

# Sexually Transmitted Diseases: Prevalence, Treatment, and Diagnostics

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## LEARNING OBJECTIVES:

1. Describe the similarities and differences among the major sexually transmitted diseases.
2. Identify sexually transmitted infectious agents.
3. Discuss the significance of congenital infections in sexually transmitted diseases.

## ABSTRACT

Sexually transmitted diseases contribute substantially to issues in human health. Since sexually transmitted pathogens originate from viruses, bacteria, and eukaryotes, there are few commonalities regarding characteristics of disease. Some bacterial sexually transmitted pathogens, once considered curable, are beginning to develop antibacterial resistance, viral pathogens have been implicated in major congenital malformations, and even death, and eukaryotic infections are increasing in prevalence. In this Focus Series, the prevalence, transmission, treatment, diagnostics and emergence of sexually transmitted diseases are discussed.

**ABBREVIATIONS:** STDs - Sexually Transmitted Diseases, STIs - Sexually Transmitted Infections, HPV - Human Papilloma virus, HIV - Human Immunodeficiency Virus

**INDEX TERMS:** Sexually transmitted diseases, sexually transmitted infections

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## INTRODUCTION

Sexually Transmitted Diseases (STDs) and Sexually Transmitted Infections (STIs) have been described for centuries and continue to persist all over the world; they include a gamut of bacterial, viral, and protozoal organisms. It is estimated that 110 million people in the United States are living with STDs and 15 million new cases are diagnosed each year.<sup>1</sup> Worldwide, there are approximately 100 million acts of sexual intercourse per day,<sup>2</sup> which the World Health Organization estimates generate more than 1 million new sexually transmitted infections every day.<sup>3</sup> Healthcare costs of sexually transmitted infections have reached \$10 billion/year in the US alone.<sup>4</sup> In addition, rates of the classical STDs have decreased in nearly every industrialized country except the U.S. and 2/3 of all U.S. STDs/STIs occur in people 25 years old or younger.<sup>5</sup>

Symptoms of sexually transmitted diseases are diverse and dependent on numerous factors including the infectious agent present, whether the individual is immune suppressed, the gender of the infected individual, and, in cases where STDs are congenital, the age of the infected individual. Some STDs are curable while others are treatable but persist as lifelong conditions. The World Health Organization lists eight STDs as the most prevalent with infectious agents ranging from bacterial to viral to protozoal.<sup>3</sup>

Each of the significant STDs have special considerations and challenges that make them important to human health. Bacterial-induced conditions such as gonorrhea, chlamydia, and syphilis, and protist-caused trichomoniasis are easily treatable but are currently increasing in prevalence.<sup>6</sup> These infections primarily cause diseases of the genital tract and other mucous membranes. Gonorrhea may not remain easily treatable, however, as antibiotic resistant strains are arising that are predicted to pose a substantial threat to human health in the future.<sup>7</sup> Trichomoniasis is noteworthy, not only because of the symptoms caused by the initial infectious

agent, but also because it vastly increases the likelihood of becoming infected with other sexually transmitted pathogens.<sup>8,9</sup>

Viral infections of Herpes virus, Human Papilloma virus (HPV), Hepatitis B virus, and Human Immunodeficiency Virus (HIV) make up the most frequently transmitted STDs.<sup>3</sup> Each viral STD originates from a different viral family and so employs unique characteristics for transmission and pathogenesis. Treatment options are available for the viral STDs but none are considered curable. Immune-suppressing HIV and cancer-causing high-risk strains of HPV can be fatal without proper treatment.

In addition to the infections considered the classic STDs, three emerging pathogens have recently become of greater interest. Zika virus has emerged over the last few years as a viable threat to the health of newborns in endemic areas<sup>10</sup> and increased publicity of the effects of the virus has led to new incentives for research. The new focus on Zika virus has also renewed public interest in Cytomegalovirus infections, which also cause detrimental congenital abnormalities in infants of infected mothers.<sup>11</sup> Finally, *Mycoplasma genitalium* was first identified in the late 1970s but its impact on sexual health has only more recently begun to be solidified.<sup>12</sup> This Focus Series will discuss the rates of infection for the most prevalent STDs, along with recent advances in testing methodology and current treatment guidelines. In addition, two sexually transmitted viruses that cause congenital abnormalities, Zika virus and Cytomegalovirus, will be addressed, alongside emerging bacterial STD *Mycoplasma genitalium*.

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