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2.00 of the 7.00 hours on pharmacotherapeutic education is pharmacotherapeutic/controlled substance prescriptive authority content. These 2.00 hours fulfill the South Carolina Board of Medical Examiners Opioid education mandate related to approved procedures of prescribing and monitoring controlled substances.

Financial Relationships:

Name	Name of Ineligible companies with which relevant financial relationships	Nature of Relationship
Dr. Robert Oliverio	Pfizer	Leadership Advisory Panel
Dr. Toby Fugate	Gilead Sciences	Speaker
Dr. Richard Pierce	Sensus Healthcare	Employee, Medical Director, Stockholder

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Additional Resources have been provided in the enduring presentations.

Diagnosis, Treatment, and Prevention of Sexually Transmitted Infections

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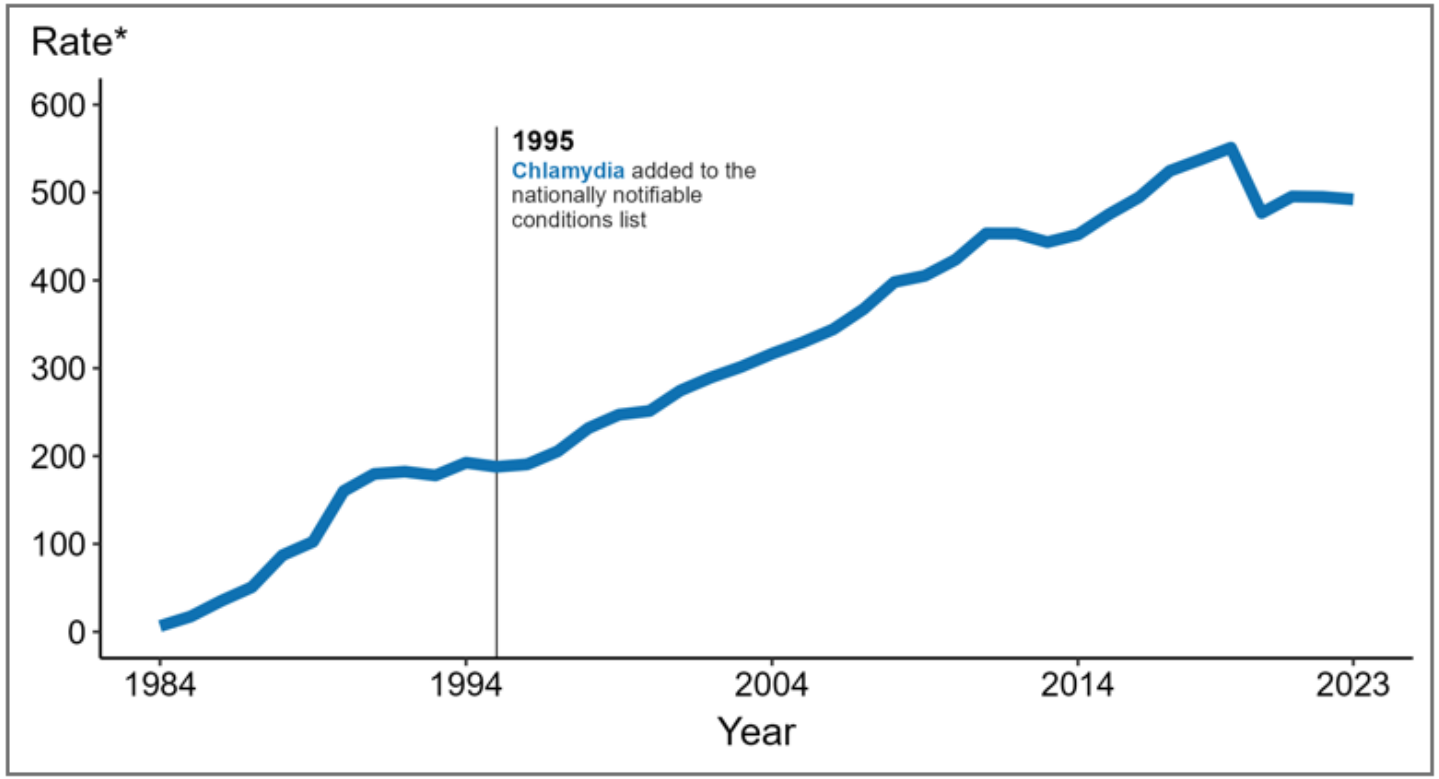
Disclosures

- Gilead Sciences Speaker Bureau

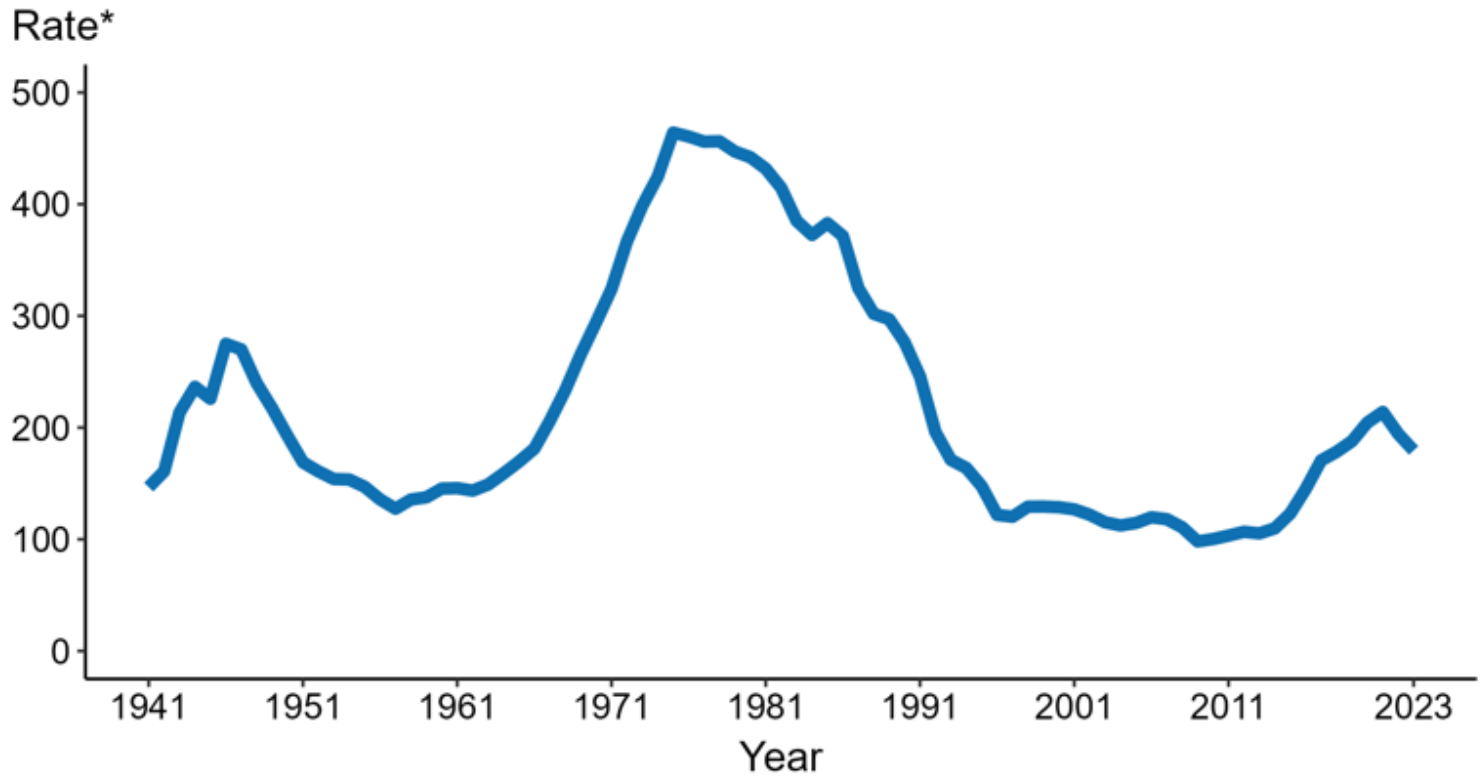
Chlamydia — Rates of Reported Cases by Year, United States, 1984–2023



* Per 100,000

https://www.cdc.gov/sti-statistics/annual/slides.html

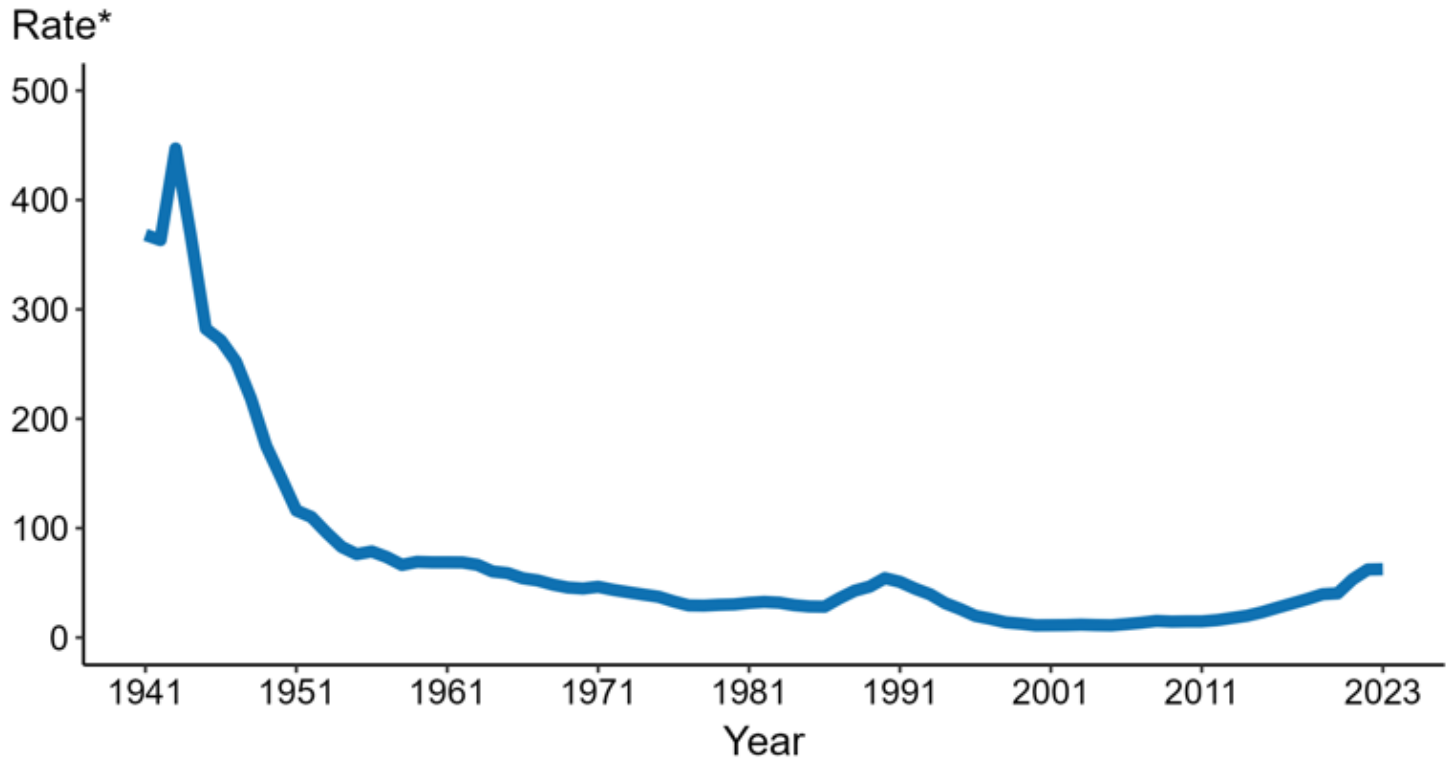
Gonorrhea — Rates of Reported Cases by Year, United States, 1941–2023



* Per 100,000

https://www.cdc.gov/sti-statistics/annual/slides.html

Syphilis — Rates of Reported Cases by Year, United States, 1941–2023

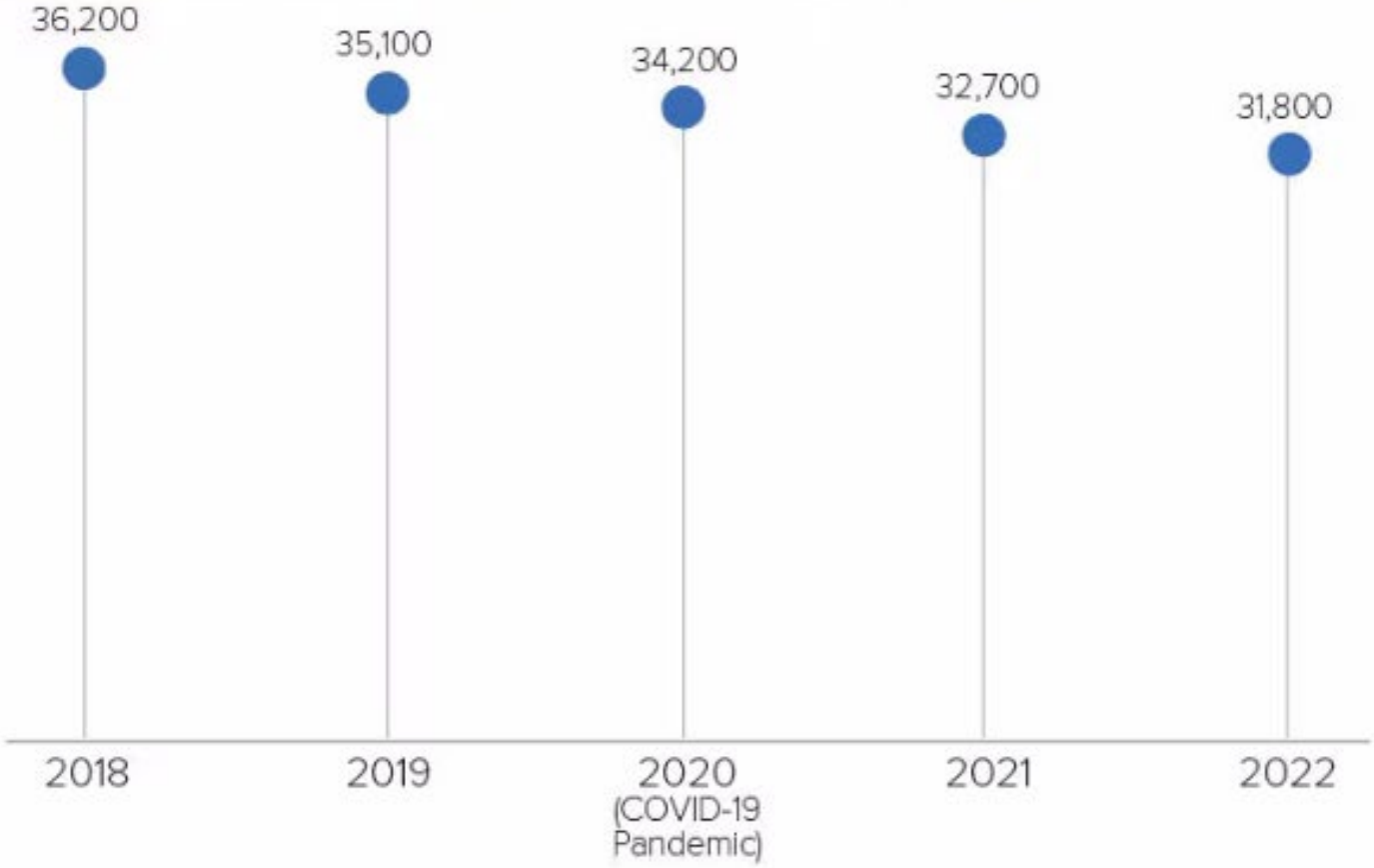


* Per 100,000

NOTE: Includes all stages of syphilis and congenital syphilis.

https://www.cdc.gov/sti-statistics/annual/slides.html

Progress in HIV prevention continues with an overall 12% decline in estimated HIV infections from 2018 to 2022.



https://www.hiv.gov/hiv-basics/overview/data-and-trends/statistics

Sexually transmitted infection screening recommendations by sex assigned at birth and population

Sex assigned at birth	Population	Routine screening recommendation	Screening frequency	Additional screening recommendations and comments
Cisgender females	Age <25 years and sexually active	Genital chlamydia*	Annually	If at increased risk¶, additionally screen for: ▪ Syphilis ▪ Trichomoniasis
		Genital gonorrhea*	Annually	
		HIV	At least once	
		HBV	At least once (if age ≥18 years and immunity not already documented)Δ	
		HCV	At least once (if age ≥18 years)◇	
	Age ≥25 years	HIV	At least once	If at increased risk¶, additionally screen for: ▪ Genital chlamydia and gonorrhea* ▪ Syphilis ▪ Trichomoniasis
		HBV	At least once (if immunity not already documented)Δ	
		HCV	At least once◇	
	Pregnant	Genital chlamydia*	First trimester (if <25 years or at increased risk¶)	Repeat screening for these infections in third trimester if at increased risk. Additional screening at first prenatal visit: ▪ HCV for those at risk (or if ≥18 years with no prior screening)◇ ▪ Trichomoniasis for those with HIV
		Genital gonorrhea*	First trimester (if <25 years or at increased risk¶)	
		Syphilis	First trimester	
		HIV	First trimester	
		HBV	First trimester	
	With HIV infection	Genital chlamydia*	Annually	
		Genital gonorrhea*	Annually	
		Genital trichomoniasis	Annually	
		Syphilis	Annually	
		HBV	At least once (eg, at first visit)	
		HCV	At least once (eg, at first visit)◇	
	WSW and WSWM	WSW and WSWM should not be assumed to be at lower risk for STIs on the basis of their sexual orientation. Screening for cervical cancer and STIs should be conducted according to guidelines for women, based on an open discussion of sexual and behavioral risk factors.		

Sexually transmitted infection screening recommendations by sex assigned at birth and population

Sex assigned at birth	Population	Routine screening recommendation	Screening frequency	Additional screening recommendations and comments
Cisgender males	MSW only without HIV infection	HIV	At least once	If at increased risk[§], additionally screen for: ▪ Genital chlamydia and gonorrhea ▪ Syphilis Targeted screening venues for chlamydia include adolescent clinics, STI clinics, and correctional facilities.
		HBV	At least once (if age ≥18 years and immunity not already documented)[Δ]	
		HCV	At least once (if age ≥18 years)[◇]	
	MSM without HIV infection	Genital chlamydia	At least annually	More frequent screening (every 3 months) for chlamydia, gonorrhea, and syphilis is recommended in those with risk factors. More frequent screening for HIV, HBV, and HCV may also be warranted.[¥]
		Rectal chlamydia (if exposed)	At least annually	
		Genital gonorrhea	At least annually	
		Rectal gonorrhea (if exposed)	At least annually	
		Pharyngeal gonorrhea (if exposed)	At least annually	
		Syphilis	At least annually	
		HIV	At least annually	
		HAV	At least once	
		HBV	At least once	
		HCV	At least once[◇]	
	MSW only with HIV infection	Genital chlamydia	Annually	
		Genital gonorrhea	Annually	
		Syphilis	Annually	
		HBV	At least once (eg, at first visit)	
		HCV	At least once (eg, at first visit)[◇]	
	MSM with HIV infection	Genital chlamydia	At least annually	More frequent screening (every 3 months) for chlamydia, gonorrhea, and syphilis is recommended in those with risk factors. More frequent screening for HBV and HCV may also be warranted.[¥]
		Rectal chlamydia (if exposed)	At least annually	
		Genital gonorrhea	At least annually	
		Rectal gonorrhea (if exposed)	At least annually	
		Pharyngeal gonorrhea (if exposed)	At least annually	
		Syphilis	At least annually	
		HAV	At least once (eg, at first visit)	
		HBV	At least once (eg, at first visit)	
		HCV	At least annually[◇]	

Sexually transmitted infection screening recommendations by sex assigned at birth and population

Sex assigned at birth	Population	Routine screening recommendation	Screening frequency	Additional screening recommendations and comments
		HCV	At least annually	
Transgender and gender-diverse individuals		Screening for STIs should be based on an individual's anatomy: ▪ Transgender men and gender-diverse individuals with a cervix should be screened for genital gonorrhea, chlamydia, and cervical cancer according to recommendations for cisgender women. ▪ Transgender women and gender-diverse individuals assigned male at birth should be screened for genital gonorrhea and chlamydia according to recommendations for cisgender men. Screening for other STIs should be based on sexual practice, risk factors, and exposures.		

HAV: hepatitis A virus; HBV: hepatitis B virus; HCV: hepatitis C virus; HIV: human immunodeficiency virus; MSM: men who have sex with men; MSW: men who have sex only with women; STI: sexually transmitted infection; WSW: women who have sex with women; WSWM: women who have sex with women and men.

* Screening for nongenital infections in females (eg, rectal chlamydial infection, pharyngeal and rectal gonococcal infection) can be considered based on reported sexual behaviors and exposure, via shared clinical decision-making between the patient and the provider.

¶ Factors conferring increased risk for gonorrhea, chlamydia, and trichomoniasis in females include transactional sex, new sex partner, multiple sex partners, a sex partner with concurrent partners, or a sex partner with an STI. Risk factors for syphilis include residence in high-prevalence areas, history of incarceration, or transactional sex work. STI screening may also be considered in high-prevalence settings (eg, STI clinic or correctional facility).

Δ For all adults 18 years of age or older, regardless of risk factors, at least 1-time screening for HBV infection is recommended, unless they have documented vaccine receipt and serologic evidence of vaccine response. Those who are susceptible should be vaccinated. For those who have risk factors for HBV exposure, ongoing screening is warranted if they are unvaccinated or have nonresponse to vaccination. Refer to other UpToDate content on STIs for details.

◇ All adults 18 years of age or older should be screened for HCV at least once, except in settings where the HCV positivity is <0.1%. Repeated screening is warranted for those with ongoing risk factors (eg, injection drug use). Increased risk factors for hepatitis C infection among MSM include HIV infection, high community HCV prevalence and incidence, high-risk sexual behaviors, and concomitant ulcerative STIs or STI-related proctitis. Refer to other UpToDate content on hepatitis C screening for details.

§ Factors conferring increased risk for gonorrhea and chlamydia in MSW include an infection in the preceding 24 months. Screening for chlamydia in young males can be considered in high-prevalence clinical settings (adolescent clinics, correctional facilities, STI/sexual health clinic). Increased risk factors for syphilis may be based on geography, race/ethnicity, history of incarceration, transactional sex work, or age <29 years.

¥ Increased risk factors for gonorrhea, chlamydia, syphilis, and HIV among MSM include multiple or anonymous partners; intravenous drug use; sex in conjunction with illicit drug use, including methamphetamines; and sex partners who engage in these activities. MSM who have not been vaccinated for HBV or have had nonresponse to vaccination remain at risk for HBV infection.

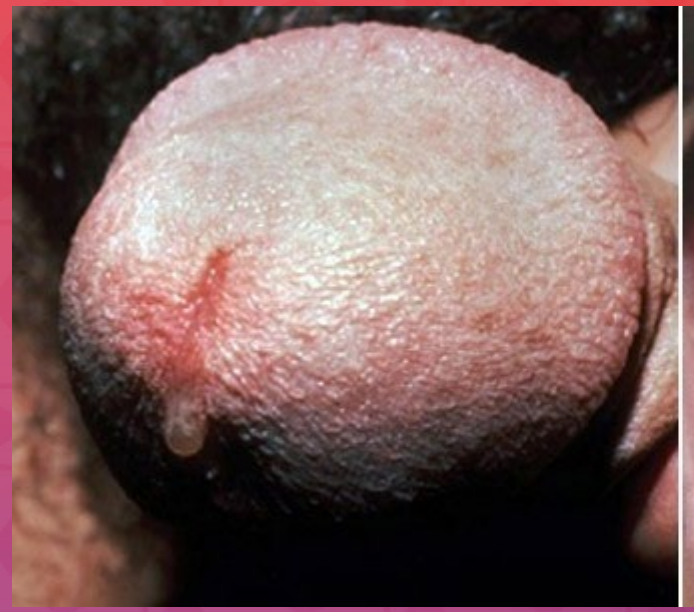
References:

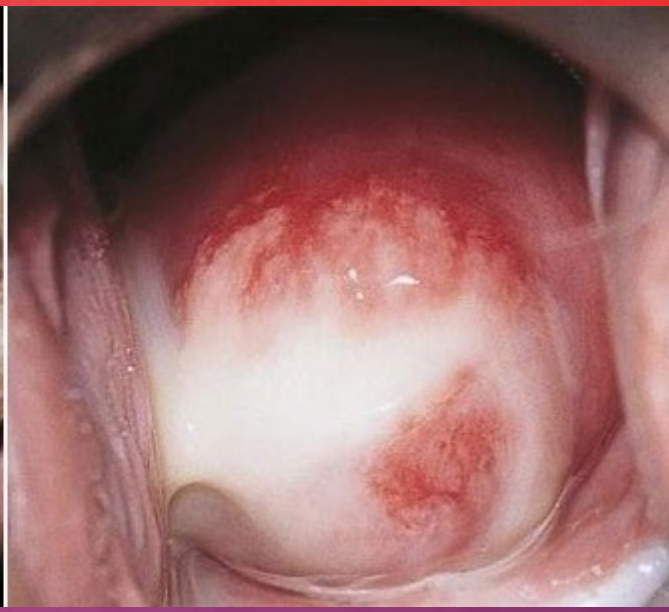
1. *California sexually transmitted infections (STI) screening recommendations, 2021. California Department of Public Health. https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/California-STI-Screening-Recommendations.aspx (Accessed on January 24, 2023).*
2. *Workowski KA, Bachmann LH, Chan PA, et al. sexually transmitted infections treatment guidelines, 2021. MMWR Recomm Rep 2021; 70:1.*
3. *Conners EE, Panagiotakopoulos L, Hofmeister MG, et al. Screening and testing for hepatitis B virus infection: CDC recommendations – United States, 2023. MMWR Recomm Rep 2023; 72:1.*

Chlamydia

Manifestations of Chlamydia trachomatis

- Asymptomatic infection
  - Majority
- Urogenital infection
  - Cervicitis
  - Pelvic inflammatory disease
  - Urethritis
  - Epididymitis
- Extragenital infections/syndromes
  - Pharyngeal
  - Rectal/Lymphogranuloma venereum (LGV)
  - Conjunctivitis
  - Reactive arthritis





STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Diagnosis of Chlamydia trachomatis

- Nucleic acid amplification test (NAAT)
  - Vaginal swab or first-catch urine for women
  - First-catch urine for men
  - Pharyngeal swab
  - Rectal swab

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Treatment of Chlamydia trachomatis

- Preferred
  - Doxycycline 100 mg PO BID for 7 days with presumptive treatment for Neisseria gonorrhoeae (unless Neisseria gonorrhoeae has been ruled out with NAAT)
- Pregnant
  - Azithromycin 1 gram PO once with presumptive treatment for Neisseria gonorrhoeae (unless Neisseria gonorrhoeae has been ruled out with NAAT)
- Other
  - Nonpregnant
    - Levofloxacin 500 mg PO daily for 7 days with presumptive treatment for Neisseria gonorrhoeae (unless Neisseria gonorrhoeae has been ruled out with NAAT)
  - Pregnant
    - Amoxicillin 500 mg PO TID for 7 days with presumptive treatment for Neisseria gonorrhoeae (unless Neisseria gonorrhoeae has been ruled out with NAAT)

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Chlamydia trachomatis Other Considerations

- Management of sexual partners
  - Any sex partner within 60 days of infection
  - The most recent sex partner if >60 days from infection
  - Expedited partner therapy
- Follow-up testing
  - Test of cure at four weeks after treatment
    - Pregnant individuals
    - Persistent symptoms
    - Concern for nonadherence to the treatment regimen
  - All individuals treated for C. trachomatis infection should undergo retesting after three months to identify reinfection

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Lymphogranuloma venereum (LGV)

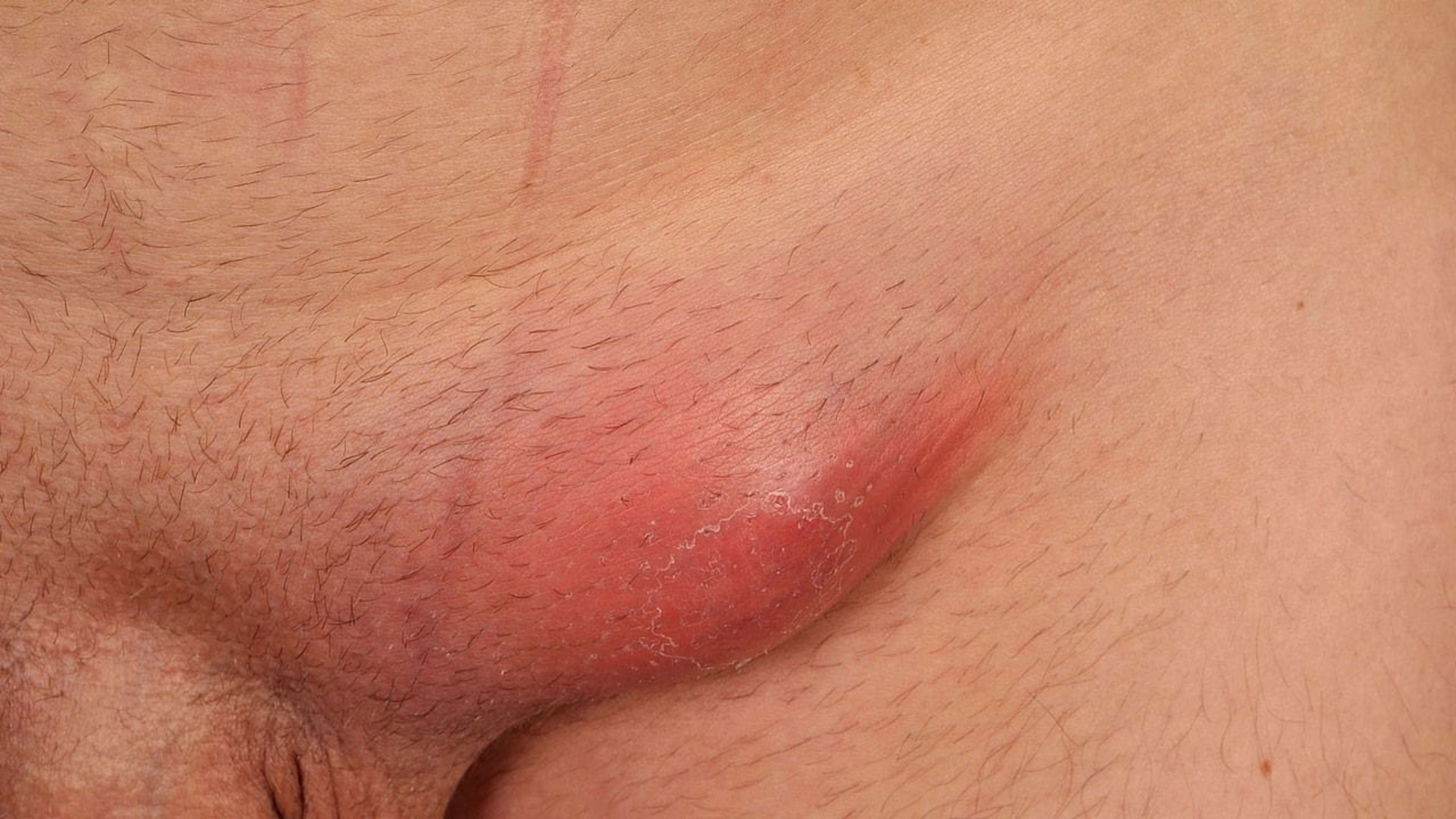
- Caused by the L1, L2, and L3 biovars of Chlamydia trachomatis
- Infection has traditionally been seen in tropical and subtropical resource-limited areas of the world
  - More recently, LGV has been increasingly reported as a cause of proctitis among men who have sex with men in high-income settings with temperate climates.
- Symptoms
  - Genital ulcer (painless) at the site of inoculation
  - Secondary stage appears 2-6 weeks later and can present as an inflammatory reaction in the superficial and deep inguinal nodes (buboes)
  - Anorectal syndrome can also occur (bloody rectal discharge, anal pain, perianal or mucosal ulcers, fever, and/or tenesmus)

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Lymphogranuloma venereum

- Diagnosis
  - A presumptive diagnosis of LGV is made in a patient with consistent symptoms, clinical findings, epidemiologic risk factors, and a positive C. trachomatis nucleic acid amplification test
- Treatment
  - For nonpregnant patients with confirmed or suspected symptomatic LGV, treat with doxycycline 100 mg orally twice daily for 21 days
  - For patients who cannot tolerate doxycycline and for pregnant women, treat with azithromycin 1 g orally once weekly for three weeks

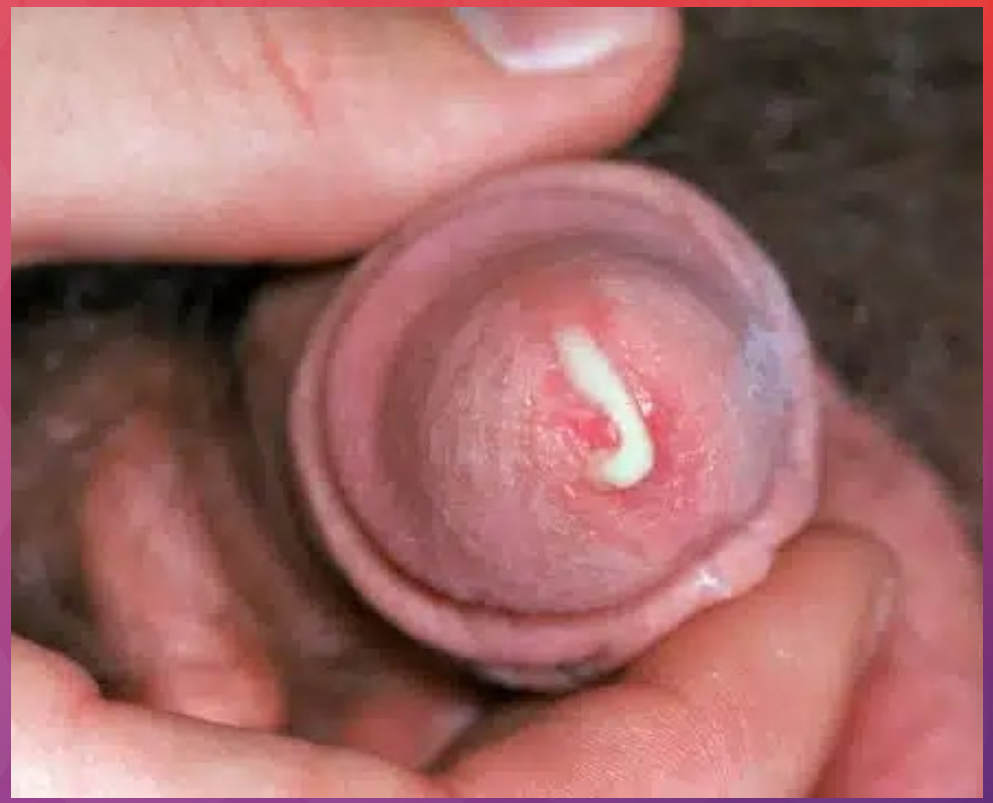
STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf



Gonorrhea

Manifestations of Neisseria gonorrhoeae

- Urogenital
  - Urethritis
  - Epididymitis
  - Cervicitis
  - Pelvic inflammatory disease
  - Bartholinitis
- Extragenital infections/syndromes
  - Pharyngeal
  - Rectal
  - Conjunctivitis
  - Disseminated gonococcal infection
  - Perihepatitis (Fitz-Hugh-Curtis syndrome)
- Pregnancy complications
  - Chorioamnionitis
  - Premature rupture of membranes
  - Preterm birth
  - Low birth weight/ small for gestational age infants
  - Spontaneous abortions in pregnant females
  - Neonatal conjunctivitis ("ophthalmia neonatorum")
  - Pharyngitis
  - Arthritis
  - Gonococcemia



STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Diagnosis of Neisseria gonorrhoeae

- Nucleic acid amplification test (NAAT)
  - Vaginal swab or first-catch urine for women
  - First-catch urine for men
  - Pharyngeal swab
  - Rectal swab

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Treatment of Neisseria gonorrhoeae

- Preferred
  - Ceftriaxone
    - Weight < 150 kg: 500 mg IM once with presumptive treatment for Chlamydia trachomatis (unless C. trachomatis has been ruled out with NAAT)
    - Weight > 150 kg: 1 gram IM once with presumptive treatment for Chlamydia trachomatis (unless C. trachomatis has been ruled out with NAAT)
- Pregnant
  - Same as Preferred
- Other
  - Cefixime 800 mg PO once
  - Azithromyin 2 grams PO once plus gentamicin 240 mg IM once
  - Ciprofloxacin 500 mg PO once (ONLY IF SUSCEPTIBILITY IS CONFIRMED)

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Neisseria gonorrhoeae Other Considerations

- Management of sexual partners
  - Any sex partner within 60 days of infection
  - The most recent sex partner if >60 days from infection
  - Expedited partner therapy
- Follow-up testing
  - Urogenital or anorectal infection
    - If symptoms resolve with initial treatment, there is no need to test for cure
    - Retest after three months to evaluate for reinfection
  - Oropharyngeal infection
    - Perform test of cure, regardless of symptom resolution, at 7 to 14 days post-treatment to ensure eradication
    - Retest after three months to evaluate for reinfection

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Syphilis

Clinical manifestations and treatment of syphilis in nonpregnant adults

	Clinical manifestations[*]	Treatment[¶]	Monitoring after treatment[Δ]
Early syphilis	**Primary syphilis:** Typically consists of a single painless chancre at the site of inoculation, accompanied by regional adenopathy. **Secondary syphilis:** A systemic illness that often includes a rash (disseminated and/or involving the palms and soles), fever, malaise, and other symptoms such as pharyngitis, hepatitis, mucous patches, condyloma lata, alopecia. **Early latent:** Refers to the period when a patient is infected with *Treponema pallidum* as demonstrated by serologic testing but has no symptoms. Early latent syphilis occurs within the first year of initial infection.	**Preferred:** ▪ Penicillin G benzathine 2.4 million units IM once **Alternatives (choose one):**[◇] ▪ Doxycycline 100 mg orally twice daily for 14 days[§] ▪ Ceftriaxone 1 g daily IM or IV for 10 to 14 days	Clinical exam and serologic testing with a nontreponemal test (eg, RPR) at 6 and 12 months. Titers should be checked more frequently if the patient is HIV infected, follow-up is uncertain, or reinfection is a concern.
Late syphilis	**Tertiary syphilis:** Patients with late syphilis who have symptomatic manifestations involving the cardiovascular system or gummatous disease (granulomatous disease of the skin and subcutaneous tissues, bones, or viscera). **Late latent syphilis:** The period when a patient is infected with *T. pallidum* as demonstrated by serologic testing but has no symptoms. Late latent syphilis by definition is present more than one year after initial infection. If the timing of an infection is not known, late latent syphilis is presumed.	**Preferred:** ▪ Penicillin G benzathine 2.4 million units IM once weekly for three weeks **Alternatives (choose one):** ▪ Doxycycline 100 mg orally twice daily for four weeks[§] ▪ Ceftriaxone 2 g daily IM or IV for 10 to 14 days	Clinical exam and serologic testing with a nontreponemal test (eg, RPR) at 6, 12, and 24 months.
Neurosyphilis	**Neurosyphilis:** Can occur at any time during the course of infection. **Early neurosyphilis:** Patients with early neurosyphilis may have asymptomatic meningitis, symptomatic meningitis, or less commonly meningovascular disease (ie, meningitis or stroke). Vision or hearing loss with or without concomitant meningitis may also be present, and ocular/otologic syphilis is treated as neurosyphilis. **Late neurosyphilis:** The most common forms involve the brain and spinal cord (dementia [general paresis] and tabes dorsalis).	**Preferred:** ▪ Aqueous penicillin G 3 to 4 million units IV every four hours (or 18 to 24 million units continuous IV infusion) for 10 to 14 days ▪ For patients with late neurosyphilis, some experts give an additional dose of penicillin G benzathine (2.4 million units IM once) after completing IV therapy.[¥] ▪ If possible, patients allergic to penicillin should be desensitized and treated with IV penicillin **Alternative:**[‡] ▪ Ceftriaxone 2 g IV daily for 10 to 14 days	Clinical and serologic monitoring with nontreponemal tests (eg, RPR). The frequency depends upon the stage of disease (eg, early or late). CSF monitoring may be warranted.[†]

CSF: cerebrospinal fluid; IM: intramuscular; IV: intravenous; RPR: rapid plasma reagin.

* Refer to the UpToDate topics that discuss the clinical manifestations of syphilis and neurosyphilis for more detailed information.

¶ For the treatment of pregnant women and children, refer to the UpToDate topics that discuss syphilis and pregnancy and congenital syphilis.

Δ Patients infected with HIV are typically monitored more frequently. Refer to the UpToDate topic that discusses the treatment of syphilis in patients with HIV infection.

◇ Amoxicillin 3 g plus probenecid 500 mg, both given orally twice daily for 14 days, is another alternative but is rarely used given the complexity of the regimen. Azithromycin, previously an alternative regimen for syphilis, is no longer considered an appropriate treatment option in the United States and Canada due to widespread macrolide resistance. Outside of North America, the decision to use a macrolide should be made in accordance with local guidelines.

§ Tetracycline 500 mg orally four times daily is also an alternative but is harder to take.

¥ For patients with clinical manifestations of late neurosyphilis (eg, general paresis or tabes dorsalis), we suggest an additional single dose of IM penicillin G benzathine after the IV course. Without this IM dose, the duration of treatment for neurosyphilis is shorter than the regimens used for other forms of late syphilis and may be insufficient. However, data supporting this approach are lacking, and it is reasonable for a patient or provider to defer this additional dose.

‡ Limited clinical experience suggests that doxycycline (200 mg orally twice daily) for 21 to 28 days may be effective as an alternative regimen. However, this regimen should be reserved for exceptional circumstances.

† Refer to the UpToDate topic on neurosyphilis for a more detailed discussion of monitoring after treatment.

Management of Syphilis in Pregnancy

- Treat with penicillin
  - The formulation and dose depend upon the disease manifestation.
  - Those who are allergic to penicillin should be managed in conjunction with an allergist so they can be desensitized or rechallenged and treated with penicillin G

Treatment of syphilis in pregnancy

Stage of syphilis	Treatment
Primary/secondary/early latent	Penicillin G benzathine (Bicillin L-A) 2.4 million units IM in a single dose (usually administered as 1.2 million units in each buttock)*
Late latent/tertiary/unknown duration	Penicillin G benzathine (Bicillin L-A) 2.4 million units IM once weekly (usually administered as 1.2 million units in each buttock) for 3 weeks (7.2 million units total dose)¶
Neurosyphilis (including ocular syphilis)Δ	Aqueous crystalline penicillin G (intravenous) 18 to 24 million units per day, administered as 3 to 4 million units IV every 4 hours or as a continuous infusion over 24 hours for 10 to 14 days
	OR
	Penicillin G procaine 2.4 million units IM once daily (usually administered as 1.2 million units in each buttock) **plus** probenecid 500 mg PO 4 times daily, both for 10 to 14 days
Post-exposure prophylaxis	Penicillin G benzathine (Bicillin L-A) 2.4 million units IM in a single dose (usually administered as 1.2 million units in each buttock)

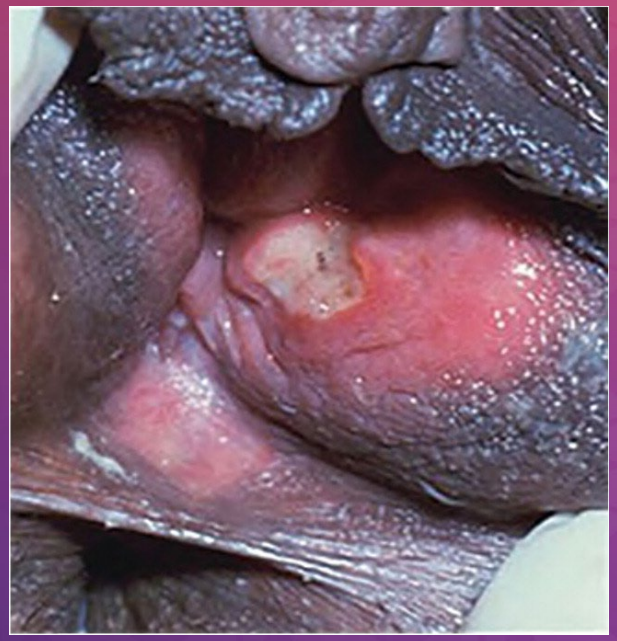
- Pregnant women are treated with the penicillin regimen appropriate for their stage of infection. Parenteral (IM or IV) penicillin G is the only therapy with documented safety and efficacy for both mother and fetus during pregnancy. Pregnant women with a history of penicillin allergy should be desensitized and treated with penicillin. Refer to the relevant topic review for further guidance on management of pregnant patients with penicillin allergy.
- If penicillin desensitization is not possible for treatment of early syphilis (primary, secondary, or latent <2 years), the World Health Organization (WHO) suggests using, with caution, erythromycin 500 mg 4 times daily for 14 days, ceftriaxone 1 g IM once daily for 10 to 14 days, or azithromycin 2 g once orally (when local susceptibility to azithromycin is likely). If penicillin desensitization is not possible for treatment of late syphilis, the WHO recommends treatment with erythromycin 500 mg orally 4 times daily for 30 days. Macrolides (eg, erythromycin) do not completely cross the placental barrier; therefore, the WHO also recommends that infants born to women treated with non-penicillin regimens receive a 10 to 15 day course of parenteral penicillin treatment.

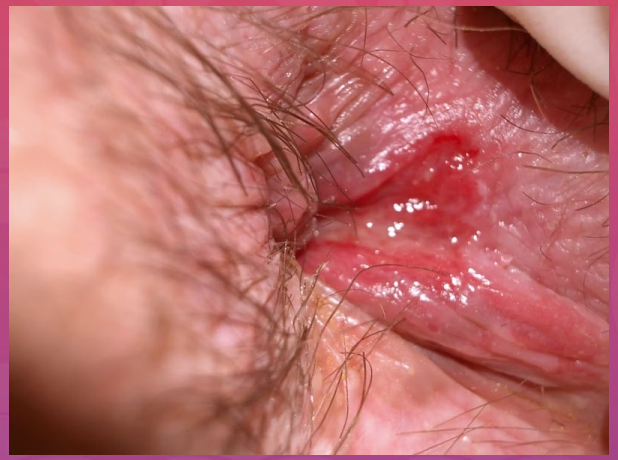
IM: intramuscular; IV: intravenous; PO: oral.

* If serologic failure is detected at follow-up and additional follow-up cannot be assured, consider retreating with penicillin G benzathine 2.4 million units IM once weekly for 3 weeks. Prompt cerebrospinal fluid examination is recommended.

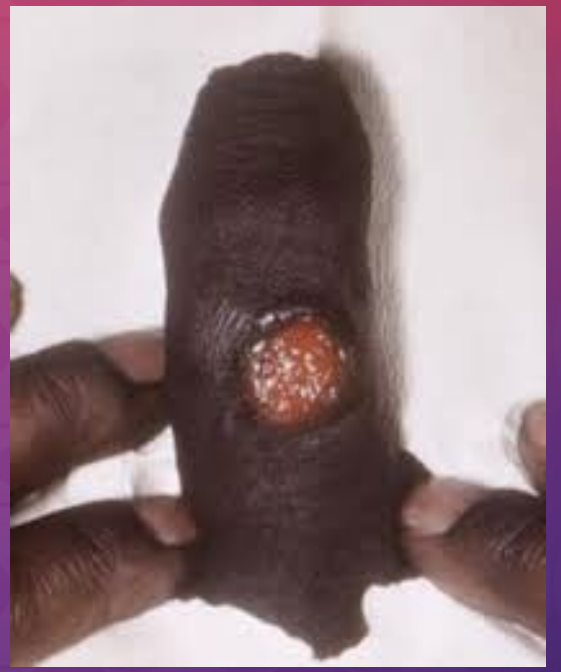
¶ If a dose is missed for more than 14 days, then the full 3 dose course of therapy should be restarted.

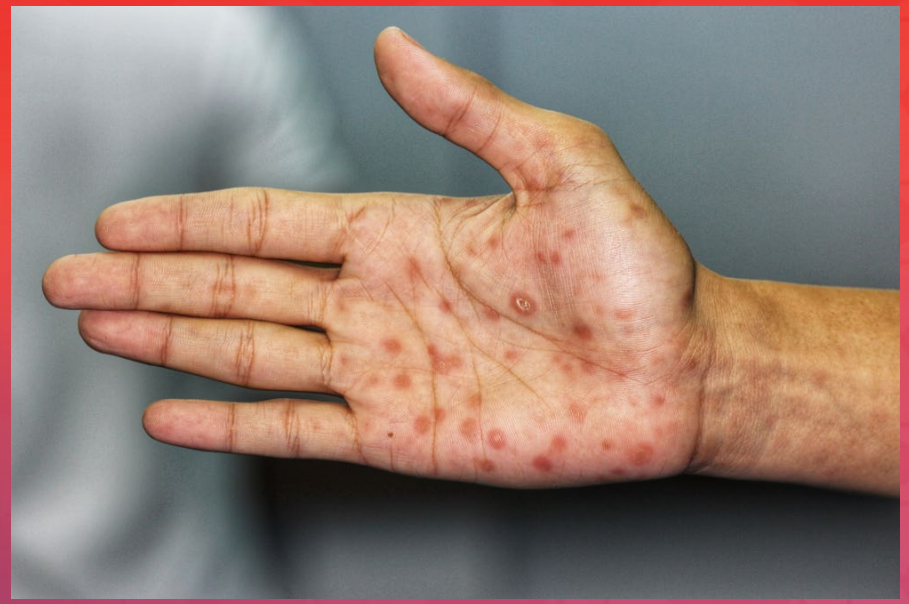
Δ Penicillin G benzathine 2.4 million units IM once per week for up to 3 weeks may be administered after completion of IV penicillin G treatment to provide a comparable total duration of therapy as latent syphilis.

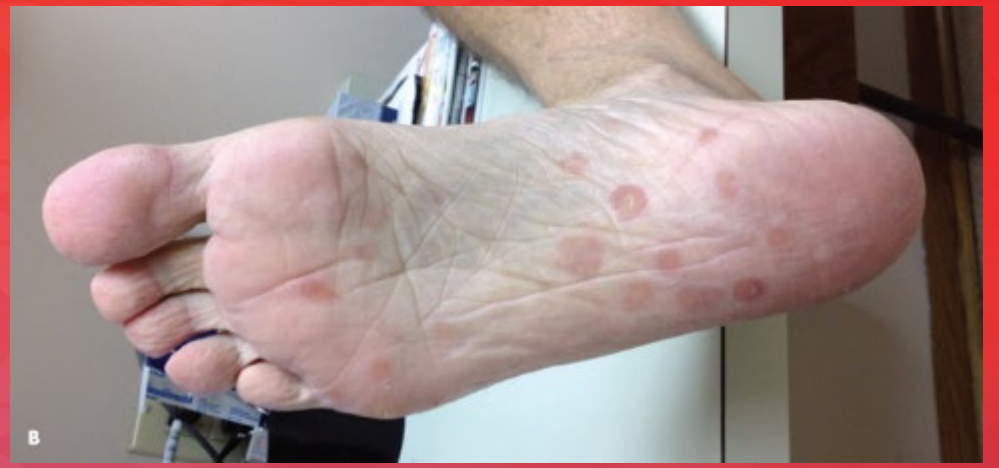





DermNet



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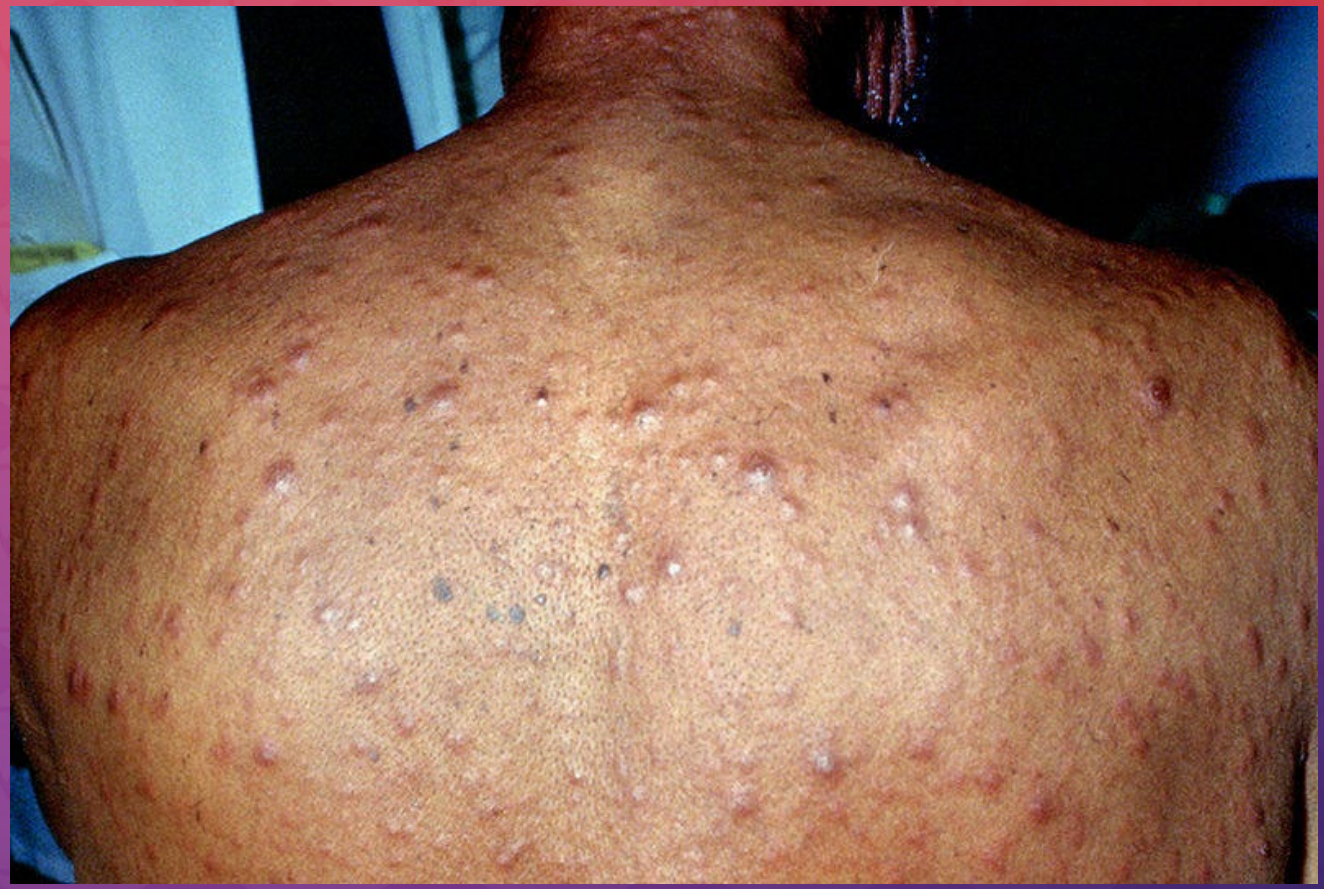


Trichomonas

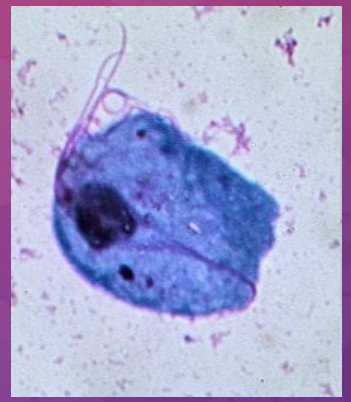
Manifestations of Trichomonas vaginalis

- Females
  - Purulent, malodorous, thin vaginal discharge with associated burning, pruritus, dysuria, frequency, and/or dyspareunia
  - Associated with a range of adverse reproductive health outcomes
    - Posthysterectomy cuff cellulitis or abscess
    - Pelvic inflammatory disease
    - Infertility
    - Preterm birth
  - May also increase susceptibility to HIV-1 infection and other STIs
- Males
  - Majority of infections are asymptomatic and often transient (spontaneous resolution within 10 days)
  - Minority of infections can persist for months
  - Clear or mucopurulent urethral discharge and/or dysuria

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Diagnosis of Trichomonas vaginalis

- Preferred test for T. vaginalis infection is nucleic acid amplification tests (NAATs, performed on vaginal or penile discharge)
- Microscopic evaluation of vaginal discharge that confirms motile trichomonads
- Culture and liquid-based cervical cytology can diagnose trichomonas but are not preferred tests because of lower sensitivity compared with NAATs



STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Treatment of Trichomonas vaginalis

- Females
  - Preferred (including pregnant patients)
    - Metronidazole 500 mg PO BID for 7 days
      - Metronidazole 2 grams PO once if compliance is a concern (less effective)
    - Metronidazole vaginal gel is NOT effective
  - Other
    - Nonpregnant patients
      - Tinidazole 2 grams PO once
      - Secnidazole 2 grams PO once
    - Pregnant patients
      - do not use tinidazole or secnidazole during pregnancy, especially in the first trimester, as data from human pregnancies are limited and studies in animals suggest risk
    - Allergy to 5-nitroimidazole drugs
      - Given the low efficacy of alternate drug therapies, patients with an IgE-mediated allergy to metronidazole or tinidazole should be referred for desensitization rather than using an alternative class of drugs
- Males
  - Single-dose treatment with metronidazole, tinidazole, or secnidazole (2 g orally given once)
  - Single-day therapy with an oral 5-nitroimidazole is easier to use compared with multi-dose regimens
  - Although treatment efficacy may be lower with single-dose metronidazole compared with multi-dose regimens, the available data are inadequate to make a definitive conclusion
- Concerns with alcohol ingestion and metronidazole
  - Previous guidelines and package label inserts have recommended avoiding alcohol ingestion while taking metronidazole due to a potential disulfiram-like reaction associated with 5-nitroimidazoles. However, several authors have reviewed the cases that are the basis of these reports and have not identified any convincing data to suggest that this is a true association

STI Guidelines

https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Treatment of Trichomonas vaginalis in HIV-positive patients

- Females
  - Metronidazole 500 mg BID for 7 days
    - single-dose metronidazole is not used in this population given the high prevalence of asymptomatic bacterial vaginosis coinfection
    - Single-dose oral metronidazole has been shown to be less effective in this population
- Males
  - Same treatment regardless of HIV status.

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Trichomonas vaginalis Other Considerations

- Management of sexual partners
  - Concurrent treatment for trichomoniasis rather than observation
  - Expedited partner therapy (EPT)
- Follow-up testing
  - Females
    - Repeat testing at 3 months
  - Males
    - No clear recommendation

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Mycoplasma genitalium

Manifestations of Mycoplasma genitalium

- Important cause of nongonococcal urethritis in males, cervicitis in females, possibly pelvic inflammatory disease in females, possibly proctitis in men who have sex with men
- Men
  - Urethritis that is typically symptomatic
- Females
  - Cervicitis that is frequently asymptomatic

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Diagnosis of Mycoplasma genitalium

- Nucleic acid amplification testing (first-catch urine, vaginal swab, rectal swab)
- Whom to test
  - Symptomatic patients with urethritis, cervicitis, pelvic inflammatory disease, and proctitis with persistent symptoms despite empiric treatment for chlamydia/gonorrhea

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Treatment of Mycoplasma genitalium

- Relatively limited susceptibility to antibiotic agents
  - The main active agents are azithromycin and certain fluoroquinolones, although resistance is an issue for each to varying degrees
  - As a class, mycoplasmas are largely susceptible to tetracyclines, but M. genitalium is an exception to this generalization
  - Although the organism appears susceptible to the tetracyclines in vitro, microbiologic treatment failures to doxycycline range from 60 to 70 percent
- Nonpregnant patients
  - Doxycycline 100 mg BID for 7 days followed by moxifloxacin 400 mg orally daily for 7 days
  - For patients who cannot use moxifloxacin, doxycycline (as above) followed by high-dose azithromycin for 4 days (1 g once followed by 500 mg daily the next three days)
- Pregnant patients
  - High-dose azithromycin treatment (1 g on day 1 followed by 500 mg daily on days 2 through 4)

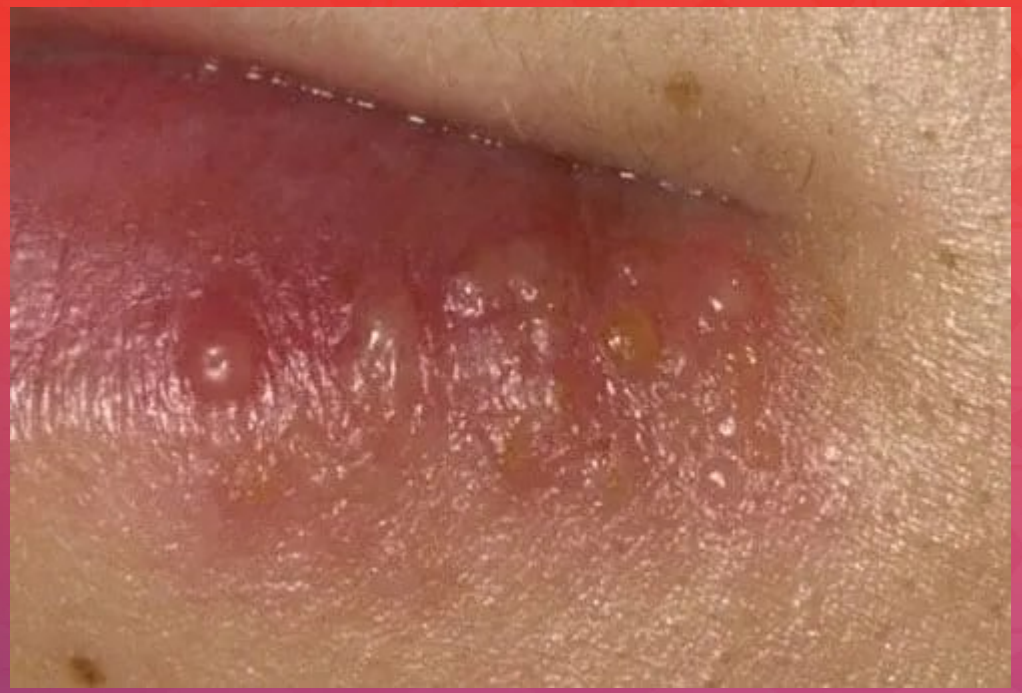
STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

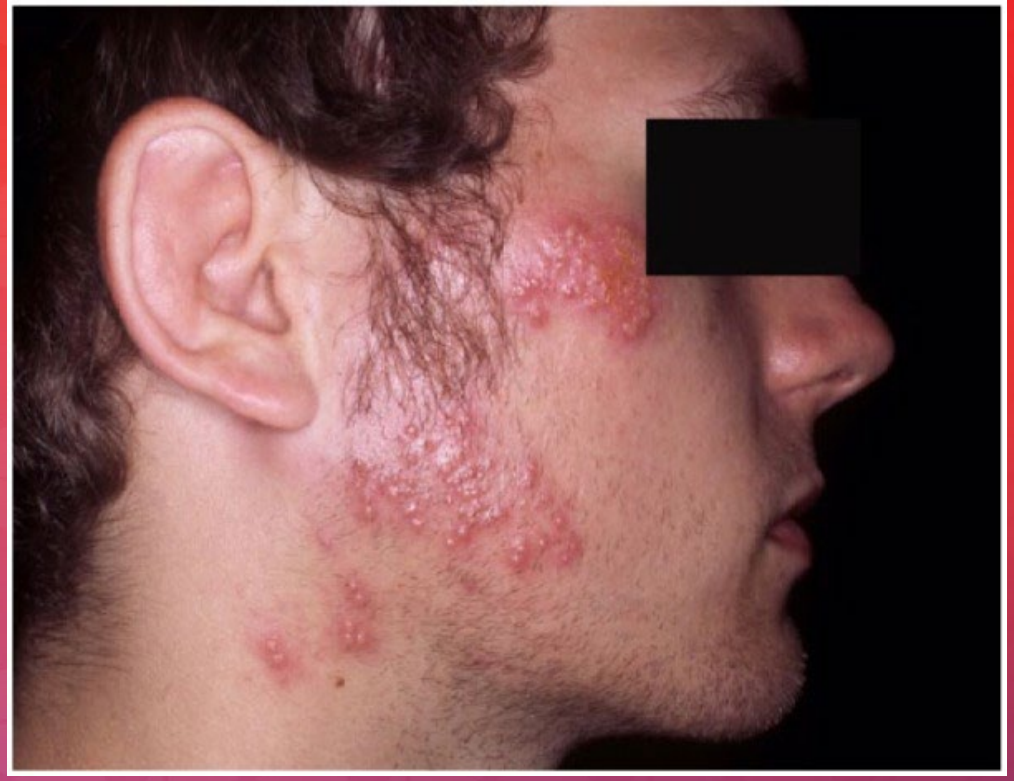
Herpes Simplex

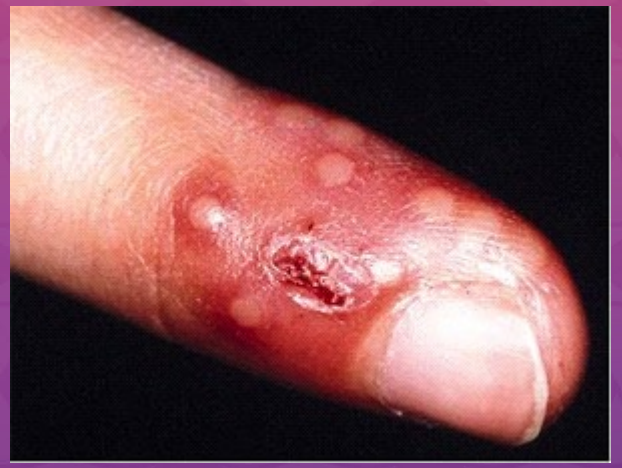
Manifestations of Herpes Simplex Type 1 Infection

- Painful (syphilis chancre is painless)
- Gingivostomatitis and pharyngitis
- Primary genital HSV-1
- Cutaneous
  - Herpetic whitlow, herpes gladiatorum ("mat herpes"), erythema multiforme, eczema herpeticum
- Ocular
- Severe disease
  - Encephalitis, meningitis, hepatitis, respiratory tract infections, esophagitis

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf







Diagnosis of HSV-1

- PCR is the most sensitive test
- Serology can be inaccurate

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Treatment of HSV-1

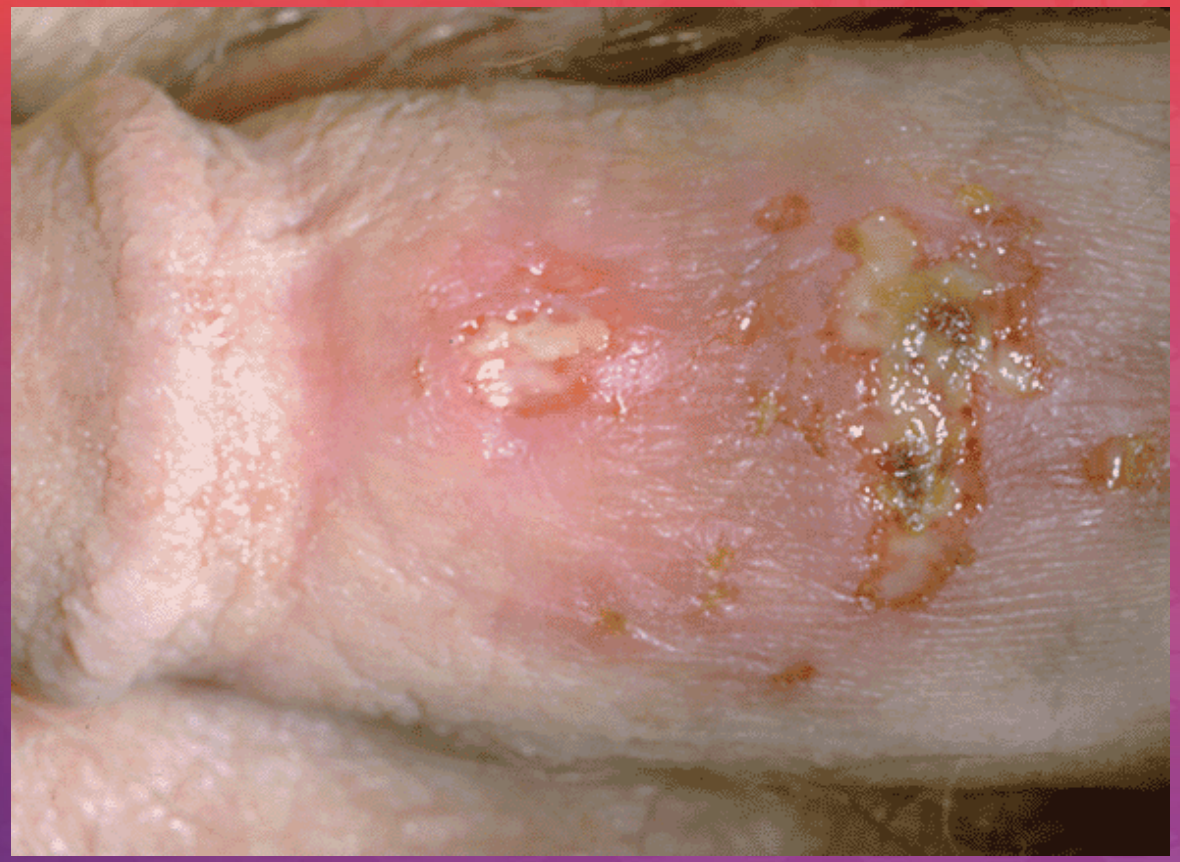
- Primary infection
  - Valacyclovir 1 gram TWICE daily for 7-10 days started within the first 72 hours of symptoms
- Recurrent outbreaks
  - Mild to moderate symptoms/occasional outbreaks
    - Episodic treatment
      - Valacyclovir 2 grams TWICE daily for 1 day
  - Severe symptoms/frequent outbreaks (6 or more episodes a year)
    - Suppressive treatment
      - Valacyclovir 500 mg daily
        - Can increase dose to valacyclovir 1 gram daily if patient continues to have breakthrough episodes

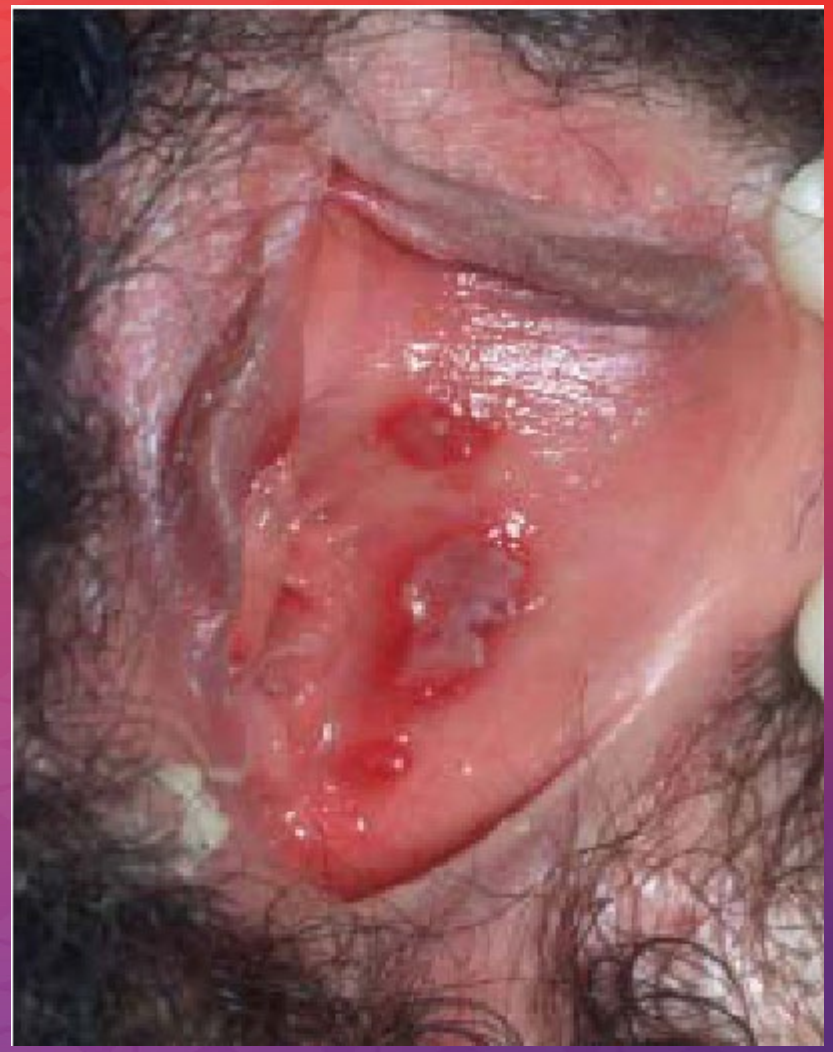
STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Manifestation of HSV-2

- Painful (syphilis chancre is painless)
- Gential infection
- Oral infection
- Extragenital infection
  - Aspetic meningitis (Mollaret's meningitis), urinary bladder retention due to sacral autonomic nervous system dysfunction, proctitis

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf





Diagnosis of HSV-2

- PCR is most sensitive
- Serology can be inaccurate

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

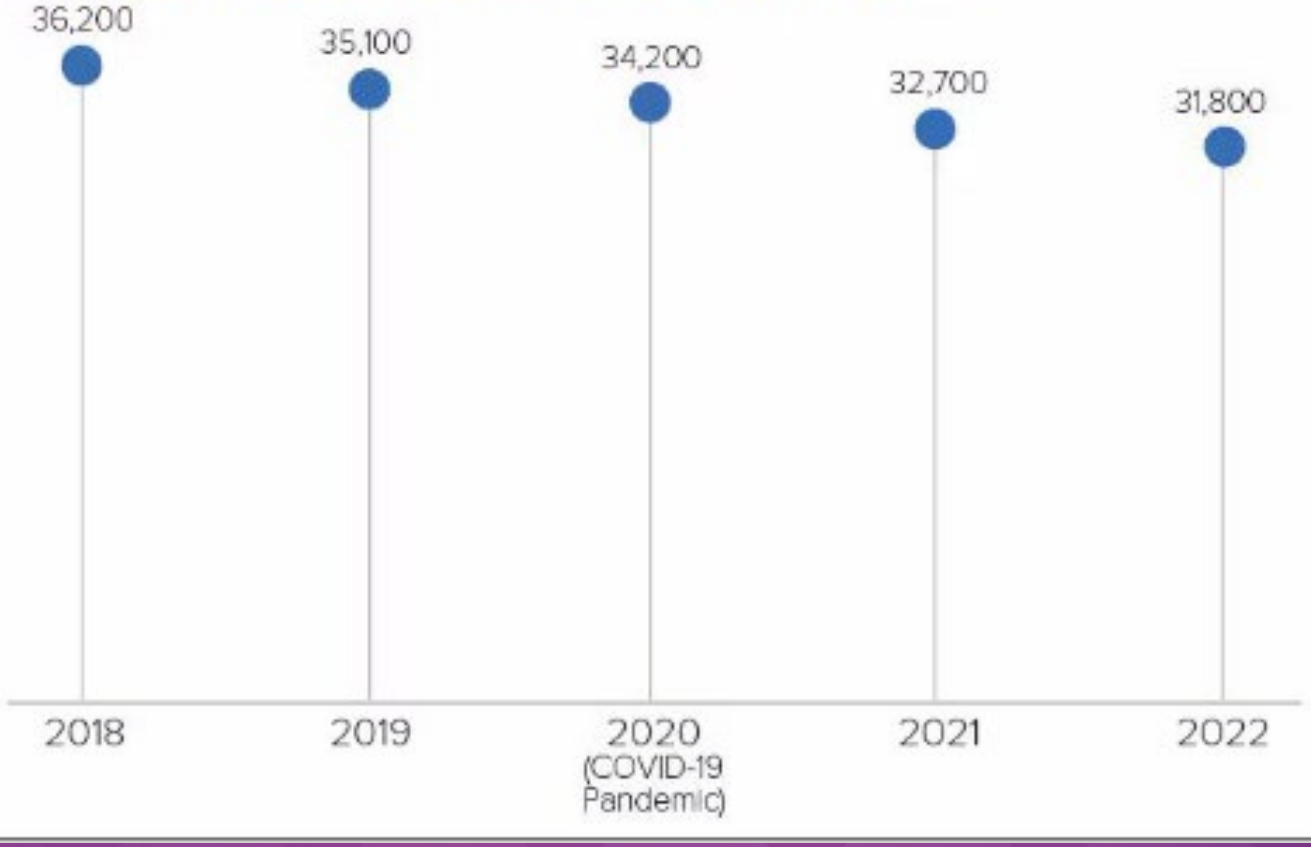
Treatment of HSV-2

- Primary infection
  - Valacyclovir 1 gram TWICE daily for 7-10 days started within the first 72 hours of symptoms
- Recurrent outbreaks
  - Mild to moderate symptoms/occasional outbreaks
    - Episodic treatment
      - Valacyclovir 500 mg twice daily for 3 days
      - Valacyclovir 1 gram once daily for 5 days
  - Severe symptoms/frequent outbreaks (6 or more episodes a year)
    - Suppressive treatment
      - Valacyclovir 500 mg daily
        - Can increase dose to valacyclovir 1 gram daily if patient continues to have breakthrough episodes

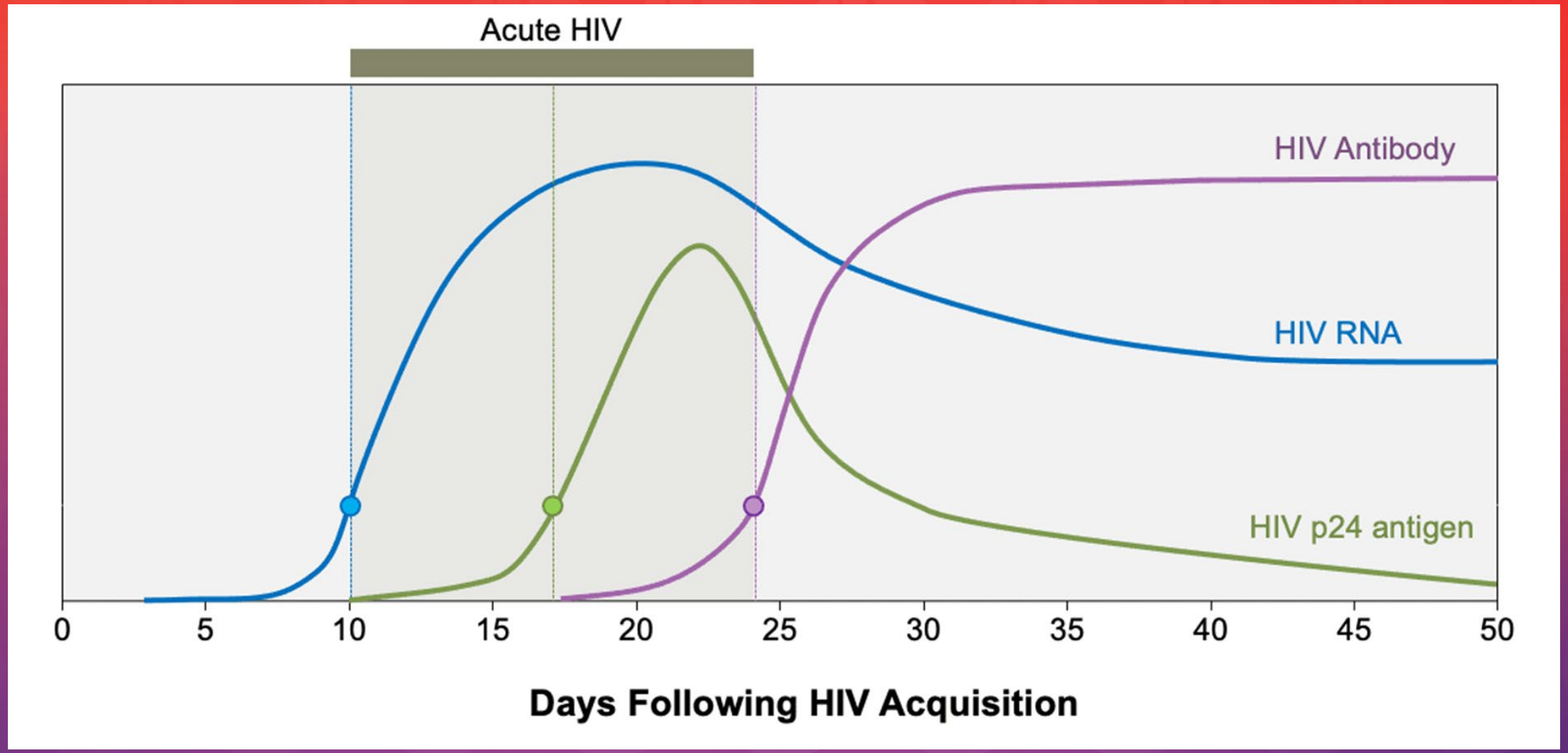
STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

HIV Infection

Progress in HIV prevention continues with an overall 12% decline in estimated HIV infections from 2018 to 2022.



https://www.hiv.gov/hiv-basics/overview/data-and-trends/statistics



https://www.hiv.uw.edu/go/screening-diagnosis/diagnostic-testing/core-concept/all

Testing for HIV

- 4th-generation HIV test (p24 antigen and HIV antibody)
- US Preventive Services Task Force recommends that everyone between the ages 13 and 64 get tested for HIV at least once.
  - People at higher risk should be tested more often
- People with symptoms of acute HIV infection (fever, lymphadenopathy, oral ulcers, rash)
  - 4th-generation HIV test AND HIV PCR
- People with recent diagnosis of STI (chlamydia, gonorrhea, syphilis)
- People at risk
  - Men and transgender women who have sex with men
  - Persons who inject drugs
  - Persons who exchange sex for money or drugs
  - Persons who have sex partners with uncontrolled HIV
  - Persons from regions with generalized HIV epidemics who have condomless sex

HIV Guidelines
https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-arv/whats-new

Common medications interact with some HIV drugs

- Multivitamins
- Proton pump inhibitors
- H2-blockers
- Steroids (systemic and inhaled)
- Drug interactions search engine/Epic

HIV Guidelines
https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-arv/whats-new

Hepatitis A, B, C

Hepatitis A, B, C

- HAV can be a sexually transmitted disease due to oral to anal sex
- HBV and HCV are transmitted like HIV through body fluids
- Screening
  - HAV antibody total
  - HBV core antibody total, HBV surface antigen, HBV surface antibody
  - HCV antibody
- Prevention
  - Single-antigen inactivated HAV vaccine (0, 6 months)
  - Recombinant HBV vaccine with CpG-adjuvanted (0, 1 month)
  - Combined HAV/HBV vaccine (0, 1, 6 months)

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Monkeypox

Monkeypox Outbreak in 2022

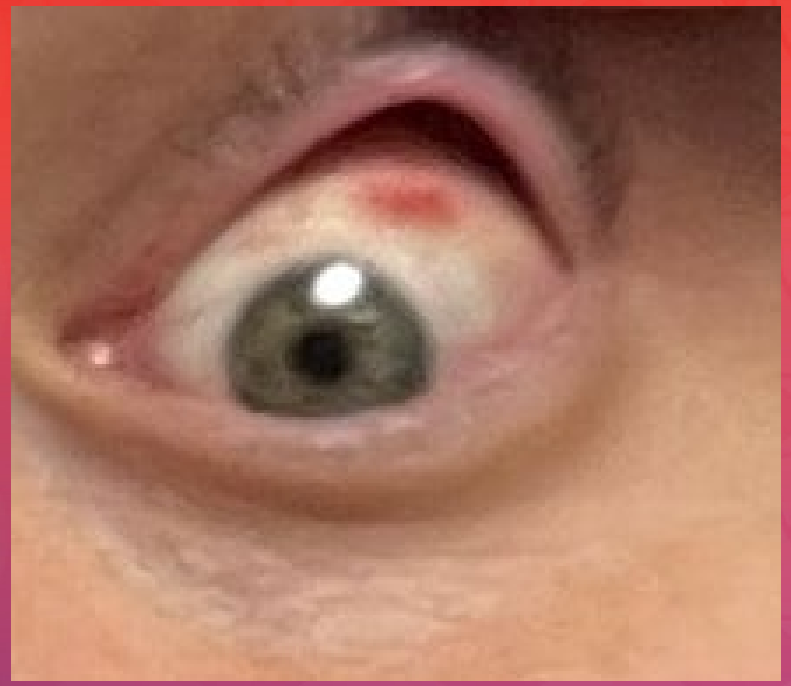
- Orthopoxvirus that is in the same genus as variola (the causative agent of smallpox) and vaccinia viruses (the virus used in the smallpox vaccine)
- Clade 1 originated in Congo Basin and Clade 2 originated in West Africa
  - Clade 2 is less severe and responsible for the 2022 outbreak
- Clade 2 spread to Europe, Great Britain, and US in May 2022
  - Nontravel-related cases
  - Transmitted by direct intimate contact
    - It is unclear to what degree monkeypox is spread through respiratory secretions
  - Most patients diagnosed with monkeypox in 2022 were men who have sex with men reporting high-risk sexual behavior as a risk factor.
    - Many early cases occurred in people who had attended an international pride event held on the Spanish island of Gran Canaria
    - There were some cases in cisgender women and transgender women as well
- First two cases in South Carolina diagnosed on July 8, 2022 in the Midlands and the Lowcountry
- First case in our clinic was diagnosed on July 26, 2022
  - PrEP patient who had just returned from a trip to German, The Netherlands, and Belgium
  - Patient admitted to attending sex parties in Europe

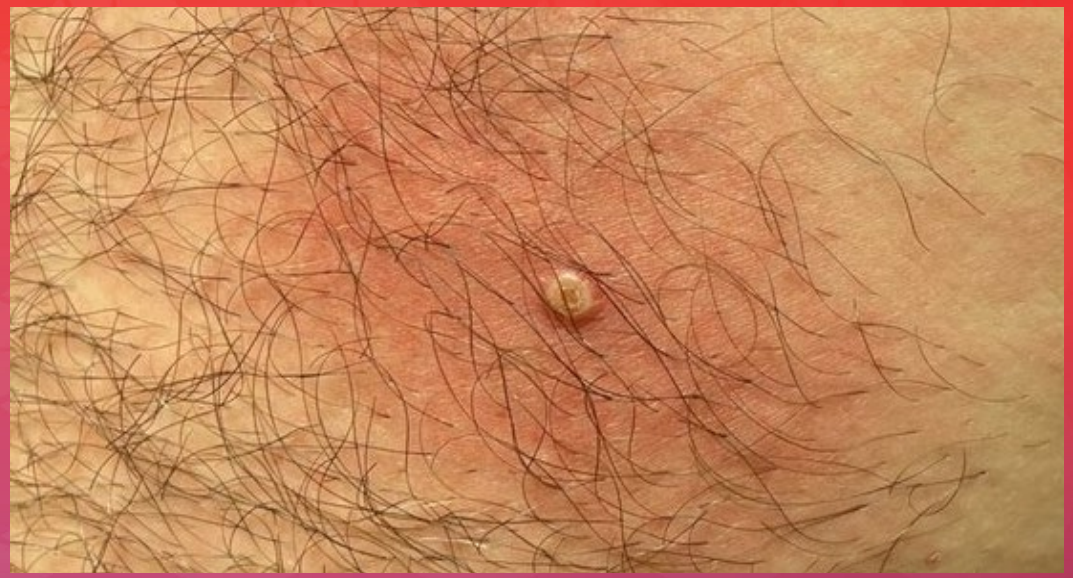
STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

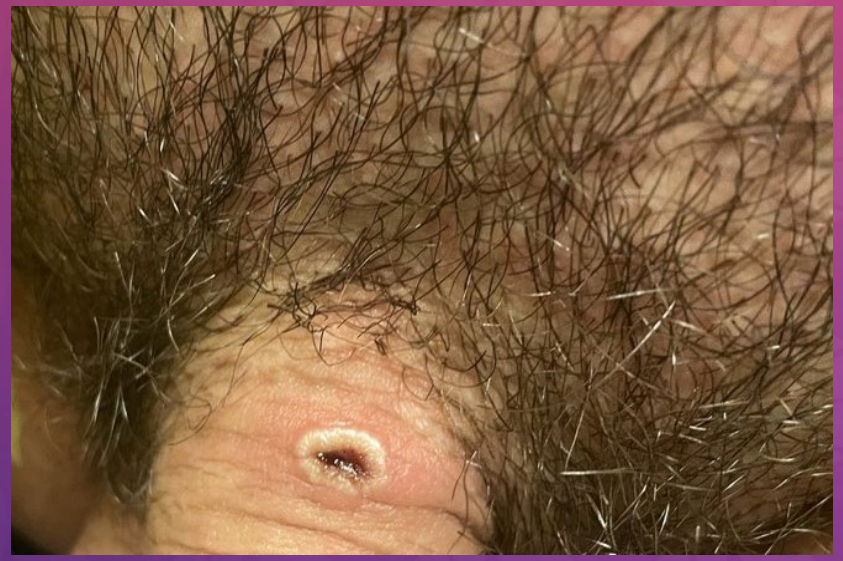
Clinical Manifestations of Monkeypox

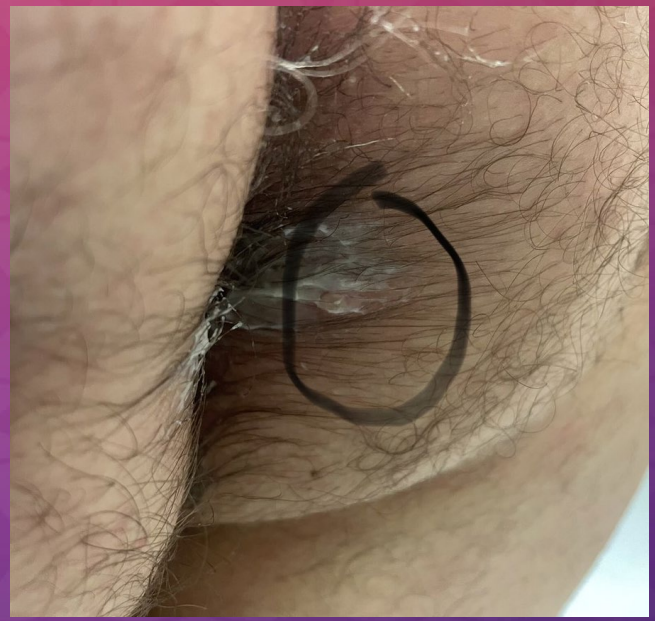
- Systemic illness that includes fevers, chills, and myalgias, with a characteristic rash (painful)
- Important to differentiate from that of other vesicular eruptions (eg, varicella, smallpox) and syphilis (painless ulcers)
- Rash typically begins as 2 to 5 mm diameter macules
- Lesions subsequently evolve to papules, vesicles, and then pseudo-pustules (papules that simulate pustules but are predominantly filled with cell debris and do not contain fluid or pus)
- Lesions are well circumscribed, deep seated, and often develop umbilication
- Lesions eventually crust over, and these crusts dry up and then fall off usually 7-14 days after the rash begins
- The lesions typically begin to develop simultaneously and evolve together on any given part of the body (like smallpox)
- Lesions concentrated in the anogenital, oral, perioral areas, ocular

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

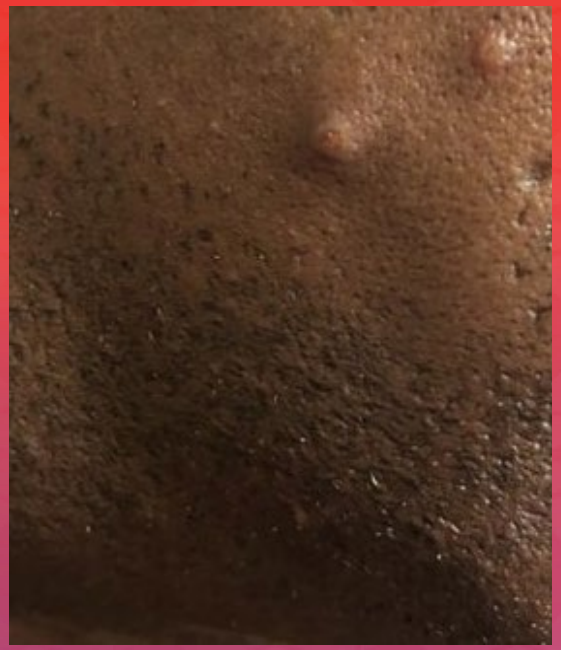


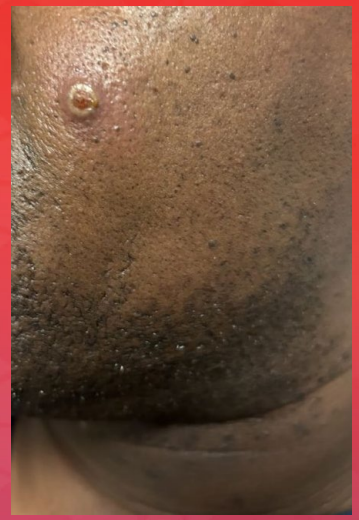


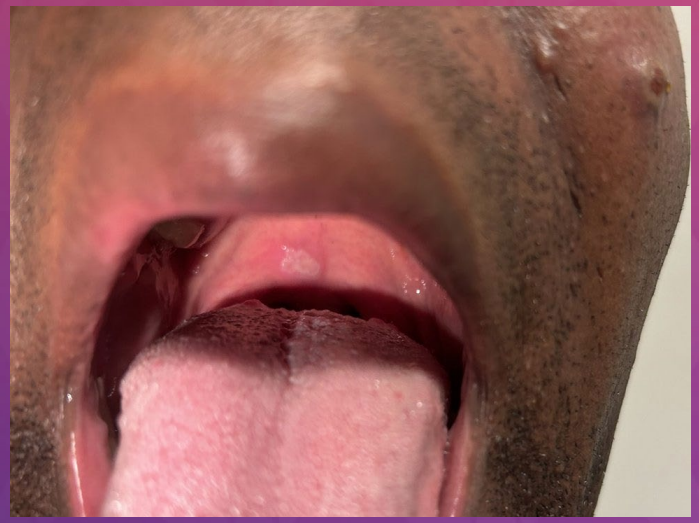


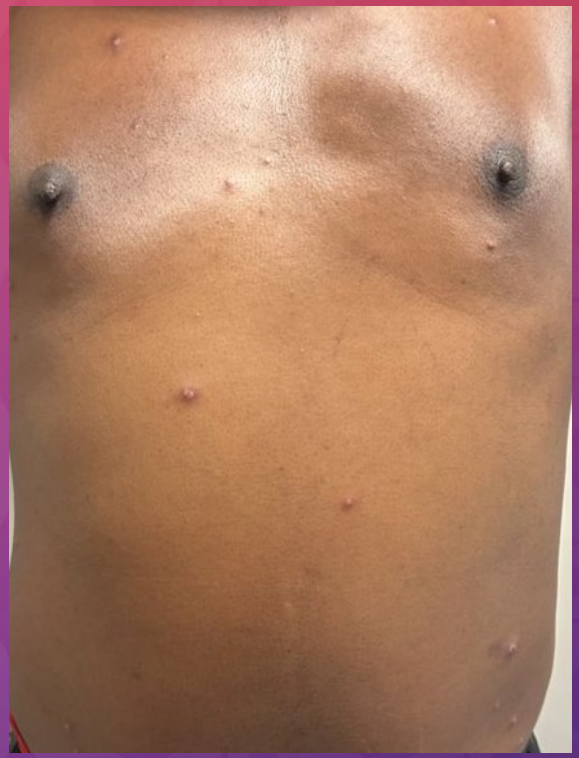


Source: Dr. Toby Fugate









Source: Dr. Toby Fugate

Diagnosis of Monkeypox

- Clinical presentation
- Swab for monkeypox PCR (available in Epic)
  - In questionable cases, screen for HSV and syphilis as well
- Notify Department of Public Health of any suspected cases

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Treatment of Monkeypox

- Candidates
  - Patients who are severely immunocompromised
  - Patients with active skin conditions placing them at higher risk for disseminated infection
  - Persons who are pregnant or lactating, regardless of illness severity or underlying comorbidities at presentation
  - Persons <18 years of age, regardless of illness severity or underlying comorbidities at presentation
  - Patients with protracted or life-threatening manifestations, including ocular disease
- Tecovirimat
  - Investigational drug available through CDC
  - 40 to < 120 kg: 600 mg every 12 hours taken with fatty meal
  - >/= 120 kg: 600 mg every 8 hours taken with fatty meal
  - Treat for 14 days
  - Adverse events: headache, nausea, and abdominal pain
  - Recent study by NIH showed that the drug did NOT improve resolution or pain
- Brincidofovir
  - Prodrug of cidofovir that can be given orally and has less nephrotoxicity than cidofovir
  - Available through an FDA single-patient emergency investigational drug (EIND) protocol
  - 200 mg suspension or tablet given once weekly for two weeks on an empty stomach
- Trifluridine eye drops/ointment
  - Applied every four hours for 7 to 10 days

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Monkeypox vaccine

- Modified vaccinia Ankara (MVA) vaccine is made from a highly attenuated, nonreplicating vaccinia virus and has an excellent safety profile, even in immunocompromised people and those with skin disorders
  - Two doses four weeks apart
  - Approved for the prevention of smallpox and monkeypox
  - Recommended for persons aged 18 years and older with any of the following risk factors for community-acquired monkeypox
    - Gay, bisexual, and other men who have sex with men, transgender, or nonbinary people who in the past six months have had one of the following
      - A new diagnosis of ≥1 sexually transmitted disease
      - More than one sex partner
      - Sex at a commercial sex venue
      - Sex in association with a large public event in a geographic area where mpox transmission is occurring
    - Sexual partners of persons with the risks described above
    - Persons who anticipate experiencing any of these risk factors
  - Available at our clinic and through South Carolina Department of Health

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

Human Papillomavirus

Human Papillomavirus (HPV)

- Most common STI in the US
- Condylomata
- Cancer
  - Cervical, vaginal, vulvar, penile, anal, and head/neck cancer
  - HPV 16 and 18
- Anal cancer is preceded by high-grade squamous intraepithelial lesions (HSIL)
- Treatment of HSIL with ablation prevents anal cancer

STI Guidelines
https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf

The NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

Treatment of Anal High-Grade Squamous Intraepithelial Lesions to Prevent Anal Cancer

Palefsky JM et al. DOI: 10.1056/NEJMoa2201048

CLINICAL PROBLEM

Anal cancer is caused by human papillomavirus infection and is preceded by high-grade squamous intraepithelial lesions (HSIL). Whether treatment of anal HSIL reduces progression to anal cancer is unknown.

CLINICAL TRIAL

Design: A multisite, randomized, U.S. trial examined the efficacy and safety of HSIL treatment for the prevention of anal cancer in adults living with HIV, a group disproportionately affected by anal cancer.

Intervention: 4446 participants 35 years of age or older with HSIL and without a history of anal cancer received either HSIL treatment until complete resolution (e.g., office-based ablation, ablation or excision under anesthesia, or topical therapies) or active monitoring without treatment. Participants in the treatment group returned for high-resolution anoscopy at least every 6 months, suspicious lesions were biopsied, and recurrences were treated. Participants in the active-monitoring group underwent anoscopy every 6 months, and visible lesions were biopsied annually. The primary outcome was progression to anal cancer in a time-to-event analysis.

RESULTS

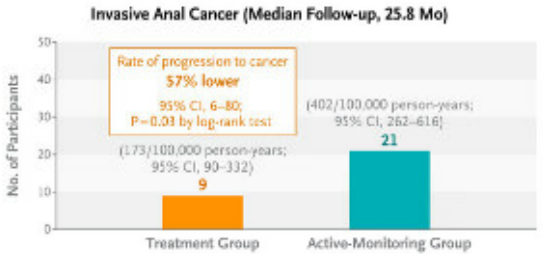
Efficacy: During a median follow-up of roughly 26 months, the rate of progression to anal cancer was significantly lower in the treatment group than in the active-monitoring group.

Safety: Trial-related serious adverse events were uncommon.

LIMITATIONS AND REMAINING QUESTIONS

- HSIL treatment did not prevent all cancers, which underscores the need for close follow-up and for more effective treatments.
- The results may not be generalizable to settings in which high-resolution anoscopy and treatment are performed by clinicians with less training and support.
- Additional research is warranted to improve screening algorithms for identifying anal HSIL.

Links: Full Article | NEJM Quick Take



CONCLUSIONS

Among adults living with HIV who had anal HSIL, treatment of HSIL reduced the risk of progression to anal cancer, with a low incidence of serious adverse events.

HPV Vaccine

- All persons up through age 26 years: 2- or 3-dose series depending on age at initial vaccination or condition
  - Age 9-14 years at initial vaccination and received 1 dose or 2 doses less than 5 months apart: 1 additional dose
  - Age 9-14 years at initial vaccination and received 2 doses at least 5 months apart: HPV vaccination series complete, no additional dose needed
  - Age 15 years or older at initial vaccination: 3-dose series at 0, 1-2 months, 6 months (minimum intervals: dose 1 to dose 2: 4 weeks / dose 2 to dose 3: 12 weeks / dose 1 to dose 3: 5 months; repeat dose if administered too soon)
- Adults age 27-45 years: Based on shared clinical decision-making, complete a 2-dose series (if initiated age 9-14 years) or 3-dose series (if initiated ≥15 years)
- Special situations
  - Immunocompromising conditions, including HIV infection

https://www.cdc.gov/vaccines

HIV Pre-Exposure Prophylaxis (PrEP)

HIV Pre-Exposure Prophylaxis (PrEP)

- The use of HIV PrEP with antiretroviral therapy (ART) for those without HIV has proven to be an effective HIV prevention strategy
- Among persons who are adherent to treatment, HIV PrEP can reduce the risk of HIV transmission by greater than 99 percent, although rare infections may still occur
- Less than one-third of people who meet HIV PrEP indications have ever been prescribed PrEP

PrEP Guidelines
https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf

Estimated per-act risk for acquisition of HIV, by exposure route

Exposure route		Risk per 10,000 exposures to an infected source (risk)
Blood-borne exposure	Blood transfusion	9000 (9/10)
	Needle-sharing injection drug use	67 (1/150)
	Percutaneous needle stick	23 (1/435)
	Mucous membrane exposure to blood (eg, splash to eye)	10 (1/1000)
Sexual exposure	Receptive anal intercourse	138 (1/72)
	Insertive anal intercourse	11 (1/900)
	Receptive penile-vaginal intercourse	8 (1/1250)
	Insertive penile-vaginal intercourse	4 (1/2500)
	Receptive or insertive penile-oral intercourse	0-4
Other	Biting, spitting, throwing body fluids (including semen and saliva), sharing sex toys	Negligible

There are scant empiric data on per contact risk of exposure. This table lists the estimated risk by exposure type in the absence of antiretroviral treatment of the HIV-infected source and in the absence of amplifying factors. Most of these estimates are derived through modeling studies of different cohorts. Clinicians need to be aware that estimates of sexual risk are often based on studies of monogamous couples among whom amplifying factors have been treated and repeated exposure may offer as yet unexplained protection from infection. Using a single value for assessing risk of HIV transmission based on route of sexual exposure fails to reflect the variation associated with important cofactors. A variety of amplifying factors and conditions have been identified, and these factors can be expected to increase transmission probability.

Data from:

1. *Donegan E, Stuart M, Niland JC, et al. Infection with human immunodeficiency virus type 1 (HIV-1) among recipients of antibody-positive blood donations. Ann Intern Med 1990; 113:733-9.*
2. *Baggaley RF, Boily MC, White RG, Alary M. Risk of HIV-1 transmission for parenteral exposure and blood transfusion: A systematic review and meta-analysis. AIDS 2006; 20:805.*
3. *Kaplan EH, Heimer R. HIV incidence among New Haven needle exchange participants: updated estimates from syringe tracking and testing data. J Acquir Immune Defic Syndr 1995; 10:175-6.*
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5. *Cohen MS. Amplified transmission of HIV-1: Missing link in the HIV pandemic. Trans Am Clin Climatol Assoc 2006; 117: 213–225.*
6. *Centers for Disease Control and Prevention, US Department of Health and Human Services. Updated Guidelines for Antiretroviral Postexposure Prophylaxis After Sexual, Injection Drug Use, or Other Nonoccupational Exposure to HIV—United States, 2016.*

Candidates for HIV PrEP

- Anyone who asks for HIV PrEP
- Any person who has a sexual partner with HIV and a detectable viral load
- Men who have sex with men
- Women who have engaged in condomless receptive vaginal or anal sex with male partners who are at high risk of HIV infection (eg, persons who inject drugs, bisexual male partners, persons who exchange money for sex) or have been diagnosed with a STI
- People who inject drugs and report sharing needles/equipment in the last six months

PrEP Guidelines
https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf

Options for HIV PrEP

- Oral
  - Tenofovir disoproxil fumarate 300 mg-emtricitabine 200 mg (TDF-FTC) PO once daily
  - Tenofovir alafenamide 25 mg-emtricitabine 200 mg (TAF-FTC) PO once daily
- Injectable
  - Cabotegravir LA 600 mg (3 mL) IM into the gluteal muscle monthly for two months and then every two months thereafter
  - For those who are concerned about side effects of long-acting injectable cabotegravir, oral cabotegravir (30 mg once daily) can be administered for a four-week lead-in period prior to initiating injections.

PrEP Guidelines
https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf

Factors to consider when choosing a PrEP regimen

	Benefits	Risks	Additional considerations
TDF-FTC	▪ Well tolerated. ▪ Most studied regimen and can be used in all populations. ▪ Can be administered as event-driven therapy for persons who engage only in anal sex (unless they have concurrent chronic HBV infection).	▪ Can result in reduced kidney function. ▪ Can result in bone loss. ▪ For patients with chronic HBV, they are at risk for flare of their liver disease if therapy is discontinued.	▪ TDF should not be used in persons with an eGFR <60. ▪ Patients require monitoring of creatinine on therapy.
TAF-FTC	▪ Well tolerated. ▪ Less bone and renal toxicity compared with TDF.	▪ Should only be administered as daily therapy. ▪ Higher rates of mild triglyceride elevations and weight gain compared with TDF-FTC. ▪ Should not be used in those whose main risk for HIV is vaginal (frontal) sex or who inject drugs. ▪ Less experience compared with TDF, particularly in certain populations (eg, adolescents). ▪ For patients with chronic HBV, they are at risk for flare of their liver disease if therapy is discontinued.	▪ Has not been well studied for PrEP in persons who engage in vaginal (frontal) sex, pregnant persons, or those who inject drugs. ▪ There are no data evaluating event-driven dosing in those taking TAF-FTC.
Cabotegravir LA	▪ Well tolerated. ▪ Administered every other month. ▪ Clinical trials suggest efficacy greater than TDF-FTC (possibly related to improved adherence). ▪ Can be considered for patients with conditions that are associated with an increased risk of adverse events with TDF-FTC or TAF-FTC (eg, those with reduced kidney function, bone disease)*.	▪ Cabotegravir LA has a long half-life (drug may be detectable in blood for more than a year). An oral agent (TDF-FTC or TAF-FTC) is required for a period of time when discontinuing cabotegravir LA injections to reduce the risk of developing an integrase inhibitor-resistant strain if HIV infection is acquired when cabotegravir levels are suboptimal*. ▪ Future HIV treatment options (ie, use of an integrase strand transfer inhibitor) may be limited if HIV infection occurs and resistance to cabotegravir develops. ▪ Need to be near a center that administers cabotegravir LA so doses are not missed. ▪ Injection site reactions (generally mild).	▪ For those who are concerned about side effects of cabotegravir LA, oral cabotegravir (30 mg once daily) can be administered for a 4-week lead-in period prior to initiating injections. ▪ There are only limited data in persons who are pregnant or who desire pregnancy. ▪ Cabotegravir LA has not yet been studied in persons who inject drugs.

This table should be used in conjunction with UpToDate content on pre-exposure prophylaxis.

PrEP: pre-exposure prophylaxis; TDF-FTC: tenofovir disoproxil fumarate-emtricitabine; HBV: hepatis B virus; TAF-FTC: tenofovir alafenamide-emtricitabine; LA: long-acting injectable formulation.

* For patients with an absolute contraindication to TDF-FTC or TAF-FTC, consistent condom use or abstinence is required for a period of time if cabotegravir LA is discontinued.

Graphic 140045 Version 2.0

Evaluation of patients prior to initiation of oral pre-exposure prophylaxis (PrEP) against HIV[1-3]

Before initiating PrEP

Determine eligibility*

- Document negative HIV test(s) (typically antigen/antibody test) within one week of starting PrEP medication
- Test for acute HIV infection with HIV RNA if patient has symptoms consistent with acute HIV infection or has had a known exposure to HIV in the last 4 weeks
- Confirm that patient is at ongoing, high risk for acquiring HIV infection based upon detailed sexual and drug use history and results of STI testing*
- Confirm that calculated estimated glomerular filtration rate is ≥30 mL/min/1.73 m^2 ¶Δ

Other tests to determine risks of PrEP

- Screen for HBV◇ and HCV§
- Obtain urinalysis in patients with risk factors for renal disease¥
- Perform DXA scan in patients with, or at high risk for, osteoporosis‡
- Obtain baseline lipid panel and weight if TAF-FTC is being considered for PrEP†
- Perform pregnancy testing for patients who could become pregnant

Beginning PrEP medication regimen

- Prescribe 1 tablet of TDF-FTC or TAF-FTC daily Δ
- In general, prescribe no more than a 90-day supply, renewable only after HIV testing confirms that patient remains HIV uninfected
- Provide counseling on condoms,** risk reduction for sexual and drug-using behaviors, and PrEP medication adherence

This table addresses the evaluation of patients prior to initiating oral PrEP with a tenofovir-containing regimen and should be used in conjunction with UpToDate content on PrEP.

Evaluation of patients prior to initiation of oral pre-exposure prophylaxis (PrEP) against HIV[1-3]

DXA: dual-energy x-ray absorptiometry; FTC: emtricitabine; HBV: hepatitis B virus; HCV: hepatitis C virus; HIV: human immunodeficiency virus; PrEP: pre-exposure prophylaxis; STI: sexually transmitted infection.

* Some patients may request PrEP but not endorse specific risk factors for HIV acquisition. In this setting we typically administer PrEP, assuming there are no other contraindications, since some people may not feel comfortable disclosing HIV risk behaviors.

¶ Individuals with an estimated glomerular filtration rate (eGFR) <60 mL/min/1.73 m^2 are not candidates for PrEP with TDF-FTC. Individuals with an eGFR <30 ml/min/1.73 m^2 are not candidates for PrEP with either TDF-FTC or TAF-FTC. For such persons, injectable therapy with long-acting cabotegravir can be considered.

Δ Daily TDF-FTC is our preferred oral regimen for most patients. For men who have sex with men (MSM) without chronic HBV infection, on-demand/event driven PrEP with TDF-FTC (referred to as 2-1-1) is an alternative to daily PrEP. In addition, TAF-FTC is an alternative regimen for MSM and transgender women with renal and bone issues. Refer to the UpToDate topic on PrEP for additional information on regimen selection.

◇ Vaccinate against hepatitis B if susceptible. If chronic HBV is diagnosed, patients with chronic HBV should also be managed in conjunction with a specialist in the management of HBV. Although TDF-FTC or TAF-FTC can be used for both treatment of chronic HBV and HIV prevention, there is a theoretical risk that discontinuing therapy may result in a flare of HBV.

§ Persons who inject drugs and MSM who engage in high-risk sexual behaviors are at risk for HCV infection. Patients who test positive should be referred for treatment.

¥ It is reasonable to obtain a baseline urinalysis when starting TDF-FTC in patients with risk factors for renal disease, such as hypertension, diabetes, proteinuria, and prior history of renal insufficiency. This may help inform the choice of agent (TDF-FTC versus TAF-FTC) and be used for comparison when monitoring.

‡ Refer to the topic within UpToDate that discusses risk factors for osteoporosis.

† Although lipid testing and weight are not specifically recommended by guideline panels, in clinical trials, higher rates of triglyceride elevation and weight gain were seen among men taking TAF-FTC compared with those taking TDF-FTC.

** In addition to preventing sexually transmitted infections, condoms should be encouraged until adequate levels of tenofovir are achieved in the rectal and cervicovaginal tissues (eg, 7 days in patients engaging in anal sex and 21 days for women engaging in receptive vaginal sex).

References:

1. *Interim guidance: preexposure prophylaxis for the prevention of HIV infection in men who have sex with men. MMWR 2011; 60:65.*
2. *Interim Guidance for Clinicians Considering the Use of Preexposure Prophylaxis for the Prevention of HIV Infection in Heterosexually Active Adults. MMWR 2012; 61:586.*
3. *Preexposure Prophylaxis for the Prevention of HIV Infection in the United States (2021 Update) – Clinical Practice Guideline. United States Centers for Disease Control and Prevention. Available at: https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf (Accessed on August 26, 2022).*

Routine monitoring for patients on a stable PrEP regimen*

What to monitor	Frequency for patients receiving TDF-FTC or TAF-FTC	Frequency for patients receiving cabotegravir LA
▪ Perform an HIV test¶	Every 3 months	Every 2 months
▪ Evaluate and support PrEP medication adherence	Every 3 months	Every 2 months
▪ Assess for side effects	Every 3 months	Every 2 months
▪ Assess risk behaviors and provide risk-reduction counseling and condoms	Every 3 months	Every 2 months
▪ Assess pregnancy status for patients who could become pregnant△	Every 3 months	Every 2 months
▪ Test for STIs among individuals with high-risk sexual behaviors, even if patient is asymptomatic◇	MSM and transgender women: Every 3 months All others: Every 6 months	MSM and transgender women: Every 4 months All others: Every 6 months
▪ Serum creatinine	Persons at risk for renal disease§¥: Every 6 months All others: Every 12 months	Routine monitoring not needed
▪ HCV testing	MSM, transgender women, persons who inject drugs: Every 12 months	MSM, transgender women, persons who inject drugs: Every 12 months
▪ Lipids and weight	Persons on TAF-FTC: Every 12 months	Routine monitoring not needed

This table addresses routine monitoring in patients on a stable PrEP regimen. Additional information on monitoring (eg, the first month after antiviral therapy is started, when therapy is discontinued) and management of adverse outcomes are discussed in the UpToDate topic review on PrEP.

Routine monitoring for patients on a stable PrEP regimen*

* For persons who are asymptomatic, routine monitoring can occur in conjunction with scheduled follow-up visits. Additional monitoring should be performed if there are specific concerns (eg, inconsistent adherence is identified, person has signs or symptoms of an STI or acute HIV infection).

¶ Patients receiving oral PrEP should have plasma HIV testing with a fourth-generation antigen/antibody test. We obtain RNA testing if the patient has signs or symptoms suggestive of acute HIV infection or has an indeterminate antigen/antibody test, although some experts recommend HIV RNA testing for monitoring all patients on oral PrEP.

For patients receiving cabotegravir LA, our approach is generally consistent with the United States Centers for Disease Control and Prevention (CDC), which recommends that HIV RNA testing be performed in addition to an antigen/antibody test to monitor for HIV. However, this many not always be feasible (eg, due to cost or availability). In these settings, an antigen/antibody test alone is reasonable for those who have not missed doses and are without evidence of acute HIV infection. If testing is consistent with new HIV infection, clinicians should order and document results of resistance testing and establish immediate linkage to HIV care. PrEP regimens are not sufficient for treatment of HIV.

Δ Oral PrEP can be used in pregnancy after an informed decision is made. Refer to the UpToDate topic that discusses PrEP for information on regimen selection.

◇ STI screening should include serum testing for syphilis and screening for gonorrhea and chlamydia at mucosal sites with potential exposures (eg, throat, rectum, urogenital). Refer to the topic that discusses screening for STIs within UpToDate.

§ Discontinue oral PrEP if there is evidence of moderate or severe proximal tubular dysfunction or Fanconi syndrome. In other settings the approach must be individualized. As an example, TDF-FTC should be discontinued in persons whose estimated glomerular filtration rate falls below 60 mL/minute/1.73 m^2 but switching to TAF-FTC or cabotegravir LA may be reasonable.

¥ The United States CDC states risk factors for renal disease include age 50 and older and/or having an estimated creatinine clearance <90 mL/minute. We also consider hypertension, diabetes, proteinuria, and prior history of renal insufficiency as risk factors for renal disease. For such patients, we obtain a urinalysis every six months in addition to monitoring the creatinine. More frequent monitoring may be required for those who develop abnormal findings.

Reference:

1. *Preexposure Prophylaxis for the Prevention of HIV Infection in the United States – 2021 Update: A Clinical Practice Guideline. Centers for Disease Control and Prevention. https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf (Accessed on August 26, 2022).*
2. *Gandhi RT, Bedimo R, Hoy JF, et al. Antiretroviral drugs for treatment and prevention of HIV infection in adults: 2022 recommendations of the International Antiviral Society-USA Panel. JAMA 2023; 329:63.*
3. *Consolidated Guidelines on HIV Prevention, Testing, Treatment, Service Delivery and Monitoring: Recommendations for a Public Health Approach. World Health Organization 2021. https://www.who.int/publications/i/item/9789240031593 (Accessed on May 24, 2022).*

Graphic 114770 Version 8.0

Discontinuing HIV PrEP

- Persons receiving oral PrEP
  - It is unclear how long patients should continue oral PrEP after their last sexual exposure
    - For men who have sex with men, we typically continue PrEP for two days after their last sexual exposure based on the efficacy of the 2-1-1 event-driven PrEP regimen
    - For other populations, we continue PrEP for one month after the last high-risk exposure based upon experiences using post-exposure prophylaxis (PEP)
    - For patients with chronic HBV infection, the decision to switch to an alternative agent for treatment of HBV after PrEP is discontinued or to monitor for HBV flare should be discussed with a provider experienced in the management of HBV
- Persons receiving cabotegravir LA
  - Patients who discontinue injectable PrEP but continue to engage in high-risk sexual behaviors or sharing of injection equipment should receive oral PrEP with TDF-FTC or TAF-FTC for at least 12 months to cover the period when levels of cabotegravir are detectable but not protective. This will reduce the risk of developing drug-resistant HIV should transmission occur. They should be encouraged to continue PrEP thereafter if they continue to engage in high-risk behaviors

PrEP Guidelines
https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf

Doxycycline Post-Exposure Prophylaxis (Doxy PEP)

Doxycycline Post-Exposure Prophylaxis (Doxy PEP)

- Doxycycline 200 mg taken once orally within 72 hours of condomless oral, anal, or vaginal sex, with a maximum dose of 200 mg each day
- Indicated for men who have sex with men and transgender women who have a history of bacterial STI in the prior 12 months
  - Limited data DO NOT suggest that Doxy PEP is effective for cisgender women, possibly because of adherence challenges
- In three large randomized controlled trials, Doxy PEP has been shown to reduce syphilis and chlamydia infections by >70% and gonococcal infections by approximately 50%
- Persons who are prescribed doxy PEP should undergo bacterial STI testing at anatomic sites of exposure at baseline and every 3–6 months thereafter

https://www.cdc.gov/postexposureprophylaxis

Sources

- Guidelines for Screening, Diagnosis & Treatments for STI
  - https://www.cdc.gov/std/treatment-guidelines/STI-Guidelines-2021.pdf
- Guidelines for Screening, Diagnosis & Treatment for HIV
  - https://clinicalinfo.hiv.gov/en/guidelines/hiv-clinical-guidelines-adult-and-adolescent-arv/whats-new
  - https://www.hiv.uw.edu/go/screening-diagnosis/diagnostic-testing/core-concept/all
- Guidelines for Treatment for PrEP
  - https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2021.pdf
- Guidelines for Vaccine
  - https://www.cdc.gov/vaccines
- Guidelines for Post-Exposure Prophylaxis
  - https://www/cdc.gov/postexposureprophylaxis
- Palefsky et al. Treatment of Anal High-Grade Squamous Intraepithelial Lesions to Prevent Anal Cancer. N Engl J Med 2022;386:2273-2282
- All photos unless otherwise indicated are from UpToDate.com

Questions