyping), which is not widely available. Diagnosis is typically based on clinical suspicion, epidemiological information, and a *Chlamydia trachomatis* NAAT at the symptomatic anatomical site, along with the exclusion of other etiologies (CDC, 2021).

#### 2. Diseases Characterized by Urethritis and Cervicitis



These include Chlamydia and Gonorrhea, which are often asymptomatic, especially in women:

**Chlamydia and Gonorrhea:** Nucleic Acid Amplification Tests (NAATs) are the preferred method for diagnosing Chlamydia and Gonorrhea due to their high sensitivity and specificity. Urine samples or swabs from various anatomical sites (cervix, vagina, urethra, rectum, pharynx) can be used (CDC, 2021).

**Mycoplasma genitalium:** NAATs are the recommended diagnostic tests for *Mycoplasma genitalium*. Resistance testing is crucial for guiding treatment due to increasing antimicrobial resistance (CDC, 2021).

### 3. Diseases Characterized by Vulvovaginal Itching, Burning, Irritation, Odor, or Discharge

These include Bacterial Vaginosis (BV), Vulvovaginal Candidiasis (VVC), and Trichomoniasis:

**Bacterial Vaginosis (BV):** Diagnosis relies on microscopic examination of wet mount showing clue cells, an elevated pH (>4.5), and a KOH test yielding an amine odor. Clinical laboratory tests can also be used (CDC, 2021).

**Vulvovaginal Candidiasis (VVC):** Diagnosis relies on clinical indicators such as vulvar itching and pain, and microscopic examination showing budding yeasts or pseudohyphae. VVC is associated with a normal vaginal pH (<4.5). Yeast culture is the gold standard for diagnosis (CDC, 2021).

### 4. Other Diseases

**Human Immunodeficiency Virus (HIV):** HIV infection is diagnosed by HIV 1/2 Ag/Ab combination immunoassays. The CDC recommends that HIV testing begin with a laboratory-based HIV-1/HIV-2 Ag/Ab combination assay, followed by a laboratory-based assay with a supplemental HIV-1/HIV-2 antibody differentiation assay if repeatedly reactive (CDC, 2021).

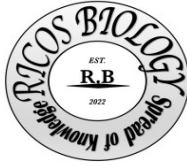
**Viral Hepatitis (B and C):** Viral Hepatitis (B and C) is diagnosed through blood tests that detect antigens, antibodies, and viral nucleic acid (CDC, 2021).

**Human Papillomavirus (HPV):** HPV is typically diagnosed through Pap tests to detect cellular changes, and HPV DNA tests to detect high-risk viral types (CDC, 2021).

Regular screening, especially for at-risk individuals, is vital for early diagnosis and effective intervention. Accurate diagnosis also guides appropriate treatment and reduces the risk of transmission (CDC, 2021).

### Treatment

The treatment of Sexually Transmitted Infections (STIs) depends on the type of infection, whether bacterial, viral, fungal, or parasitic. The goal of treatment is to eliminate the pathogen, alleviate symptoms, prevent complications, and stop the



transmission of infection to others. It is essential to adhere to the full and recommended doses of medications, even if symptoms disappear, to ensure complete cure and prevent the development of antimicrobial resistance (CDC, 2021).

## 1. Curable Bacterial Infections

Bacterial infections are treated with antibiotics and are curable if diagnosed and treated early:

**Syphilis:** Penicillin G is the preferred drug for all stages of syphilis, administered parenterally. The dosage and duration of treatment depend on the stage of the disease and clinical manifestations. Patients should be informed about the potential Jarisch-Herxheimer reaction, an acute febrile reaction that can occur within 24 hours of syphilis therapy (CDC, 2021).

**Chlamydia:** Doxycycline 100 mg orally twice daily for 7 days is the recommended treatment. Azithromycin 1 gram orally as a single dose can be used as an alternative, especially during pregnancy (CDC, 2021).

**Gonorrhea:** Gonorrhea treatment has become complicated due to the ability of *Neisseria gonorrhoeae* to develop resistance to available antibiotics. The 2021 CDC guidelines recommend ceftriaxone 500 mg intramuscularly as a single dose. Dual therapy with azithromycin or doxycycline, previously recommended, is no longer advised due to concerns about azithromycin resistance (CDC, 2021).

**Mycoplasma genitalium:** Resistance-guided therapy is emphasized due to increasing antimicrobial resistance. A two-stage approach is recommended: an initial dose of doxycycline to reduce the microbial load, followed by either high-dose azithromycin (for macrolide-sensitive infections) or moxifloxacin (for macrolide-resistant infections). If resistance testing is not available, doxycycline followed by moxifloxacin is recommended (CDC, 2021).

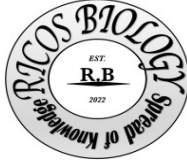
**Bacterial Vaginosis (BV):** Metronidazole 500 mg orally twice daily for 7 days, or metronidazole gel 0.75% intravaginally, or clindamycin cream 2% intravaginally are recommended. Women should be advised to abstain from sexual activity or consistently use condoms during the treatment period (CDC, 2021).

**Pelvic Inflammatory Disease (PID):** Empiric treatment for PID should be initiated in sexually active young women and other women at risk for STIs if they experience pelvic or lower abdominal pain. Recommended regimens include a combination of intravenous or intramuscular antibiotics, such as ceftriaxone with doxycycline and metronidazole (CDC, 2021).

**Epididymitis:** Treatment depends on the likely cause. If caused by Chlamydia or Gonorrhea, ceftriaxone 500 mg IM as a single dose plus doxycycline 100 mg orally twice daily for 10 days is recommended. If caused by enteric organisms, levofloxacin is recommended (CDC, 2021).

## 2. Chronic Viral Infections

There is no cure for most viral STIs, but symptoms can be managed and recurrence



reduced:

**Human Immunodeficiency Virus (HIV):** Antiretroviral therapy (ART) should be initiated as soon as possible for all persons with HIV infection, regardless of CD4+T-cell count. ART significantly reduces transmission, improves laboratory markers, decreases acute disease severity, lowers viral setpoint, reduces viral reservoir size, decreases viral mutation rate, and preserves immune function (CDC, 2021).

**Genital Herpes:** Antiviral medications such as acyclovir, valacyclovir, and famciclovir are used to manage herpes outbreaks and reduce recurrence. These drugs do not eliminate the virus from the body but help control symptoms (CDC, 2021).

**Human Papillomavirus (HPV):** There is no cure for HPV itself, but clinical manifestations such as genital warts can be treated. Treatment options include surgical removal of warts, cryotherapy, laser therapy, or topical medications. HPV

vaccines are an effective means of preventing infection and associated cancers (CDC, 2021).

**Viral Hepatitis (B and C):** Effective treatments are available for Hepatitis C that can lead to complete cure in most cases. For chronic Hepatitis B, antiviral medications can control the virus and prevent liver damage (CDC, 2021).

### 3. Fungal and Parasitic Infections

**Vulvovaginal Candidiasis (VVC):** VVC is treated with short-course topical formulations (single dose or 1-3 day regimens) or a single oral dose of fluconazole. These treatments are effective in relieving symptoms and eradicating the infection (CDC, 2021).

**Trichomoniasis:** Trichomoniasis is treated with oral metronidazole or tinidazole. It is important to treat sexual partners simultaneously to prevent reinfection (CDC, 2021).

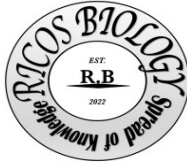
Adherence to treatment, partner management, and regular follow-up are crucial for successful treatment and reducing the spread of STIs (CDC, 2021).

#### Prognosis

The prognosis of Sexually Transmitted Infections (STIs) largely depends on the type of infection, the stage of diagnosis, adherence to treatment, and the presence of any complications. While many STIs are completely curable if diagnosed and treated early, others can cause chronic or even life-threatening health problems if left untreated (CDC, 2021).

#### 1. Curable Bacterial Infections

**Chlamydia and Gonorrhea:** If diagnosed and treated early with appropriate antibiotics, the prognosis is excellent, and complete recovery usually occurs without complications. However, if left untreated, they can lead to serious complications such as Pelvic Inflammatory Disease (PID) in women, which can cause infertility, ectopic pregnancy, and chronic pelvic pain. In men, they can cause epididymitis, which may affect fertility (CDC,



2021).

**Syphilis:** Syphilis can be effectively treated with penicillin, especially in the early stages (primary, secondary, and early latent syphilis). The prognosis is very good with proper treatment. However, if the disease progresses to late stages (late latent syphilis, tertiary syphilis, neurosyphilis), it can cause irreversible damage to vital organs such as the heart, brain, and nervous system, leading to chronic health problems, disability, and in some cases, death (CDC, 2021).

**Bacterial Vaginosis (BV) and Trichomoniasis:** These infections are curable with antibiotics. The prognosis is good with treatment. However, they can increase the risk of acquiring other STIs and cause pregnancy complications if left untreated (CDC, 2021).

## 2. Chronic Viral Infections

**Human Immunodeficiency Virus (HIV):** There is currently no cure for HIV, but with effective Antiretroviral Therapy (ART), people living with HIV can lead long and healthy lives. ART reduces the viral load to undetectable levels, preventing the progression to AIDS and significantly reducing the risk of HIV transmission. However, treatment requires lifelong adherence (CDC, 2021).

**Genital Herpes:** There is no cure for genital herpes, and the virus remains in the body for life. However, antiviral medications can reduce the frequency and severity of outbreaks. The prognosis is good in terms of symptom management, but the infection can cause psychological and social distress (CDC, 2021).

**Human Papillomavirus (HPV):** Most HPV infections clear on their own without intervention. However, some high-risk HPV types can lead to the development of cervical, anal, oral, and throat cancers, among others. The prognosis depends on early detection and treatment of cellular changes. HPV vaccines offer excellent protection against infection and associated cancers (CDC, 2021).

**Viral Hepatitis B and C:** Hepatitis B can become chronic and lead to cirrhosis and liver cancer. Antiviral treatments are available that can control the virus. Hepatitis C, in contrast, can be effectively cured in most cases using direct-acting antiviral medications, leading to complete recovery and preventing long-term complications (CDC, 2021).

## 3. Long-Term Complications

If left untreated, STIs can lead to a wide range of long-term complications, including:

**Infertility:** Untreated Chlamydia and Gonorrhea can cause damage to the fallopian tubes in women, leading to infertility or ectopic pregnancy (CDC, 2021).

**Chronic Pelvic Pain:** Can be a result of recurrent or untreated Pelvic Inflammatory Disease (CDC, 2021).

**Increased Risk of HIV Acquisition:** Other STIs, especially those causing ulcers, can increase the risk of acquiring and transmitting HIV (CDC, 2021).

**Cancer:** Certain HPV types are associated with cervical, anal, oral, and throat cancers. Hepatitis B and C are linked to liver cancer (CDC, 2021).



**Infant Health Problems:** Mother-to-child transmission of STIs can lead to serious health problems for the infant, including blindness, deafness, brain damage, and death (CDC, 2021).

Overall, the prognosis emphasizes the importance of regular screening, early diagnosis, prompt treatment, and partner management to reduce the negative health consequences of STIs (CDC, 2021).

## Future Medications and Therapeutic Innovations

The field of Sexually Transmitted Infections (STIs) treatment is undergoing continuous development, driven by the need to overcome antimicrobial resistance, improve treatment efficacy, and provide more convenient options for patients. Current research focuses on developing new drugs, preventive and therapeutic vaccines, and innovative strategies for pre-exposure and post-exposure prophylaxis (CDC, 2021).

### 1. New Antibiotics to Combat Resistance

Antimicrobial resistance poses a significant challenge in the treatment of bacterial STIs, especially Gonorrhea. Efforts are focused on developing new classes of antibiotics or repurposing existing drugs:

**Gonorrhea Treatments:** Given the increasing resistance of *Neisseria gonorrhoeae* to available antibiotics, there is an urgent need for new drugs. Research is underway on compounds such as Zoliflodacin and Cefiderocol, which have shown promising results in clinical trials against resistant Gonorrhea strains (CDC, 2021).

**Mycoplasma genitalium Treatments:** With increasing resistance of *Mycoplasma genitalium* to macrolides and fluoroquinolones, alternative drugs or new combination therapies are being explored. Research focuses on understanding resistance mechanisms to develop targeted treatments (CDC, 2021).

### 2. Preventive and Therapeutic Vaccines

Vaccines are powerful tools for preventing infectious diseases, and there are intensive efforts to develop vaccines against STIs for which no vaccines are currently available:

**Gonorrhea Vaccine:** Several vaccine candidates against Gonorrhea are under development, targeting bacterial surface proteins to prevent infection or reduce its severity. Some vaccines used against meningococcal meningitis (which resembles *Neisseria gonorrhoeae*) show some cross-protection against Gonorrhea (CDC, 2021).

**Chlamydia Vaccine:** No vaccine is currently available for Chlamydia, but research is ongoing to develop vaccines targeting *Chlamydia trachomatis* proteins to prevent infection or reduce complications (CDC, 2021).

**Genital Herpes Vaccine:** Although vaccines against Herpes Simplex Virus (HSV) are in early stages of development, no commercially available effective vaccine is currently available to



prevent genital herpes (CDC, 2021).

**HIV Vaccine:** Despite significant progress in antiretroviral therapy, developing an effective HIV vaccine remains a top priority. Research focuses on inducing broad immune responses that can neutralize different viral strains (CDC, 2021).

### 3. Pre-Exposure Prophylaxis (PrEP) and Post-Exposure Prophylaxis(PEP)

Pre-Exposure Prophylaxis (PrEP) and Post-Exposure Prophylaxis (PEP) strategies are highly effective in preventing HIV transmission, and similar applications are being explored for other STIs:

**STI PrEP:** The use of antibiotics (such as doxycycline) as pre-exposure prophylaxis (Doxy-PEP) is being investigated to reduce the risk of Chlamydia, Gonorrhea, and Syphilis in high-risk groups. Studies have shown promising results in reducing the incidence of these diseases (CDC, 2021).

**STI PEP:** Similar to HIV PEP, the use of antibiotics after sexual exposure is being evaluated to reduce the risk of bacterial STIs (CDC, 2021).

### 4. Gene Therapy and Immunotherapies

Gene therapy and immunotherapies are promising research areas for chronic STIs such as HIV and Herpes:

**Gene Therapy for HIV:** Some research aims to modify a patient's immune cells to make them resistant to HIV infection, or to enable the body to produce neutralizing antibodies (CDC, 2021).

**Immunotherapies for Herpes:** Focus on enhancing the immune system's response to control the virus and reduce the frequency of outbreaks (CDC, 2021).

### 5. Point-of-Care Testing (POCT)

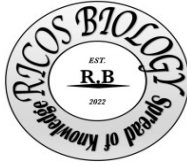
Developing rapid point-of-care tests is crucial for improving early detection and prompt treatment, thereby reducing transmission. Research focuses on developing rapid and accurate tests that can be performed outside the laboratory (CDC, 2021).

These developments demonstrate a global commitment to combating STIs and offer hope for a future where these diseases are more preventable and treatable (CDC, 2021).

## Recommendations

Controlling Sexually Transmitted Infections (STIs) requires a comprehensive and multifaceted approach that combines prevention, early diagnosis, effective treatment, partner management, and health education. Based on available information and ongoing challenges, the following recommendations can be made:

### 1. Enhance Health Education and Awareness



**Comprehensive Education Programs:** Implement comprehensive health education programs on STIs in schools and communities, focusing on transmission routes, the importance of safe sexual practices, early diagnosis, and treatment. These programs should be age-appropriate and culturally sensitive (CDC, 2021).

**Public Awareness Campaigns:** Launch public awareness campaigns targeting high-risk populations, including youth and marginalized groups, to increase awareness of risks, encourage regular screening, and reduce the stigma associated with STIs (CDC, 2021).

## 2. Expand Screening and Diagnosis

**Routine Screening:** Integrate routine STI screening into primary healthcare, especially for sexually active individuals and high-risk groups. Screening should be accessible, convenient, and confidential (CDC, 2021).

**Point-of-Care Tests (POCT):** Invest in the development and deployment of rapid and accurate point-of-care tests for STIs, enabling immediate diagnosis and treatment at the same visit, thereby reducing loss to follow-up and interrupting the chain of transmission (CDC, 2021).

**Partner Screening:** Encourage the screening and treatment of sexual partners of individuals diagnosed with STIs to prevent reinfection and curb their spread (CDC, 2021).

## 3. Improve Access to Treatment and Care

**Prompt Treatment:** Ensure immediate access to appropriate and effective treatment for individuals diagnosed with STIs. Medications should be available and affordable (CDC, 2021).

**Antimicrobial Resistance Management:** Develop and implement strategies to monitor antimicrobial resistance patterns of STIs and guide treatment based on local resistance patterns. Invest in research and development of new drugs to combat increasing resistance (CDC, 2021).

**Comprehensive Care:** Provide comprehensive care for individuals with STIs, including counseling, psychological support, and reproductive health services (CDC, 2021).

## 4. Strengthen Prevention Strategies

**Condoms:** Promote the consistent and correct use of condoms as an effective means of preventing most STIs (CDC, 2021).

**Vaccinations:** Expand vaccination programs against Human Papillomavirus (HPV) and Hepatitis B, and invest in the development of new vaccines against other STIs (CDC, 2021).

**Pre-Exposure Prophylaxis (PrEP) and Post-Exposure Prophylaxis (PEP):** Expand the use of PrEP and PEP for HIV, and explore similar applications for bacterial STIs, such as Doxy-PEP, for high-risk groups (CDC, 2021).

**Male Circumcision:** Promote male circumcision in regions with high rates of HIV and other



STIs, as studies have shown it reduces the risk of acquiring certain STIs(CDC, 2021).

## 5. Research and Development

**Investment in Research:** Increase investment in research and development for new drugs, vaccines, innovative diagnostic methods, and prevention strategies. Research should focus on a better understanding of the epidemiology, biology, and immunology of STIs (CDC, 2021).

**International Collaboration:** Foster international collaboration and the exchange of information and expertise among countries and organizations to combat STIs on a global scale (CDC, 2021).

By implementing these recommendations, communities can make significant progress in reducing the burden of STIs and improving sexual and reproductive health worldwide (CDC, 2021).

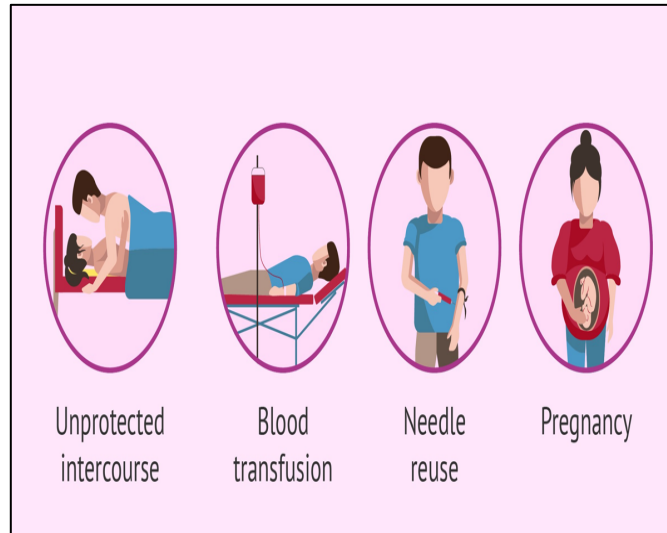
### Tables and Figures

**Table 1: Key STI Statistics (2020-2023)**

Source	Statistic Type	Value	Notes
CDC (2023)	Total Syphilis, Gonorrhea, and Chlamydia Cases	> 2.4 million	Diagnosed and reported in the United States
CDC (2023)	Syphilis Cases	> 209,000	In the United States
CDC (2023)	Gonorrhea Cases	> 600,000	In the United States
CDC (2023)	Chlamydia Cases	> 1.6 million	In the United States
CDC (2023)	Congenital Syphilis Cases	3,882	In the United States, including 279 stillbirths/infant deaths
WHO (2020)	New infections of Chlamydia, Gonorrhea, Syphilis, or Trichomoniasis	374 million	Among adults aged 15-49 globally
WHO (2020)	New cases daily	> 1 million	Among adults aged 15-49 globally
WHO (2022)	New Syphilis infections	8 million	Among adults aged 15-49 globally
WHO (2022)	Congenital Syphilis Cases	700,000	Globally
CDC (2012-2016)	HPV-associated cancers	34,800	New cases annually in the United States
CDC (pre-vaccine)	HPV-associated genital warts	355,000	New cases annually in the United States

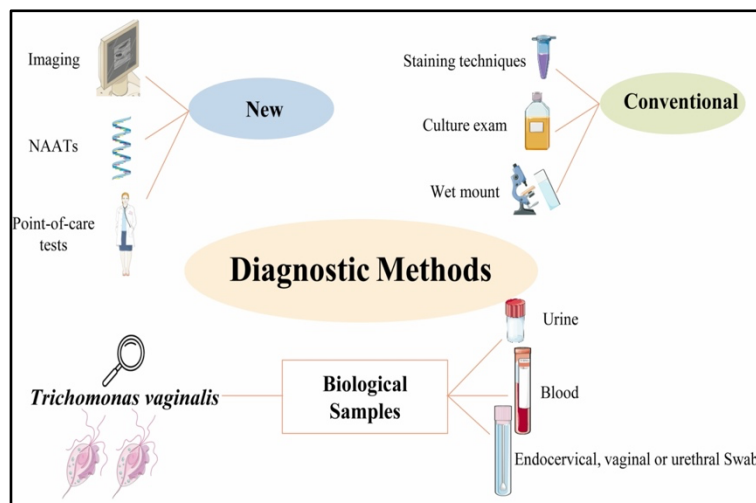


**Figure 1: Sexually Transmitted Infection Transmission Routes**



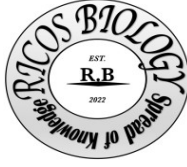
**Description:** This figure illustrates the main transmission routes of sexually transmitted infections, including unprotected sexual contact, blood transfusion, needle reuse, and mother-to-child transmission during pregnancy.

**Figure 2: Sexually Transmitted Infection Diagnosis Methods**

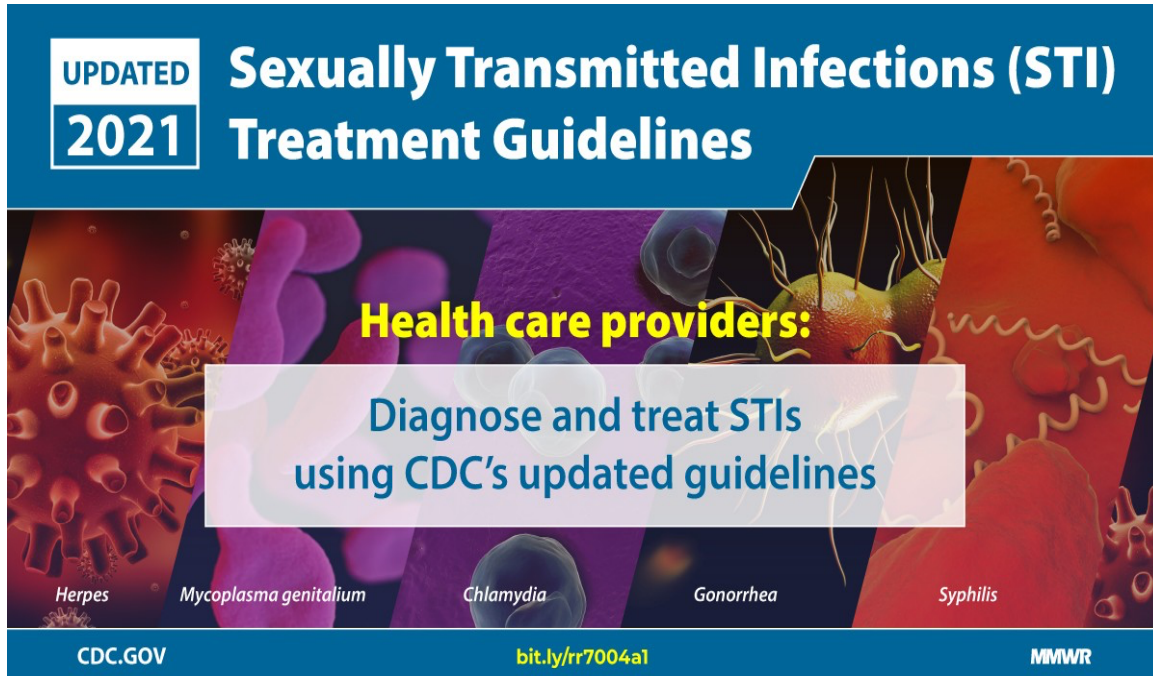


**Description:** This figure illustrates various diagnostic techniques used to detect sexually transmitted infections, ranging from wet mount microscopy to Nucleic Acid Amplification Tests (NAATs).

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**Figure 3: Sexually Transmitted Infection Treatment Guidelines**



**Description:** This figure represents the Sexually Transmitted Infection Treatment Guidelines issued by the Centers for Disease Control and Prevention (CDC), providing updated recommendations for healthcare professionals.

### References

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