Practicing Evidence-based Medicine in Managing STIs

Medical Education

Objectives

Learning objectives that will be discussed during this program

- Public health concern of sexually transmitted infections (STIs)
- Universal screening and implementation
- Symptomatic STI testing and management including trichomoniasis
- *Mycoplasma genitalium* testing and treatment

Public Health Concern

Nearly half of new STIs were among youth aged 15-24.[1]

Infection rates for the three most commonly reportable STIs (Chlamydia, Gonorrhea, and Syphilis)

increased for the sixth year in a row to an all-time high of

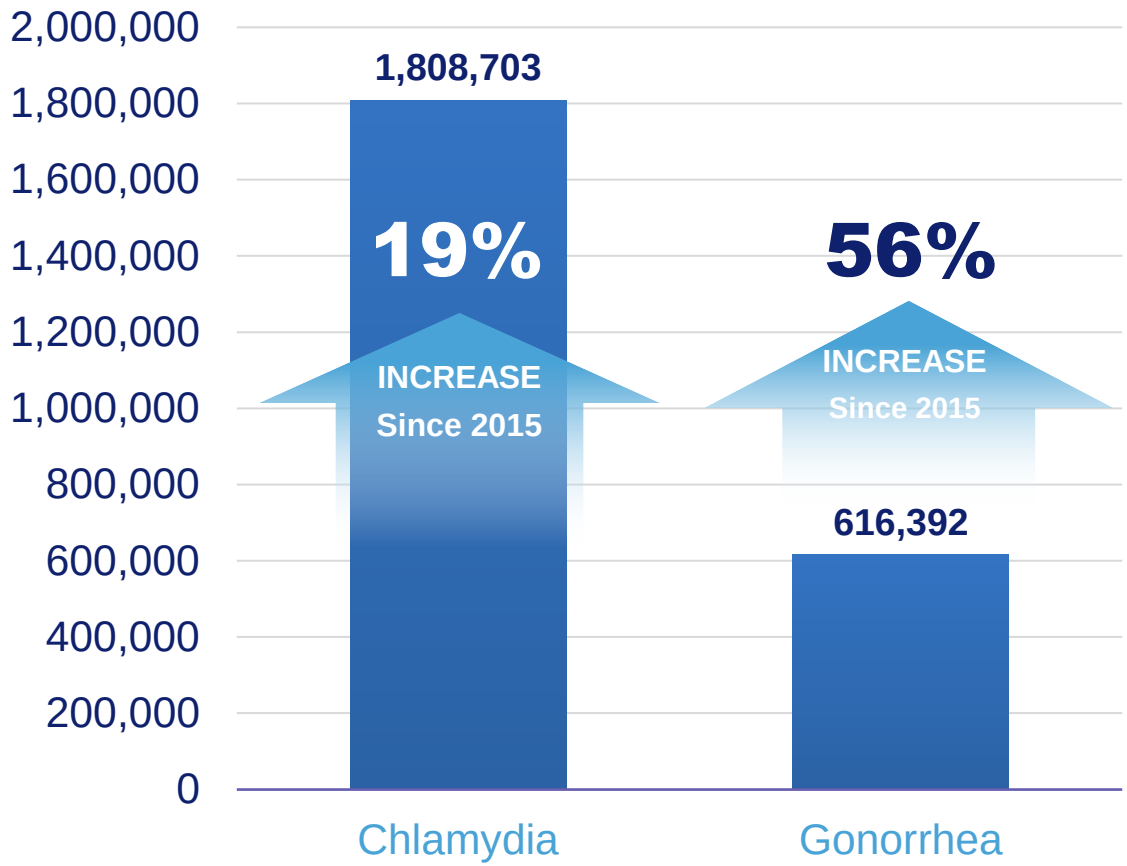
2.5 million

new cases.[2]

1. Centers for Disease Control and Prevention. Adolescents and Young Adults. Last Reviewed April 8, 2021. Accessed April 27, 2021. https://www.cdc.gov/std/life-stages-populations/adolescents-youngadults.htm **2.** Centers for Disease Control and Prevention. Reported STDs in the U.S. reach all-time high for 6th consecutive year. Last reviewed April 13, 2021. Accessed April 27, 2021. http://www.cdc.gov/std/statistics/2019/default.htm.

There Is an Increase in CT and NG Prevalence

Cases Reported in 2019



Chlamydia Rates Are Highest in Adolescents and Young Adults

Centers for Disease Control and Prevention. Reported STDs in the U.S. reach all-time high for 6th consecutive year. Last reviewed April 13, 2021. Accessed April 27, 2021. http://www.cdc.gov/std/statistics/2019/default.htm.

Untreated Infections Can Lead to PID and Infertility[1]

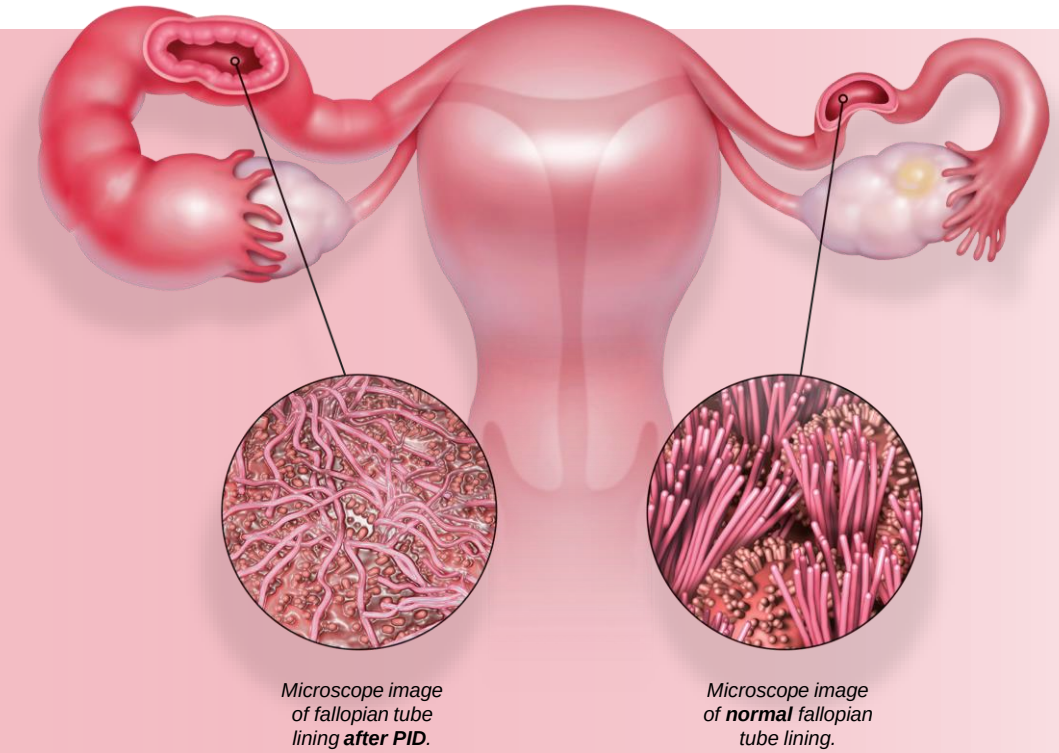
As many as

30%

of **undiagnosed and uncured chlamydia infections** progress to pelvic inflammatory disease (PID).[2]

PID can lead to:

- **Infertility**
- **Chronic pelvic pain**
- **Ectopic pregnancy**



*Microscope image of fallopian tube lining **after PID**.*

*Microscope image of **normal** fallopian tube lining.*

24,000

women become **infertile** each year due to undiagnosed STIs.[3]

1. Soper DE. Pelvic inflammatory disease. *Obstet Gynecol.* 2010;116 (2):419-428. doi:10.1097/AOG.0b013e3181e92c54. 2. Swain GR, McDonald RA, Pfister JR, Gradus MS, Sedmak GV, Singh A. Decision analysis: Point-of-care chlamydia testing vs. laboratory-based methods. *Clin Med Res.* 2004;2(1):29-35. doi:10.3121/cmr.2.1.29. 3. CDC. Sexually Transmitted Infections Among Young Americans. Published April 2013. Accessed October 15, 2020. https://www.cdc.gov/std/products/infographics/images/Youth-STI-Infographic_620.jpg

Universal Screening Focuses on Asymptomatic Patients

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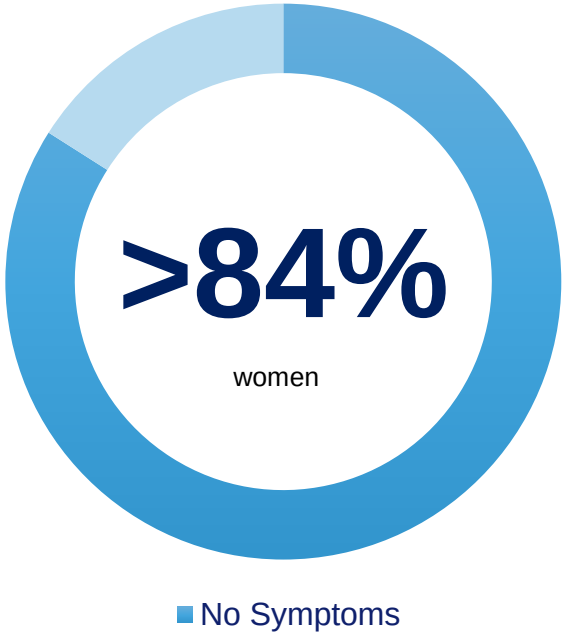
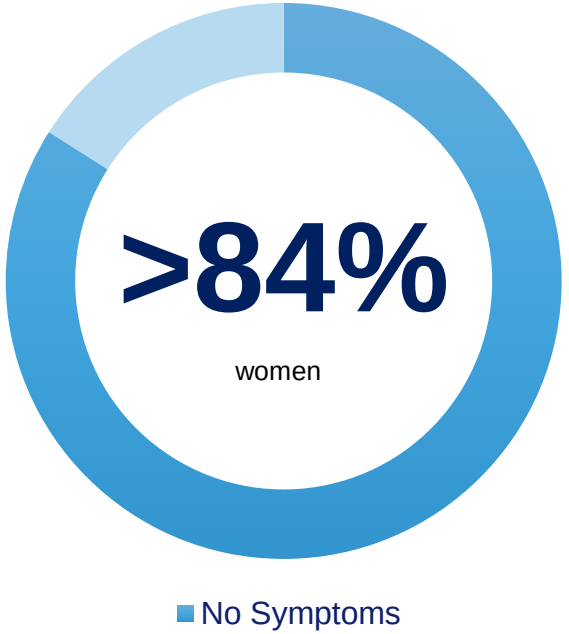
Chlamydia



Gonorrhea



Asymptomatic and Unaware leads to **Undiagnosed and Untreated**

Detels, Roger et al. "The incidence and correlates of symptomatic and asymptomatic Chlamydia trachomatis and Neisseria gonorrhoeae infections in selected populations in five countries." Sexually transmitted diseases vol. 38,6 (2011): 503-9.

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Consensus Guidelines

Young, sexually active women should be screened ANNUALLY for chlamydia and gonorrhea

CDC [1]	ACOG [2]	USPSTF [3]	American Academy of Pediatrics [4]	U.S. Department of Heath and Human Services [5]
<25 WOMEN sexually active or all women	**<25 WOMEN** sexually active	**<25 WOMEN** sexually active	**<25 WOMEN** sexually active	**<25 WOMEN** sexually active or all women
≥25 WOMEN increased risk*	**≥25 WOMEN** increased risk*	**≥25 WOMEN** increased risk*	**≥25 WOMEN** increased risk*	**≥25 WOMEN** increased risk*

* Those who have a new sex partner, more than one sex partner, a sex partner with concurrent partners, or a sex partner who has a sexually transmitted infection.

1. Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70. 2. ACOG. Chlamydia, Gonorrhea, and Syphilis. Published February 2019. Accessed October 15, 2020. https://www.acog.org/womens-health/faqs/chlamydia-gonorrhea-and-syphilis. 3. USPSTF Final Recommendation Statement on Chlamydia and Gonorrhea Screening. September 2014. Accessed October 15, 2020. . 4. American Family Physician. AAP Releases Policy Statement on Screening for Nonviral Sexually Transmitted Infections in Adolescents and Young Adults. *Am Fam Physician.* 2015;91(9):652- 654. 5. U.S. Department of Health and Human Services. 2020. Sexually Transmitted Infections. National Strategic Plan for the United States: 2021–2025. Washington, DC. 5. United States Preventive services taskforce. Draft recommendation: Screening For chlamydia and gonorrhea. www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/chlamydia-and-gonorrhea-screening. Published March 2, 2021. Accessed April 15, 2021.

Current Screening Rates

According to a recent HEDIS report:

59%

of sexually active young women, 15-24 years old, are screened annually for chlamydia.[1]

How can we continue to improve screening rates in young women?

U.S. Department of Health and Human Services. 2020. *Sexually Transmitted Infections National Strategic Plan for the United States: 2021–2025*. Washington, DC

Risk-Based Screening = Missed Opportunity

Current Risk-Based Screening Protocol

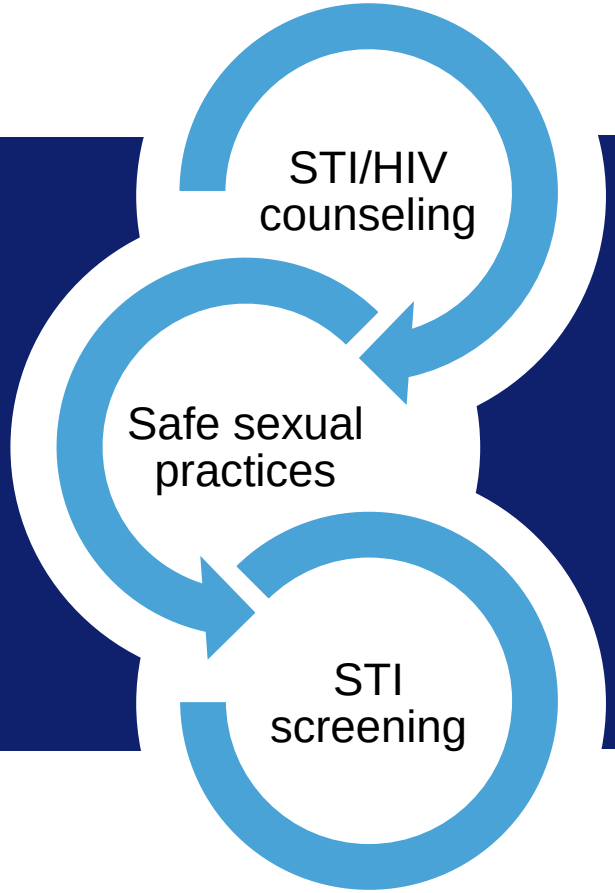
- Patients' sexual history is taken to identify sexually active women who should be tested.
- Cases of CT and NG were found in patients who reported abstinence
- Healthcare providers request permission to test, asking "Do you want to be screened today?"

Owusu-Edusei K, et al. Cost- Effectiveness of Opt-Out Chlamydia Testing for High-Risk Young Women in the U.S. *Am J Prev Med.* 2016;51(2):216-24. doi:10.1016/j.amepre.2016.01.007.

Many Parents Are Accepting of STI Screening

63%

of parents accept STI screening for their adolescent during a pediatric visit

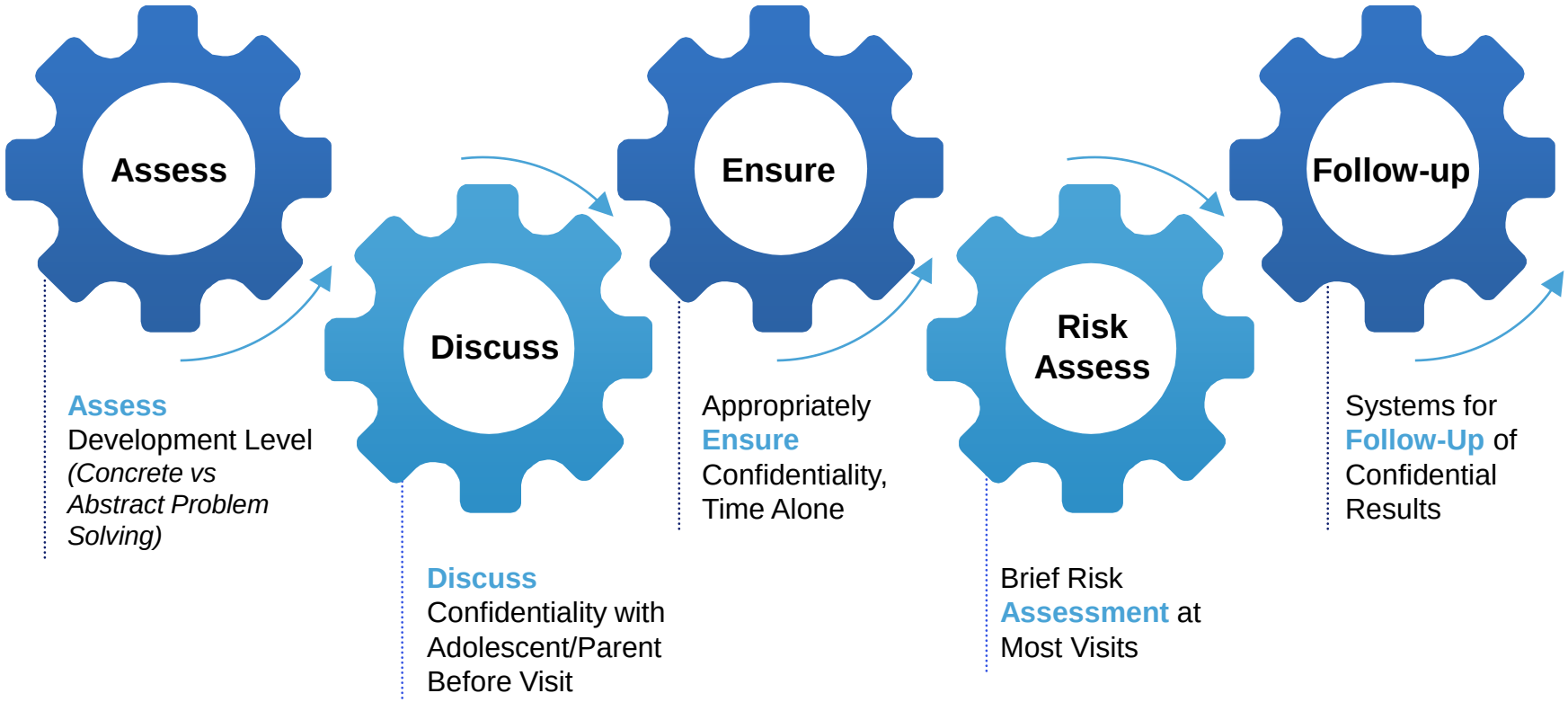


73%

of parents think it is important that adolescents spend time alone with their provider

K. Lane et al. *Journal of Adolescent Health 66* (2020) 626-628 August 2019

Improving Communication with Adolescents



Multiple Barriers to Screening

HCP Barriers

- Assumption of low risk
- Time consuming
- Concerns about adolescent confidentiality
- Desire to avoid difficult conversations
- Reimbursement

+

Patient Barriers

- Assumption of low risk
- Embarrassment/stigma
- Parent in room
- Access to testing

=

Missed Opportunity for Diagnosis

1.8%

of patients who reported no sexual partners in the last year ***tested positive for chlamydia***[1]

Prevalence of Chlamydia by Number of Sex Partners in the Last Year[1]

No. of Sex Partners	Chlamydia Prevalence (%)
0	1.8%
1	1.4%
≥2	3.2%

Torrone E, et al., Morbidity and Mortality Weekly Report. MMWR 2014;63: [p.834-837]

Screening At-Risk Patients:
The Way We Speak Is Critical

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"Opt-in"

*"Did you **want to** be screened today?"*

"Do you think you need to be tested?"

Risk-based Screening Strategy

"Opt-out"

*"We **recommend** screening."*

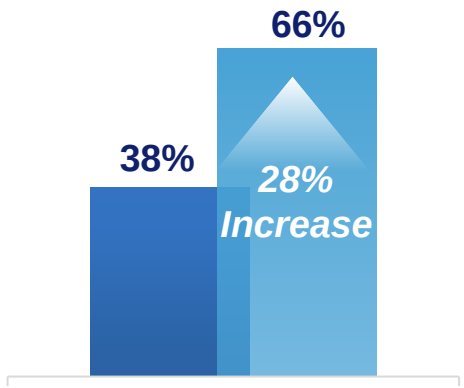
*"I talk to **all** my patients about chlamydia screening as part of preventive health."*

Universal Screening Strategy

Opt-out Testing Works

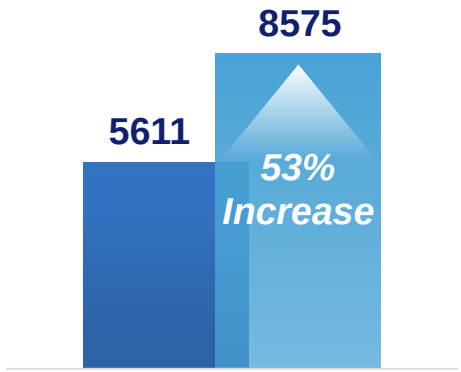
Lessons from HIV Opt-out Testing

Emergency Departments[1]



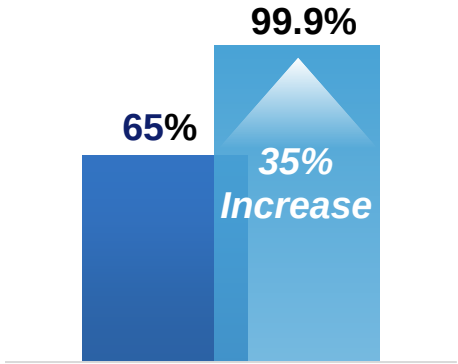
% of Patients Tested for HIV

Family Planning[2]



Number of HIV Tests/Year

Antenatal Care[3]



% of Patients Tested for HIV

Opt-in Opt-out

*Not to scale.

1. Montoy JCC, Dow WH, Kaplan BC. Patient choice in opt-in, active choice, and opt-out HIV screening: Randomized clinical trial. *BMJ*. 2016;352. doi: 10.1136/bmj.h6895. 2. Buzi RS, Madanay FL, Smith PB. Integrating routine HIV testing into family planning clinics that treat adolescents and young adults. *Public Health Rep.* 2016;131 Suppl 1:130-138. 3.Chandisarewa W, Stranix-Chibanda L, Chirapa E, et al. Routine offer of antenatal HIV testing ("opt-out" approach) to prevent mother-to-child transmission of HIV in urban Zimbabwe. *Bull World Health Org.* 2007;85(11):843-850.

Identifying sexually active young women is difficult

Considering opt-out reduces barriers to screening

2021 CDC STI Treatment Guidelines, pg. 14

"**Providers might consider opt-out chlamydia and gonorrhea screening** (i.e., the patient is notified that testing will be performed unless the patient declines, regardless of reported sexual activity) for adolescent and young adult females during clinical encounters. Cost-effectiveness analyses indicate that opt-out chlamydia screening among adolescent and young adult females might substantially increase screening, be cost-saving, and identify infections among patients **who do not disclose sexual behavior.**"

Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70

Universal Screening: An Inclusive Solution

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"We are going to test you today"

- *Healthcare provider*

Universal Screening Decreases STI prevalence

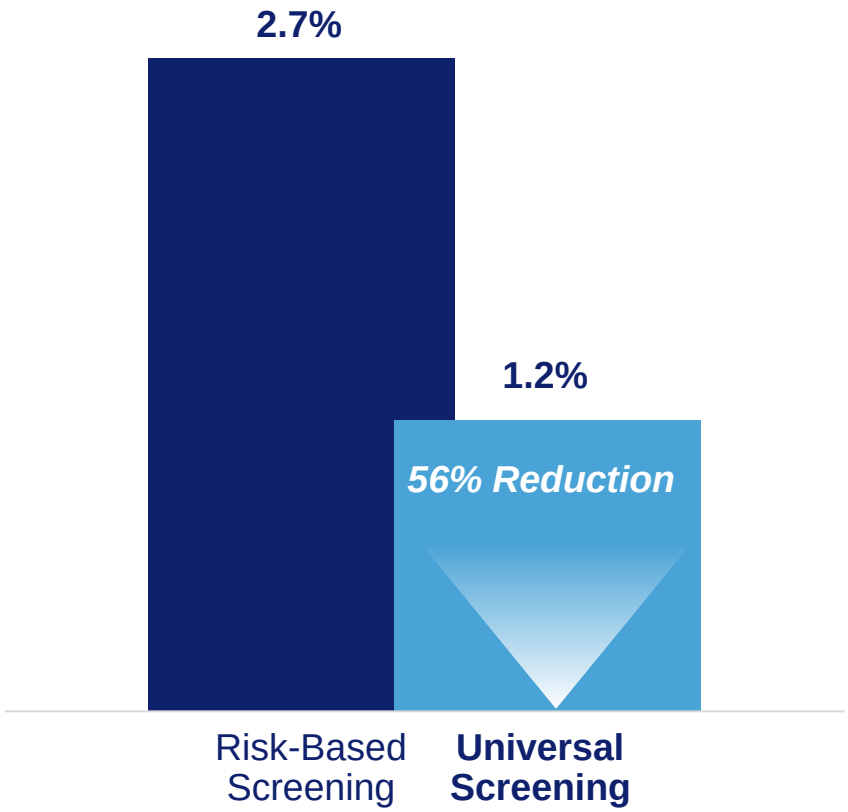
Universal Screening Protocol

- This strategy targets all young women within the high-risk age group covered by USPSTF and CDC guidelines (15-24 years), ***without regard to their reported sexual activity.***
- All young women **aged 15-24 years** are eligible for testing unless their records are flagged at check-in as having had a negative test within the past 12 months, or they declined to be tested.

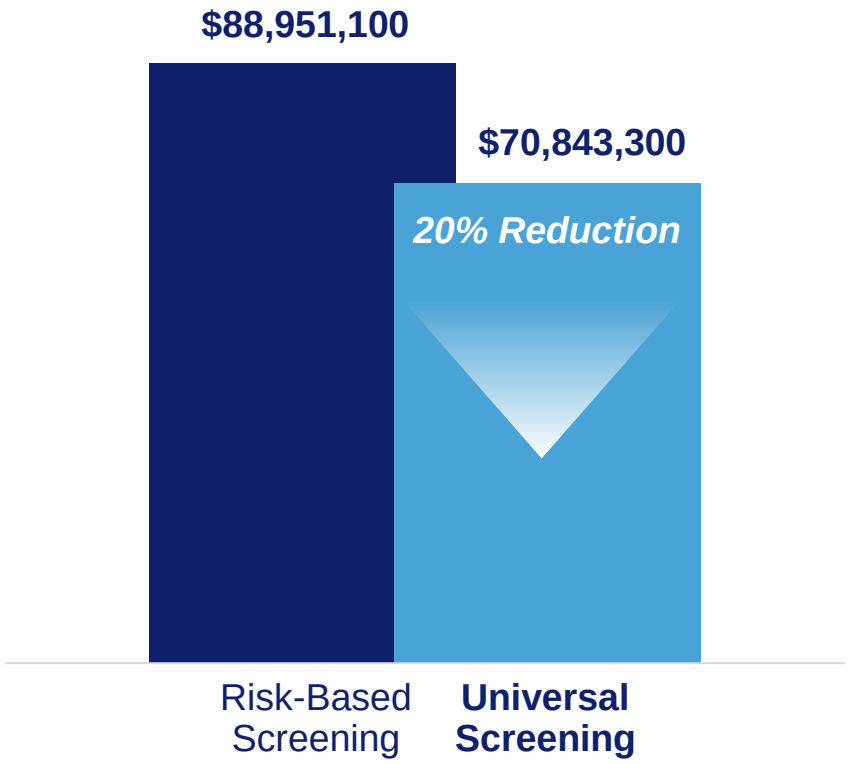
Owusu-Edusei K, et al. Cost- Effectiveness of Opt-Out Chlamydia Testing for High-Risk Young Women in the U.S. *Am J Prev Med*. 2016;51(2):216-24. doi:10.1016/j.amepre.2016.01.007.

Universal Screening: An Effective Strategy[1]

Chlamydia Prevalence



Total Cost for Hypothetical Population of 100,000 Individuals (15-24 Years)



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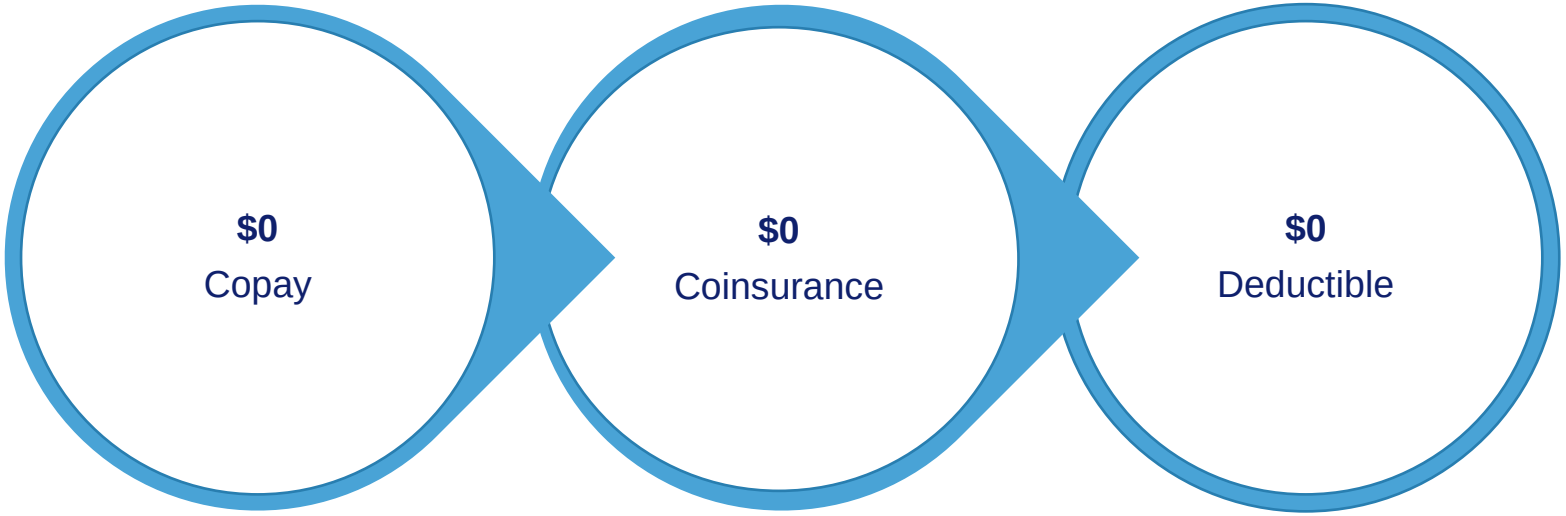
Owusu-Edusei K, et al. Cost- Effectiveness of Opt-Out Chlamydia Testing for High-Risk Young Women in the U.S. *Am J Prev Med*. 2016;51(2):216-24. doi:10.1016/j.amepre.2016.01.007.

Preventive Services through the Affordable Care Act



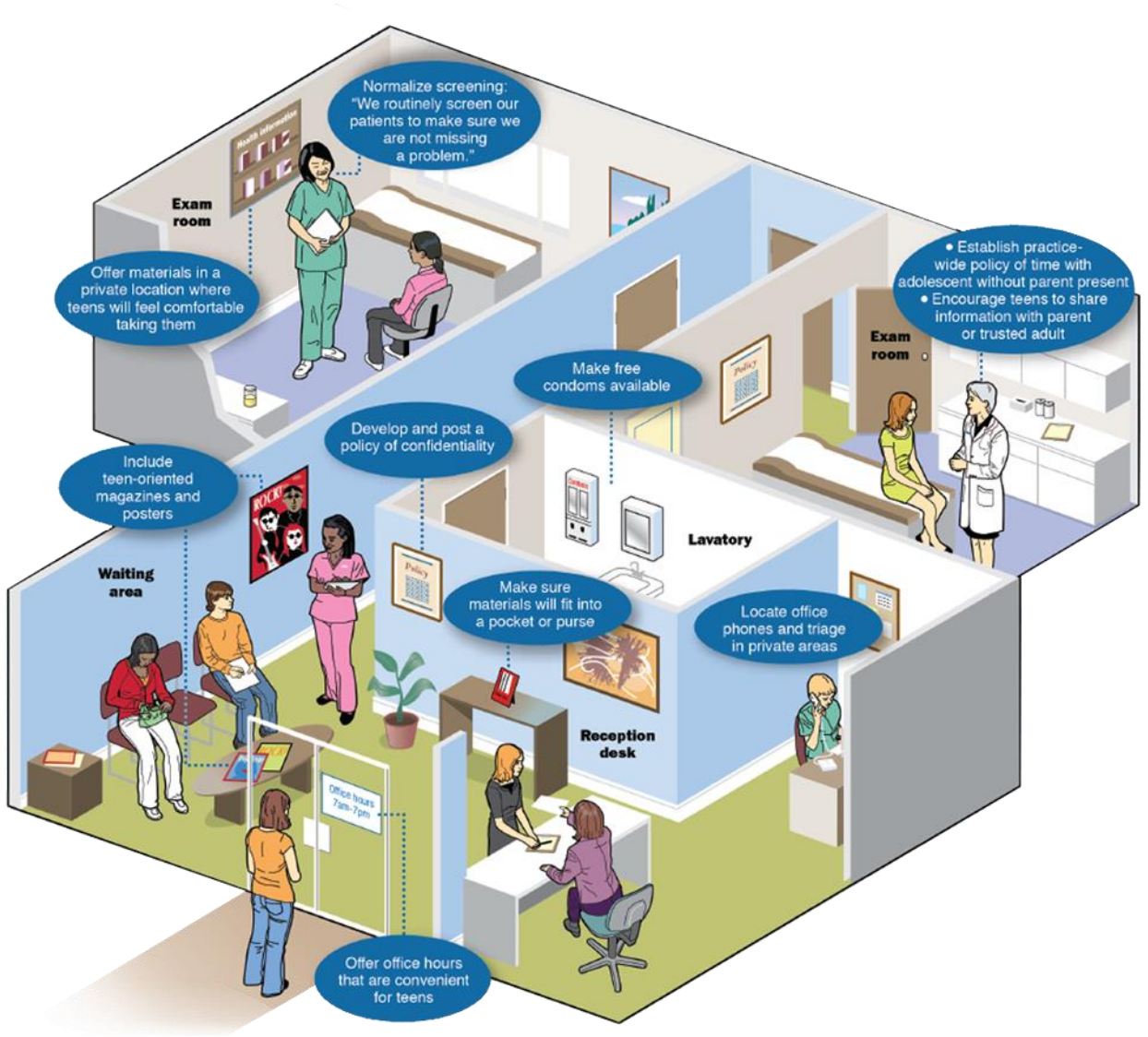
Preventive Health Services

Per the Affordable Care Act (ACA), chlamydia and gonorrhea screening is covered as preventive care and is not subject to cost sharing (co-pays, deductibles) for sexually active women 24 years and younger as well as older women who are at an increased risk. Preventive services are available to all non-grandfathered plans.

The Centers of Disease and Prevention. STD prevention through health care. https://www.cdc.gov/nchhstp/highqualitycare/preventiveservices/std.html#provisions. Published August 18, 2020. Accessed April 15, 2021.

Implementing Universal Screening in Your Practice

Navigating the Universal Screening Workflow

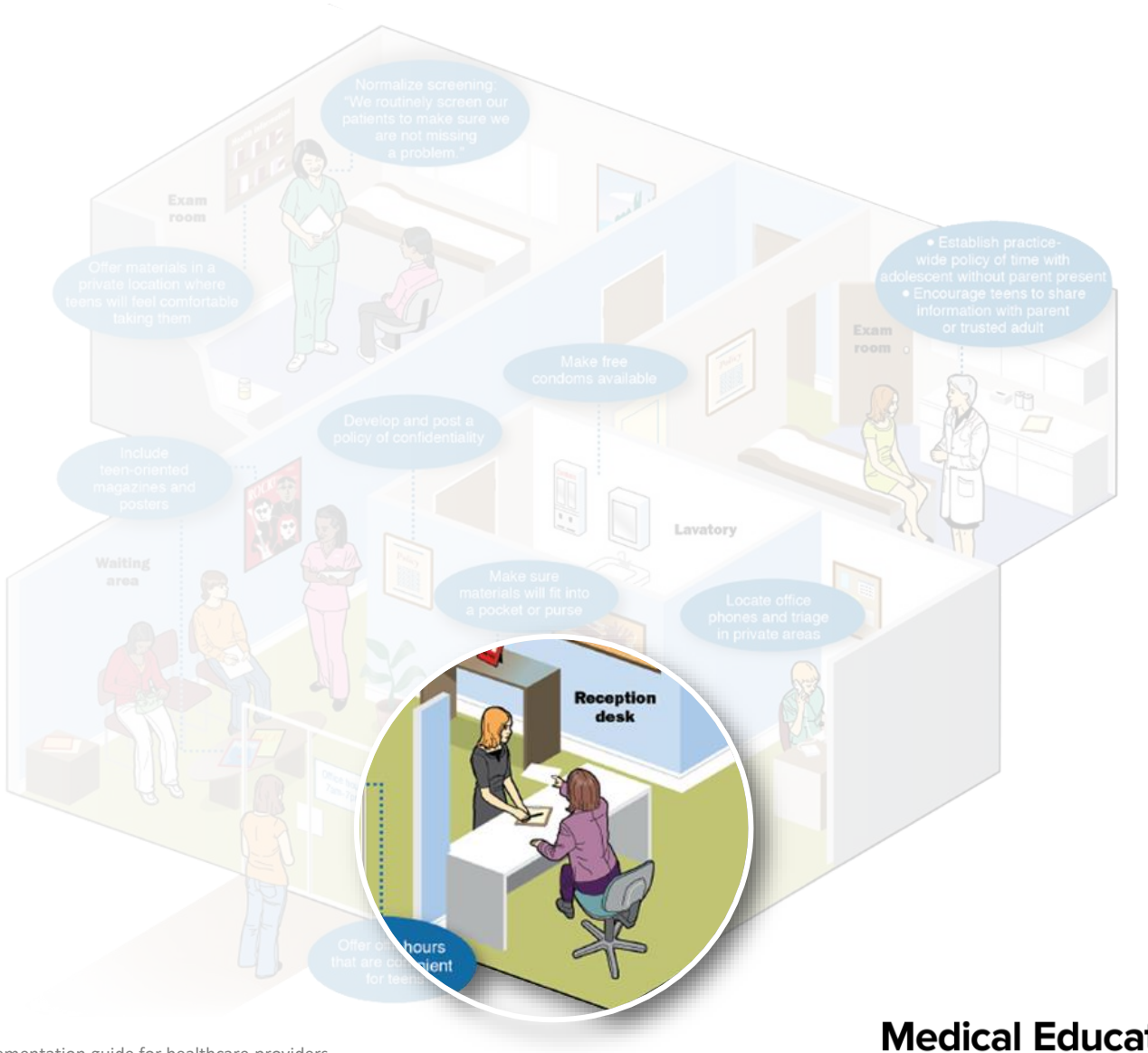


Adolescent Health Initiative. Graphic adapted from: Altarum Institute. Why screen for chlamydia? A how-to implementation guide for healthcare providers. 3rd ed. Washington, D.C.: Altarum Institute; 2016. March 29, 2021.

Universal Screening Workflow: CHECK-IN

The patient and parent receive a letter at check-in that describes chlamydia and gonorrhea testing as a routine part of care for all patients age 15 and older

- By making this a routine part of the visit, caregivers are less likely to be surprised or concerned if STI testing appears on an EOB[1]
- Emphasize that the patient, not the parent, will be notified of results[1]
- Patient has the opportunity to decline screening

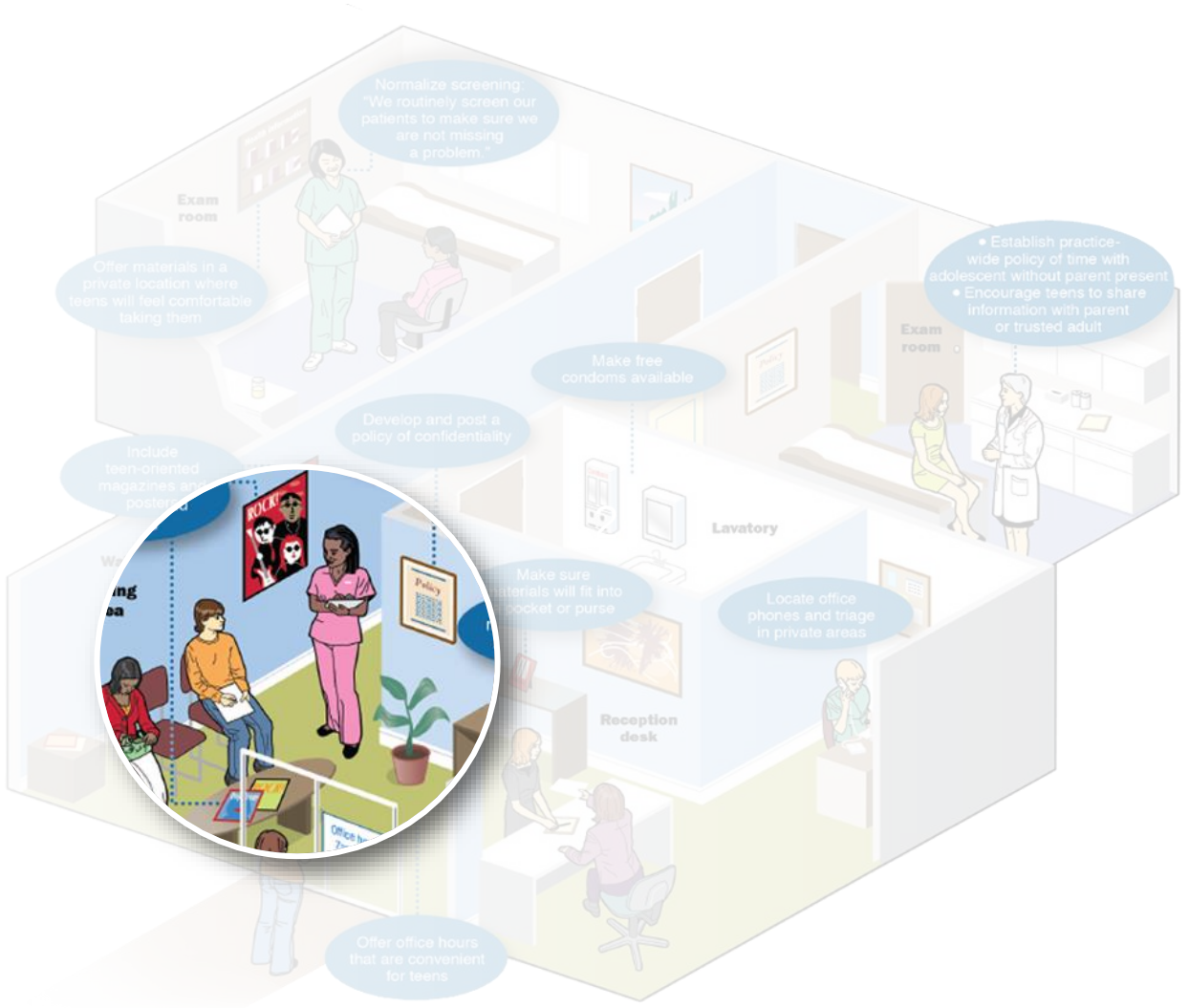


EOB = Explanation of Benefits

Adolescent Health Initiative. Graphic adapted from: Altarum Institute. Why screen for chlamydia? A how-to implementation guide for healthcare providers. 3rd ed. Washington, D.C.: Altarum Institute; 2016. March 29, 2021.

Universal Screening Workflow: COLLECTION

As the patient is called back, the clinician collects a urine sample or self-collected vaginal swab and asks the patient for a direct contact number at which the results can be confidentially shared without contacting the parent.[1]



Adolescent Health Initiative. Graphic adapted from: Altarum Institute. Why screen for chlamydia? A how-to implementation guide for healthcare providers. 3rd ed. Washington, D.C.: Altarum Institute; 2016. March 29, 2021.

Universal Screening Workflow: ASSESSMENT

During the visit, the provider can decide whether to send the sample.[1]

Adolescent Health Initiative. Graphic adapted from: Altarum Institute. Why screen for chlamydia? A how-to implementation guide for healthcare providers. 3rd ed. Washington, D.C.: Altarum Institute; 2016. March 29, 2021.

Additional Resources for Sexual Health Discussions with Adolescents

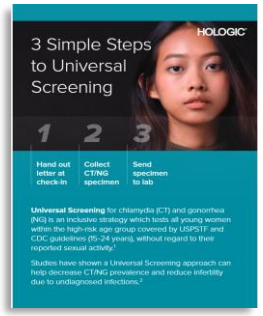
Physicians for Reproductive Health	prh.org/medical-education
University of Michigan Health System	www.umhs-adolescenthealth.org
YES MEANS TEST	www.yesmeanstest.org
The American Academy of Pediatrics	www.njaap.org/programs/adolescent-health
ncc national chlamydia coalition	www.chlamydiacoalition.org/opt-out-screening/

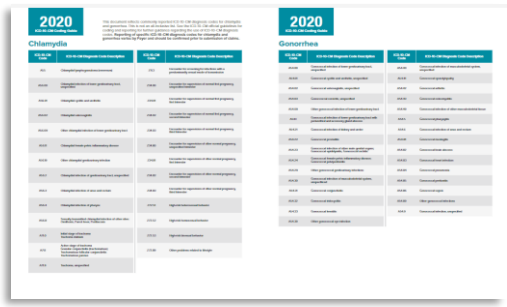
Note: These resources are provided for educational purposes only. Their inclusion should not be considered an endorsement of any product or service.

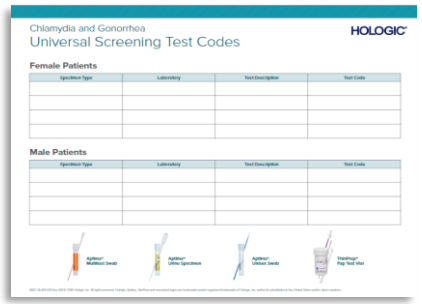
Universal Screening Toolkit

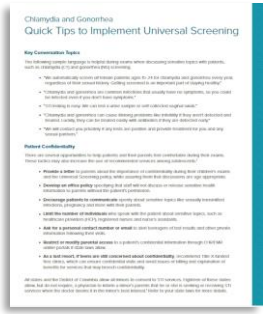
Healthcare Provider

- Universal Screening Implementation Flyer
- Quick Tips to Implement Universal Screening
- Chlamydia and Gonorrhea ICD-10-CM Codes Brochure
- Test Code Reminder Sheet



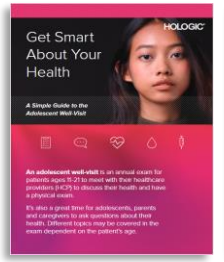


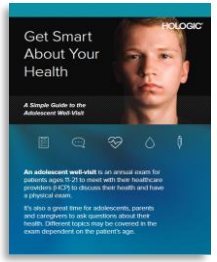


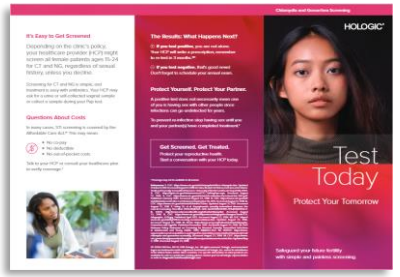


Patient

- Patient Letter
- Parent Letter
- Adolescent Well-Visit Flyer
- Chlamydia and Gonorrhea Patient Brochure
- First-Catch Urine Collection Guide
- Vaginal Swab Collection Guide







For more information please visit hologicwomenshealth.com

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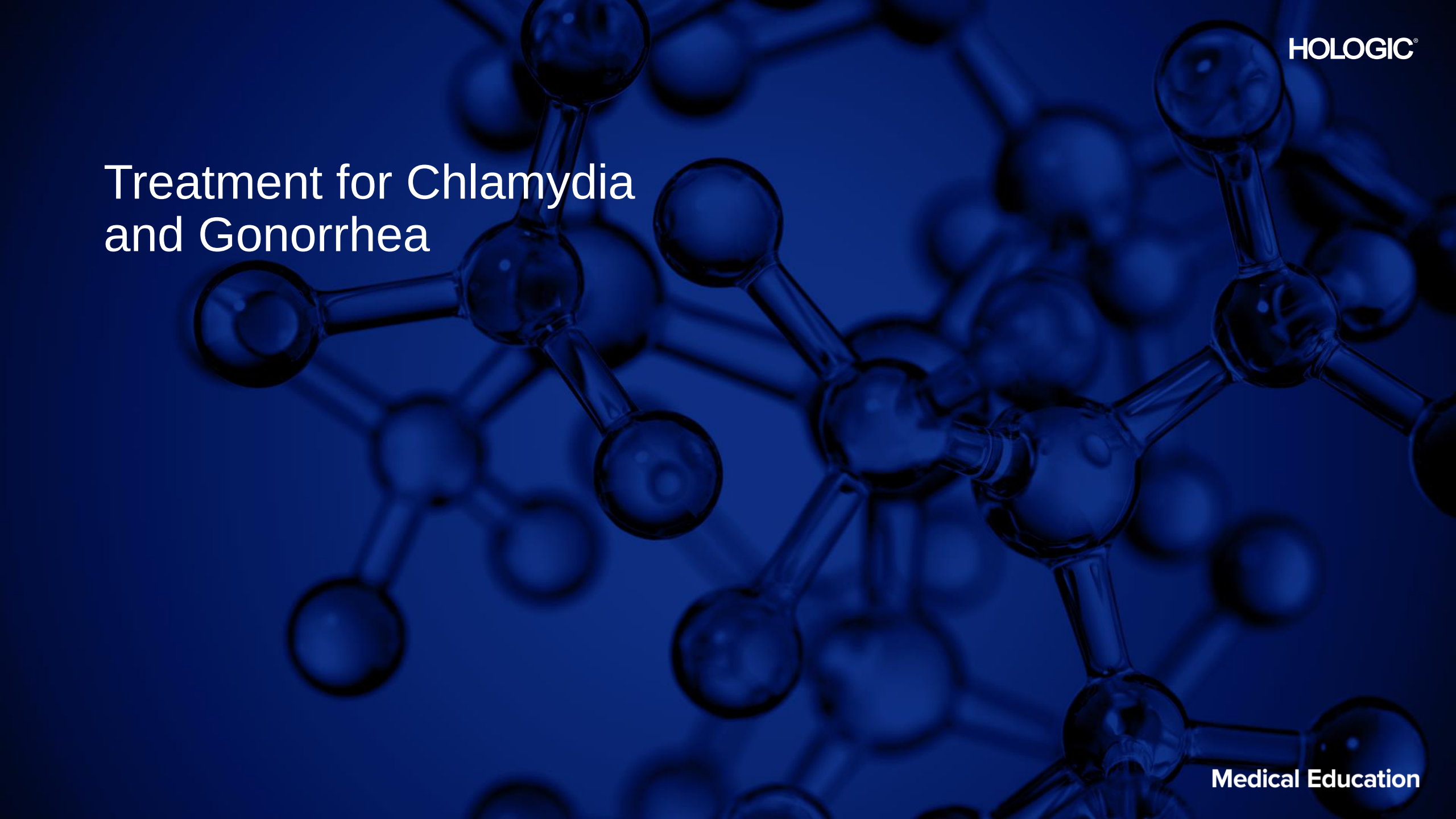

Treatment for Chlamydia and Gonorrhea

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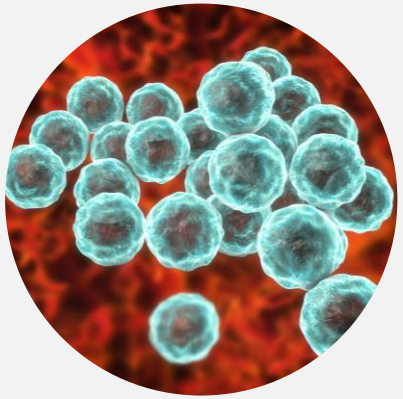
Treatment

Chlamydia and Gonorrhea Infection



Chlamydia

Recommended First Line

Doxycycline*
100 mg orally 2x/day for 7 days

Alternative

Azithromycin
1g orally single dose

OR

Levofloxacin
500 mg orally 1x/day for 7 days

Gonorrhea†

Recommended First Line

Ceftriaxone
500 mg IM in a single dose for persons <150 kg
1g IM for persons ≥150 kg

Alternative

Gentamicin
240 mg IM in a single dose

+

Azithromycin
2g orally single dose

OR

Cefixime
800 mg‡ orally in a single dose

The content in this piece is for information purposes only and is not intended to be medical advice.

*Not for use during pregnancy. Recommended alternative is azithromycin
†For uncomplicated urogenital and rectal infections only
‡If chlamydial infection has not been excluded, treat for chlamydia with doxycycline 100 mg orally, 2 times/day for 7 days
Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70

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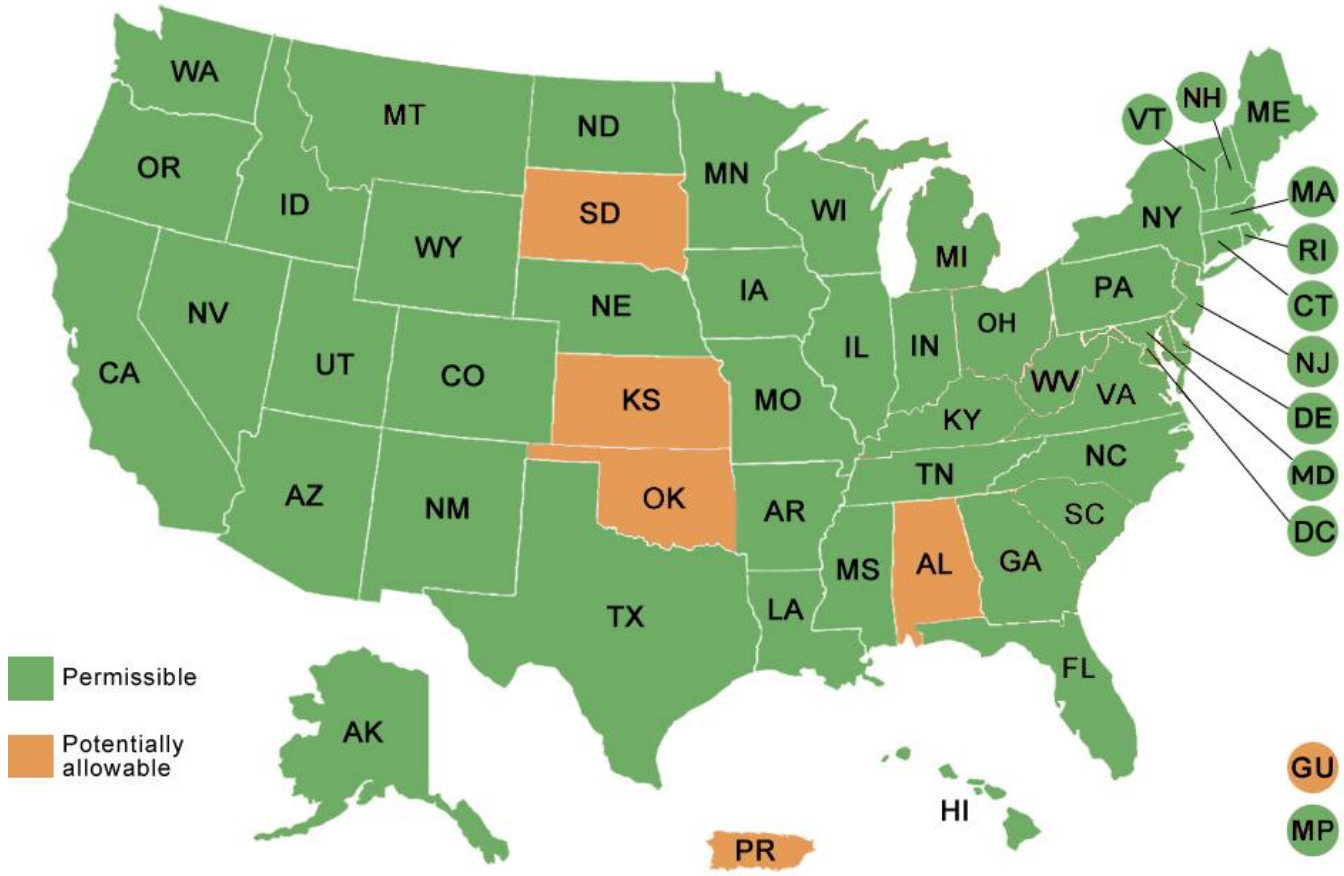
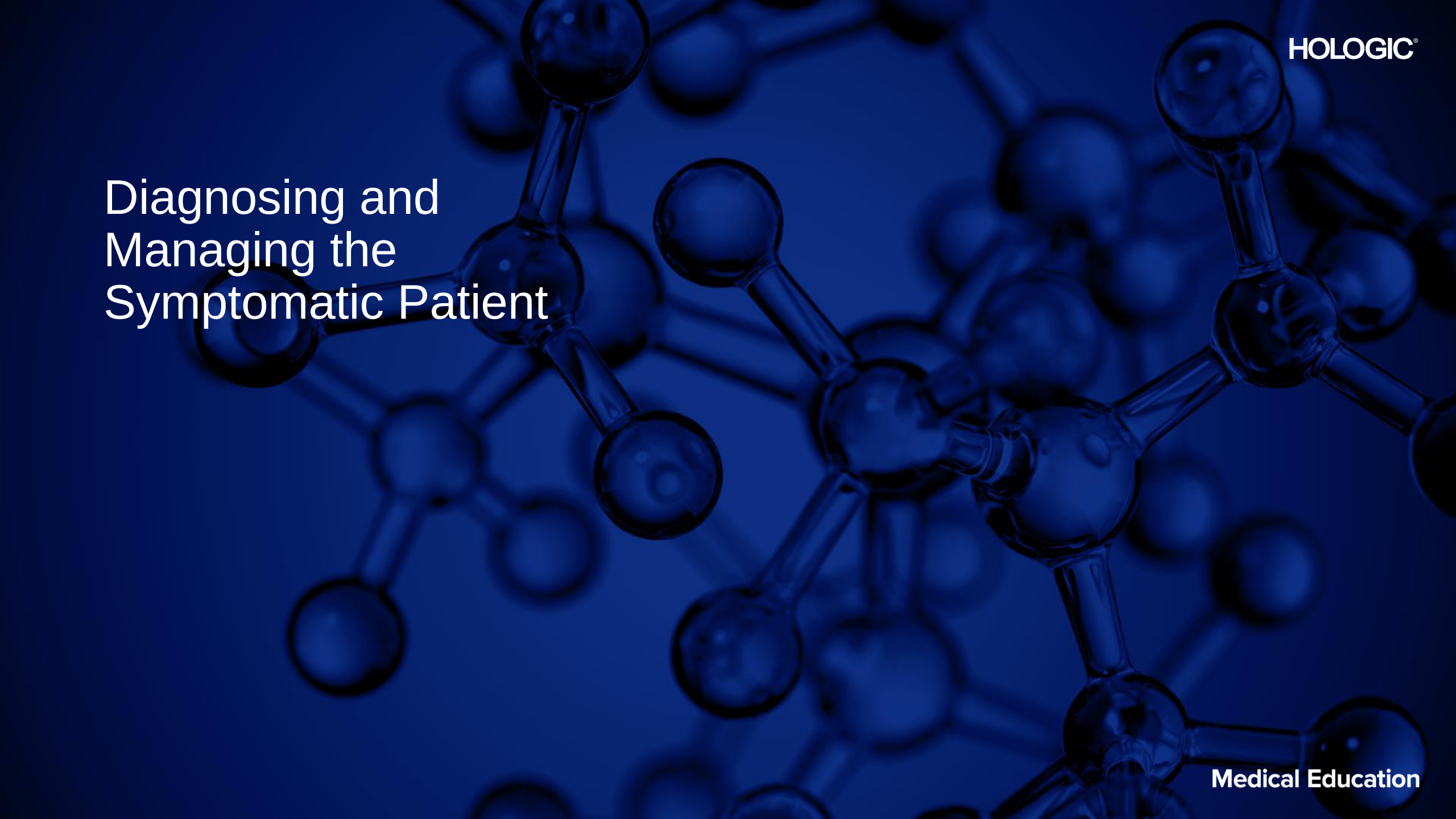
Legal Status of Expedited Partner Therapy (EPT)[5]

- ACOG supports the use of EPT.[1]
- EPT is effective in reducing CT and NG rates in women.[2]
- Partners getting EPT should be encouraged to seek medical evaluation and screening for other STIs, including HIV.[1]
- CDC supports the use of EPT where allowable by law.[3]
- Fewer than half of pharmacists were aware of EPT however almost all would dispense. In addition, only 14.7% have ever received a request for EPT.[4]



1. ACOG. Committee opinion no. 632: Expedited partner therapy in the management of gonorrhea and chlamydial infection. *Obstet Gynecol.* 2015;125(6):1526-1528. doi:10.1097/01.AOG.0000466366.67312.8c.
2. Center for Disease Control and Prevention. Expedited Partner Therapy in the Management of Sexually Transmitted Diseases. Atlanta, GA: US Department of Health and Human Services. 2006. 3. Centers for Disease Control and Prevention. Guidance on the Use of Expedited Partner Therapy in the Treatment of Gonorrhea. Updated December 8, 2016. Accessed October 15, 2020. https://www.cdc.gov/std/ept/gc-guidance.htm. 4. Mmeje OO et al. Breakdown in the Expedited Partner Therapy Treatment Cascade: From Reproductive Healthcare Provider to the Pharmacist. Am J Obstet Gynecol. 2020;223:417.e1-8.
5. Centers for Disease Control and Prevention .Legal Status of Expedited Partner Therapy (EPT). Updated May 11, 2020. Accessed October 15, 2020. https://www.cdc.gov/std/ept/legal/default.htm.



Diagnosing and Managing the Symptomatic Patient

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Many STIs are Associated with Similar Symptoms[1,2]

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Similar Symptoms						
	Trichomoniasis	Bacterial Vaginosis	Yeast Infection	Chlamydia	Gonorrhea	*Mycoplasma genitalium*
Abnormal Discharge	✓	✓	✓	✓	✓	✓
Vaginal Odor	✓	✓				
Vaginal Irritation	✓	✓	✓	✓	✓	✓
Pain During Urination/Sex	✓		✓	✓	✓	✓

1. Powell, AM. Acute cervicitis. Last updated January 27, 2020. Accessed October 15, 2020. https://www.uptodate.com/contents/acute-cervicitis. 2. Martin DH. Mycoplasma genitalium infection in men and women. Last updated October 31, 2019. Accessed October 15, 2020. https://www.uptodate.com/contents/mycoplasma-genitalium-infection-in-men-and-women

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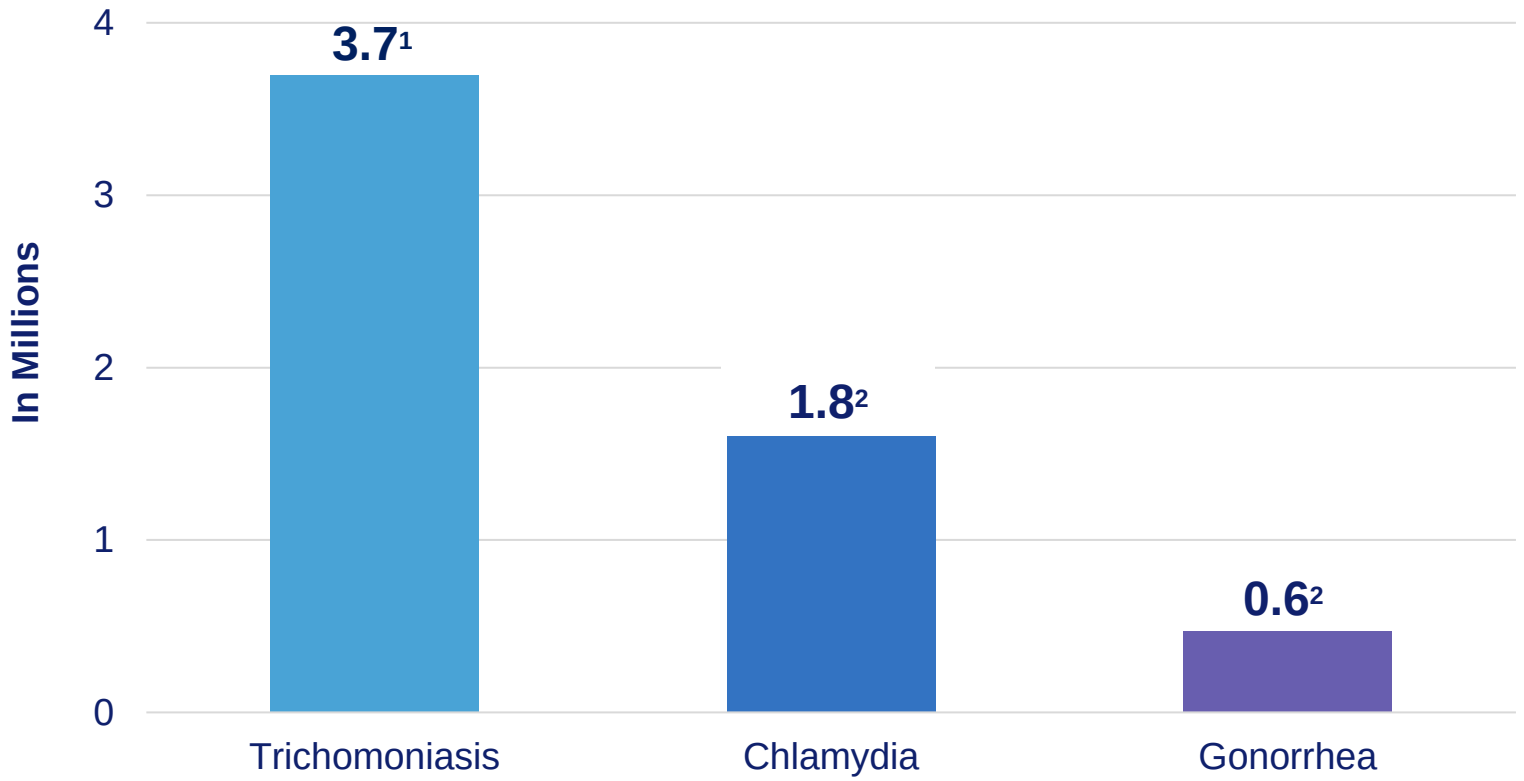
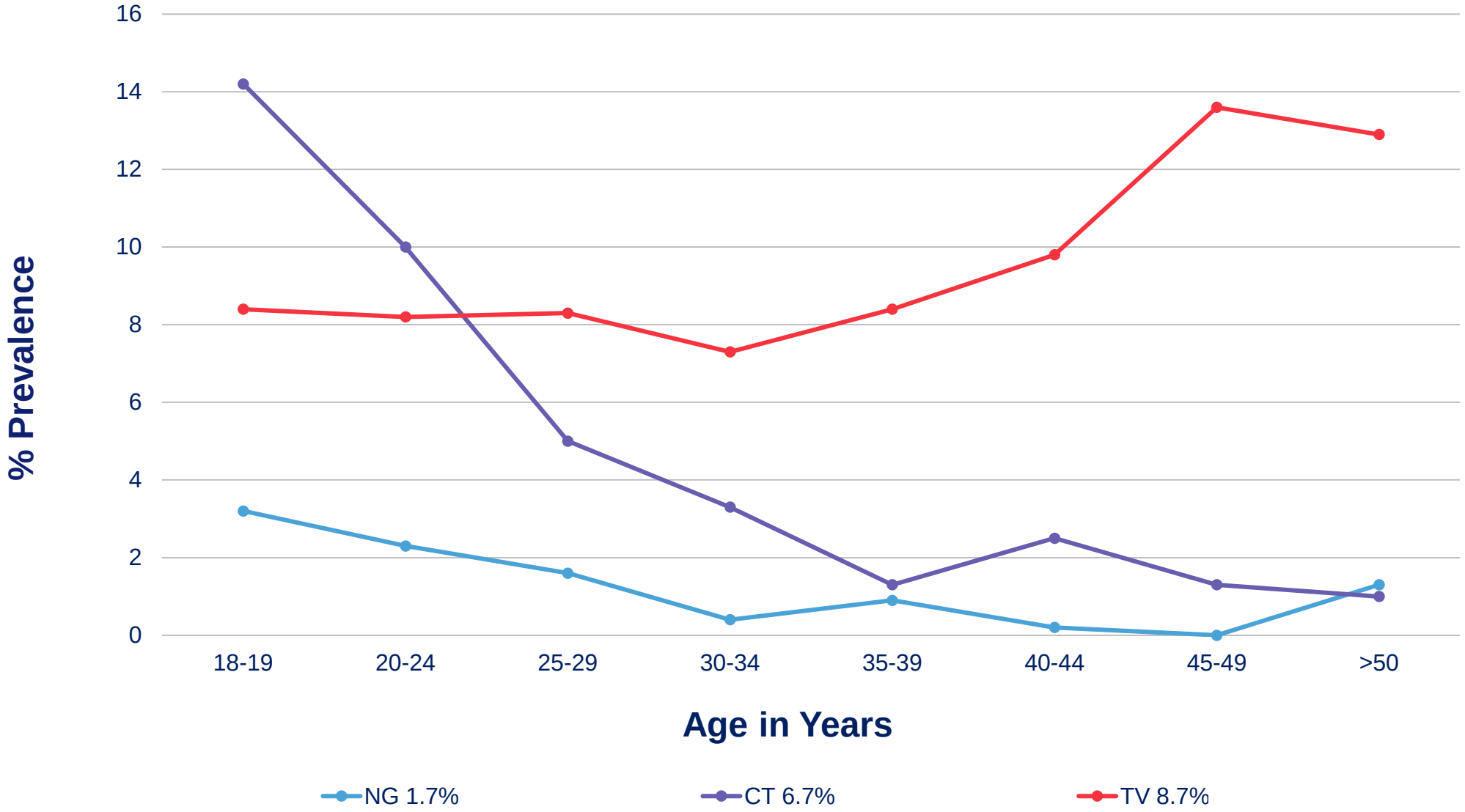
Sexually Transmitted Infections

Incidence of Infection, United States



1. Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70 2. Centers for Disease Control and Prevention. (2021, April 13). *Sexually transmitted Disease SURVEILLANCE, 2019*. Centers for Disease Control and Prevention. https://www.cdc.gov/std/statistics/2019/default.htm.

Trichomoniasis Prevalence is Highest in Older Women



Graph adapted from: Ginocchio CC, et al. Prevalence of Trichomonas vaginalis and coinfection with Chlamydia trachomatis and Neisseria gonorrhoeae in the United States as determined by the Aptima Trichomonas vaginalis nucleic acid amplification assay. *J Clin Microbiol.* 2012;50(8):2601-2608.

Consequences of Untreated Trichomoniasis

- Concurrent STIs, including chlamydia, gonorrhea and HSV1&2[1]
- Increased time to clear HPV infections[2]
- Possible connection with preterm birth and low birth weight[3]
- Increased risk of HIV transmission[3]

1. Allsworth JE, et al. Trichomoniasis and other sexually transmitted infections: results from the 2001-2004 National Health and Nutrition Examination Surveys. *Sex Transm Dis.* 2009;36(12):738–744. doi: 10.1097/OLQ.0b013e3181b38a4b 2. Shew ML, et al. Association of condom use, sexual behaviors and sexually transmitted infections with the duration of genital human papillomavirus infection among adolescent women. *Arch Pediatr Adolesc Med*. 2006;160(2):151-156. 3. CDC. Sexually Transmitted Diseases Treatment Guidelines, 2015. *MMWR*. 2015;64(3).

Trichomonas vaginalis Screening Guidelines

HOLOGIC®

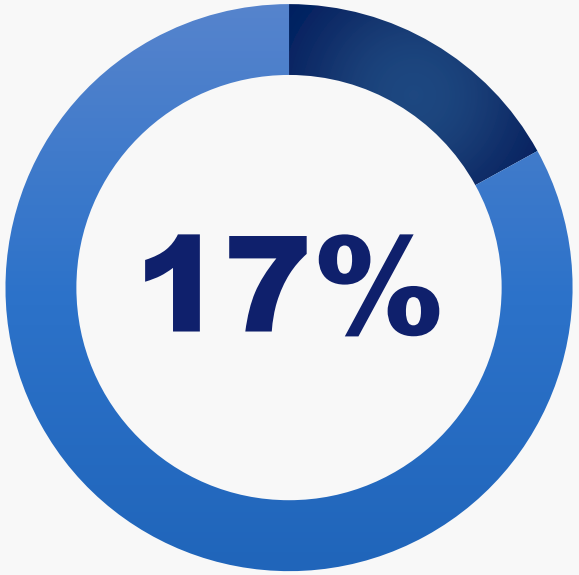
Testing is recommended for…

Women with risk factors

- Multiple partners
- History of STIs
- High-prevalence settings
- High risk for infection

HIV-infected women at least annually

Retesting is recommended because…



17% reinfected within 3 months.

Current partners should be referred for presumptive treatment to avoid reinfection.

Medical Education

Peterman TA, Tian LH, Metcalf CA, et al. High incidence of new sexually transmitted infections in the year following a sexually transmitted infection: a case for rescreening. Ann Intern Med. 2006;145(8):564-572. doi:10.7326/0003-4819-145-8-200610170-00005

Trichomonas vaginalis Guidelines[1]

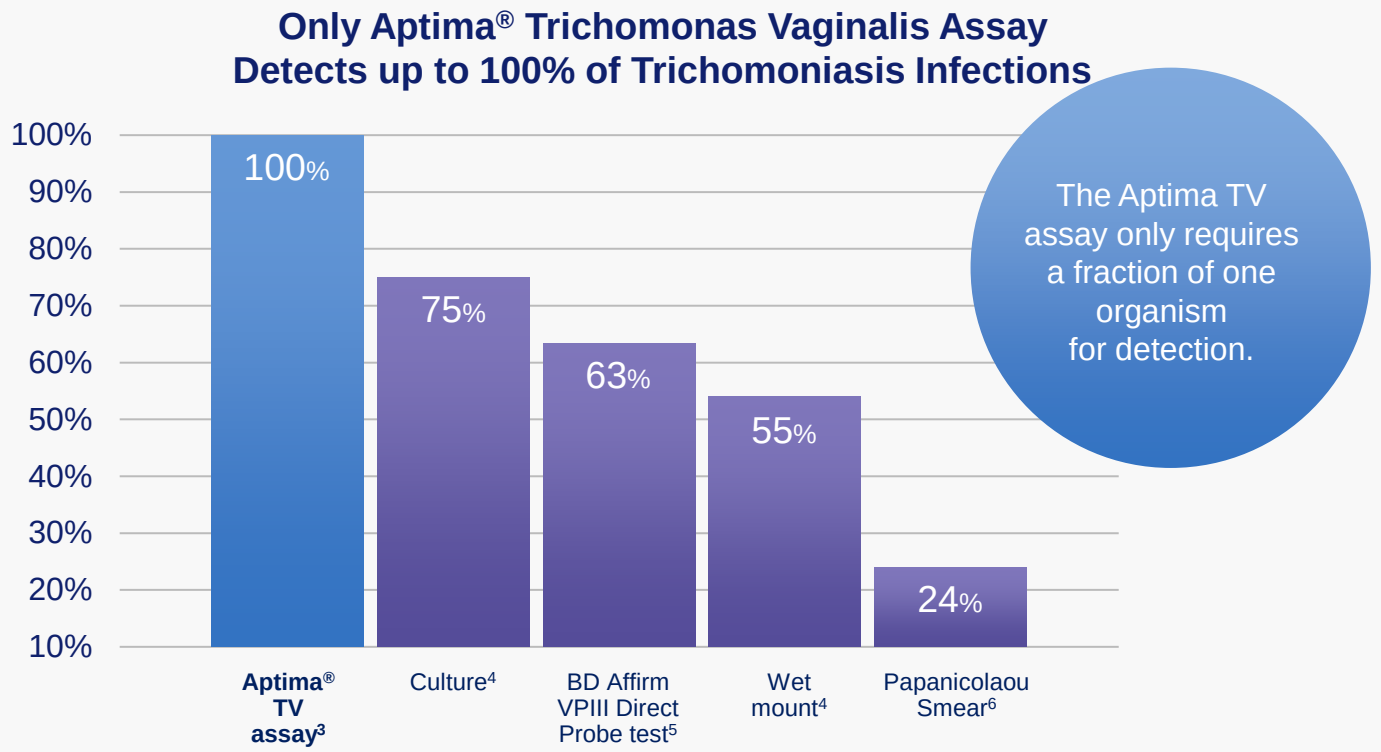
ACOG and the CDC Recommend NAAT Testing[1,2]

"Nucleic acid amplification testing (NAAT) is recommended for the diagnosis of trichomoniasis."

ACOG PRACTICE BULLETIN NUMBER 215

ACOG The American College of Obstetricians and Gynecologists

CDC



1. Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;701 2. ACOG. Vaginitis in Nonpregnant Patients. ACOG Practice Bulletin. Number 215. 2020;135(1):e1-e17. 3. Aptima Trichomonas vaginalis Assay [package insert]. #503684. San Diego, CA: Hologic, Inc.; 2017) 4. Nye MB, et al. Comparison of Aptima Trichomonas vaginalis transcription-mediated amplification to wet mount microscopy, culture, and polymerase chain reaction for diagnosis of trichomoniasis in men and women. *Am J Obstet Gynecol.* 2009;200(2):188 5. Andrea SB and Chapin KC. Comparison of Aptima Trichomonas vaginalis Transcription-Mediated Amplification Assay and BD Affirm VPIIII for Detection of T. vaginalis in symptomatic women: Performance Parameters and Epidemiological Implications. *J Clin Microbiol.* 2011;49(3):866-869. doi:10.1128/JCM.02367-10 6. Wendel KA, et al. Trichomonas vaginalis polymerase chain reaction compared with standard diagnostic and therapeutic protocols for detection and treatment of vaginal trichomoniasis. *Clin Infect Dis.* 2002;35(5):576-580

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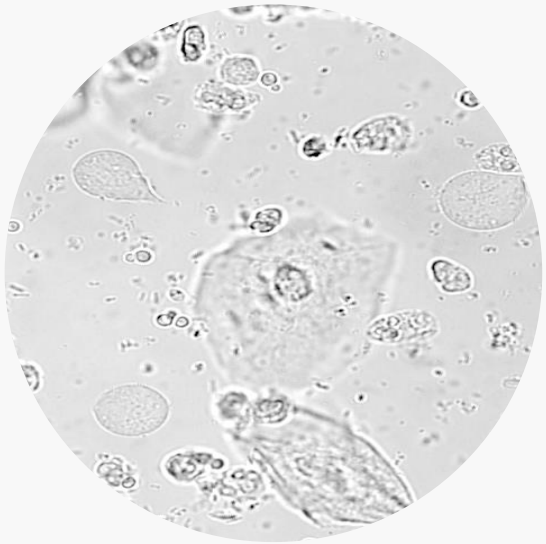
ACOG Recommends NAAT testing for Trichomonas

Limitations of Wet Mount Result in Reduced Sensitivity

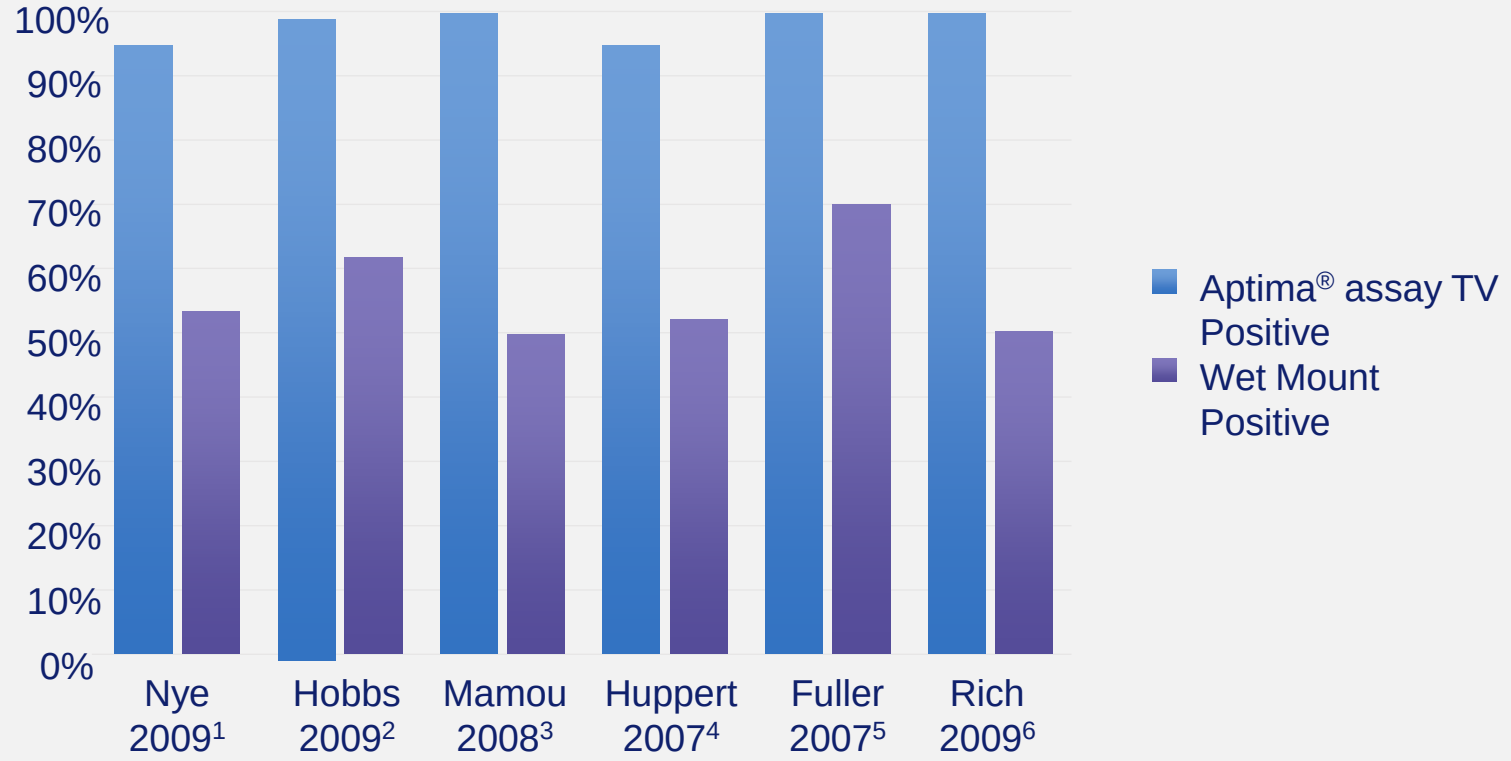


Wet mount sensitivity for *T. vaginalis* is only **55%**[3]

- Time sensitive (within 10-20 min)[1]
- Motility decreases at room temperature[1]
- Need 10,000 live organisms to detect[2]
- Requires whole, motile organism[2]
- *T. vaginalis* is similar in size as a white blood cell and the nucleus of epithelial cells[2]

1. Schwebke JR and Burgess D. Trichomoniasis. *Clin Microbiol Rev.* 2004;17(4):794-803. 2. Garber GE. The laboratory diagnosis of Trichomonas vaginalis. *Can J Infect Dis Med Microbiol*. 2005;16(1):35-38. 3. Nye MB, et al. Comparison of Aptima Trichomonas vaginalis transcription-mediated amplification to wet mount microscopy, culture, and polymerase chain reaction for diagnosis of trichomoniasis in men and women. *Am J Obstet Gynecol.* 2009;200(2):188.

Comparison of the Sensitivity of Wet Mount with NAAT for Trichomoniasis Detection



1. Nye 2009: Nye MB, Schwebke JR, Body BA. Comparison of APTIMA Trichomonas vaginalis transcription-mediated amplification to wet mount microscopy, culture, and polymerase chain reaction for diagnosis of trichomoniasis in men and women. *Am J Obstet Gynecol.* 2009;200:188.e1-7. 2. Hobbs 2009: Hobbs MM, Rich KD, Lapple DM, Lau K, Sousa S, Seña C. Endocervical and vaginal specimens are comparable for detection of T. vaginalis using transcription-mediated amplification (TMA). Poster presentation at the International Society for Sexually Transmitted Diseases Research meeting, 2009 3. Mamou 2008: Mamou F, Karinen M, Johnson G, Rudrik, J. Validation of gen-probe Aptima Trichomonas vaginalis analyte specific reagent for use in public health clinical laboratories to detect Trichomonas vaginalis in urine sediment. Poster presentation at the National STD Prevention Conference, 2008. 4. Huppert 2007: Huppert JS, Mortensen JE, Reed JL, et al. Rapid antigen testing compares favorably with transcription-mediated amplification assay for the detection of Trichomonas vaginalis in young women. *Clin Infect Dis.* 2007;45(2):194-198. 5. Fuller 2007: Fuller D, Buckner R, Newcomer K, Brunnemer C, O'Brien D, Davis T. Comparison of Aptima® specific reagents to wet mount, culture, Affirm VPIII® and OSOM Trichomonas Rapid Test® for detection of Trichomonas vaginalis from vaginal swabs and ThinPrep® vials. Poster presentation at the International Society for Sexually Transmitted Diseases Research meeting, 2007. 6. Rich 2007: Rich K, Huppert J, Mortensen J, et al. Comparison of transcription-mediated amplification, rapid antigen test, culture and wet mount for detection of Trichomonas vaginalis in female adolescents. Poster presentation at the International Society for Sexually Transmitted Diseases Research meeting, 2009.

Medical Education

Trichomoniasis Treatment

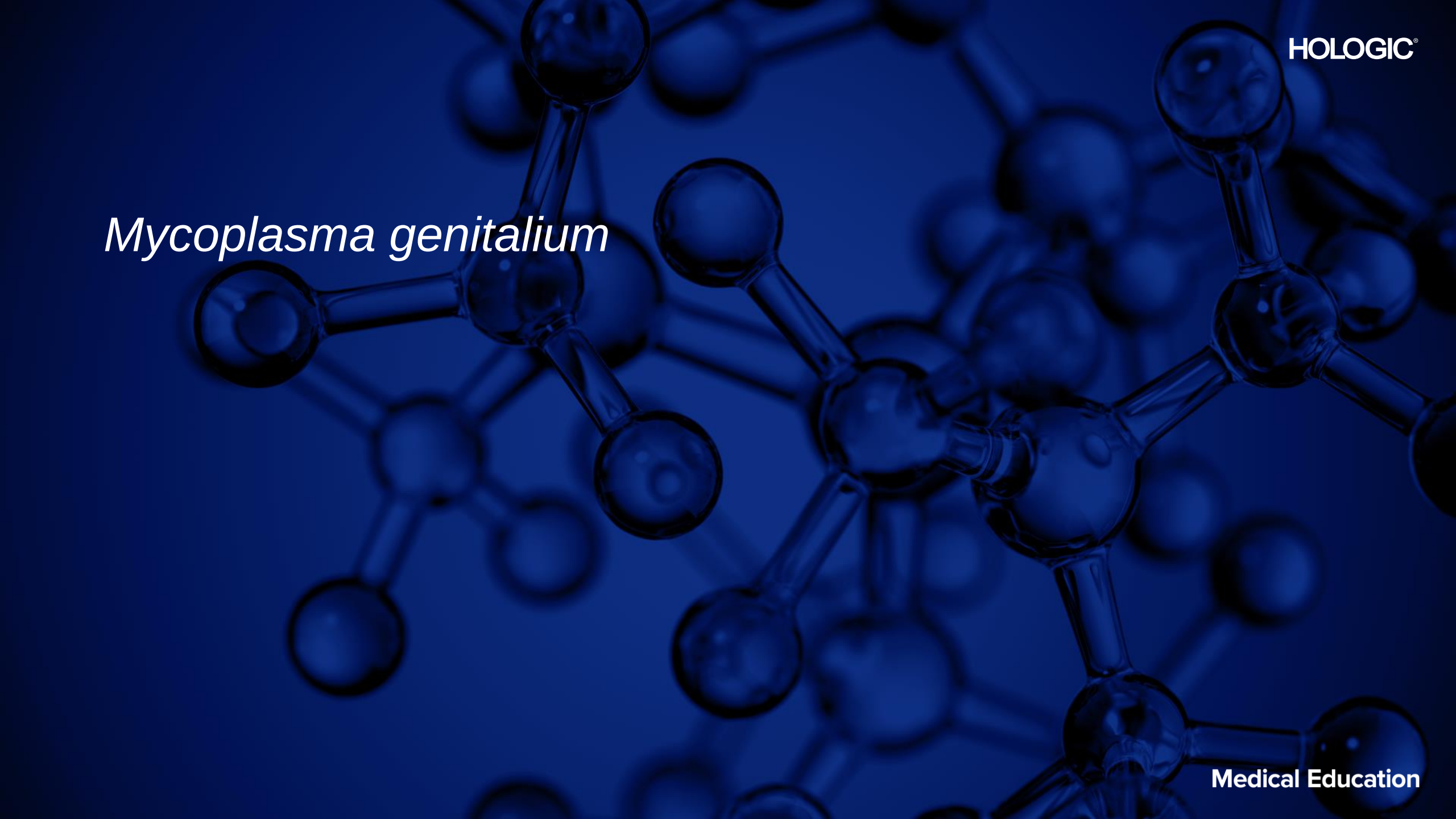
Recommended

Metronidazole
Women: 500 mg orally 2x/day for 7 days
Men: 2g orally in a single dose

Alternative

Tinidazole
2g orally in a single dose

Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70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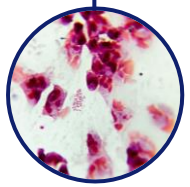
Mycoplasma genitalium
Medical Education

Why Are We Only Hearing About This Now?

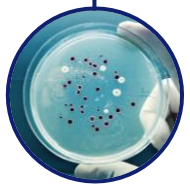
The Challenge of Diagnosing *Mycoplasma genitalium*

Early 1970's



Clinicians find NGU can be treated with antibiotics but do not observe bacteria in the urethra[1]

1980



First successful M. gen culture[1]

2015

CDC recommends NAAT testing for M. gen[2]

2019

FDA clears first NAAT for M. gen[3]

1. Taylor-Robinson D and Jensen JS. *Mycoplasma genitalium:* from chrysalis to multicolored butterfly. *Clin Microbiol Rev*. 2011 July; 24: 498-514. 2. CDC. Sexually Transmitted Diseases and Treatment Guidelines: *Mycoplasma genitalium*. Updated June 4, 2015. Accessed January 22, 2020. http://www.cdc.gov/std/tg2015/emerging.htm 3. FDA permits marketing of first test to aid in the diagnosis of a sexually-transmitted infection known as Mycoplasma genitalium [press release]. Silver Spring, MD: FDA; January 23, 2019.

Detection of *M. gen* Requires NAAT Testing

Clinical Presentation

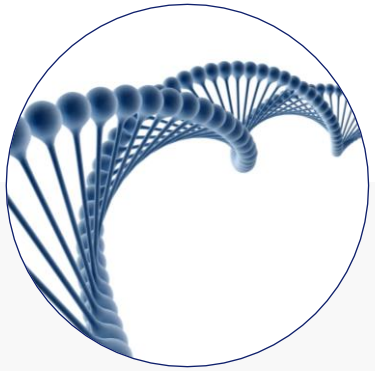
Can be similar to other STIs.[1]

Microscopy

Cannot be seen because *M. gen* has no cell wall.[2]

Culture

Is not clinically feasible as it may take up to six months.[2]



Nucleic Acid Amplification Test (NAAT)

Is the recommended method of detection.[2]

1. Jensen JS, et al. Signs and symptoms of urethritis and cervicitis among women with or without Mycoplasma genitalium or Chlamydia trachomatis infection. *Sex Transm Infect*. 2005;81(1):73-78. 2. Workowski KA and Bolan GA. Sexually transmitted diseases treatment guidelines, 2015. *MMWR Recomm Rep.* 2015;64(RR- 03):1-137. Updated June 5, 2015. Accessed October 15, 2020. https://www.cdc.gov/std/tg2015/tg-2015-print.pdf.

Mycoplasma genitalium (*M. gen*):

A Prevalent, Often Misdiagnosed STI

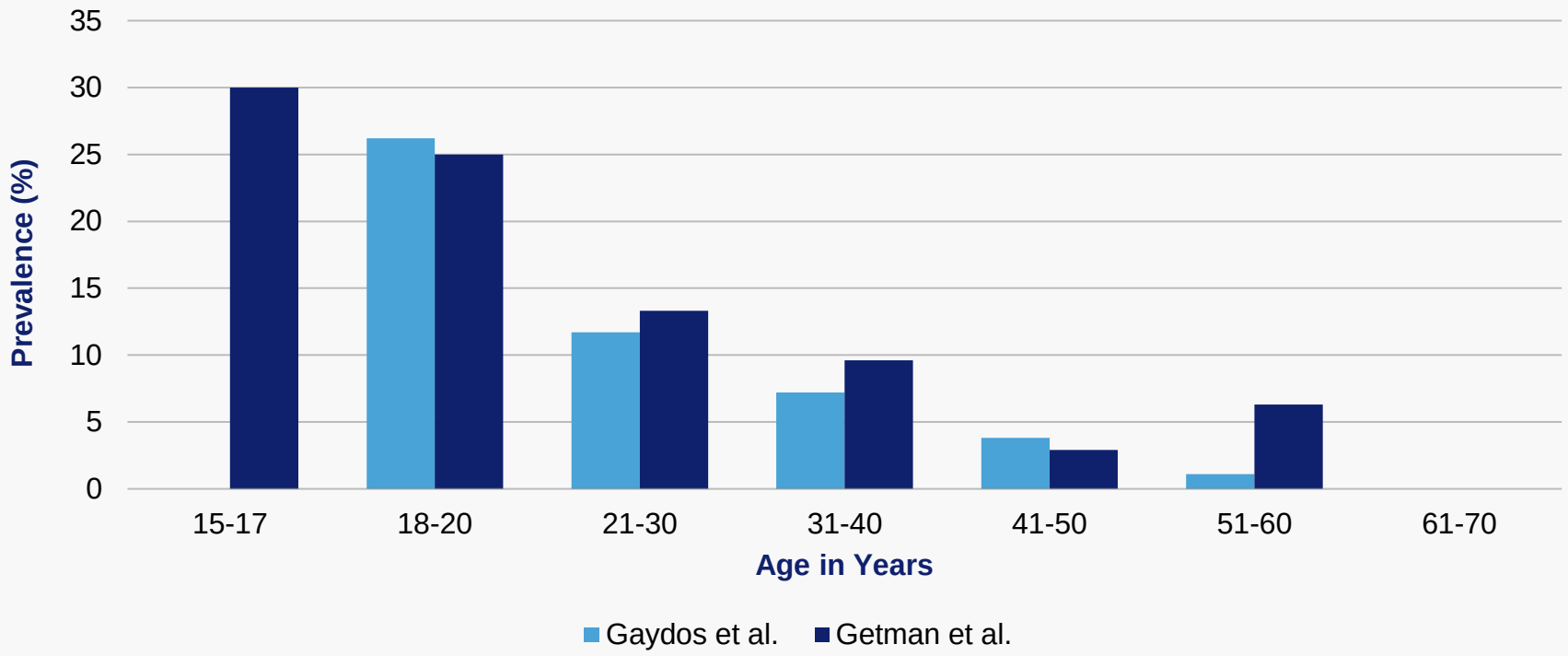
Similar Symptoms						
	Trichomoniasis	**Bacterial Vaginosis**	**Yeast Infection**	**Chlamydia**	**Gonorrhea**	***Mycoplasma genitalium***
Abnormal Discharge	✓	✓	✓	✓	✓	✓
Vaginal Odor	✓	✓				
Vaginal Irritation	✓	✓	✓	✓	✓	✓
Pain During Urination/Sex	✓		✓	✓	✓	✓

- Prevalence **~10%** in women[1]
- Rates higher than gonorrhea, and at times as high as chlamydia[2]
- Exhibits similar clinical presentation to trichomonas, chlamydia and gonorrhea[3]

1. Gaydos C, et al. Molecular Testing for Mycoplasma genitalium in the United States:Results from the AMES Prospective Multicenter Clinical Study. J Clin Microbiol. 2019;57(11):e01125-19. Published 2019 Oct 23. doi:10.1128/JCM.01125-19 2. Getman D, et al. Mycoplasma genitalium prevalence, coinfection, and macrolide antibiotic resistance frequency in a multicenter clinical study cohort in the United States. J Clin Microbiol. 2016 Sep; 54(9): 2278-83. 3. Powell, AM. Acute cervicitis. Last updated January 27, 2020. Accessed October 15, 2020. https://www.uptodate.com/contents/acute-cervicitis. 4. Martin DH. Mycoplasma genitalium infection in men and women. Last updated October 31, 2019. Accessed October 15, 2020.https://www.uptodate.com/contents/mycoplasma-genitalium-infection-in-men-and-women

Prevalence of *M. gen* by Age: Females

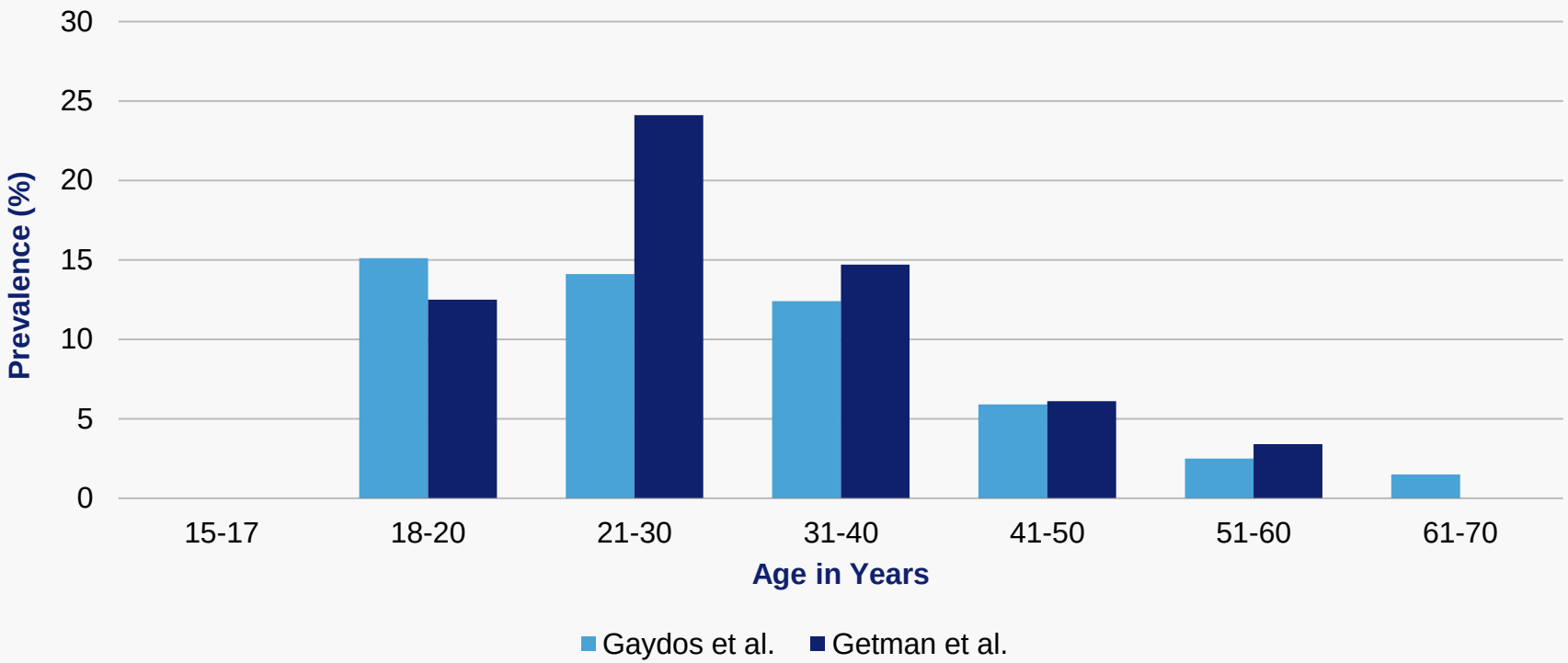
Females: 10.2%[1] to 16.1%[2]



1. Gaydos CA, et al. Molecular testing for Mycoplasma genitalium in the United States: results from the AMES prospective multi-center clinical study. *J Clin Microbiol.* 2019 Oct 23; 57(11). 2. Getman D, et al. Mycoplasma genitalium prevalence, coinfection, and macrolide antibiotic resistance frequency in a multicenter clinical study cohort in the United States. *J Clin Microbiol.* 2016 Sep; 54(9): 2278-83.

Prevalence of *Mycoplasma genitalium* by Age: Males

Males: 10.6%[1] to 17.2%[2]



1. Gaydos CA, et al. Molecular testing for Mycoplasma genitalium in the United States: results from the AMES prospective multi-center clinical study. *J Clin Microbiol.* 2019 Oct 23; 57(11). 2. Getman D, et al. Mycoplasma genitalium prevalence, coinfection, and macrolide antibiotic resistance frequency in a multicenter clinical study cohort in the United States. *J Clin Microbiol.* 2016 Sep; 54(9): 2278-83.

M. gen Can Lead to Health Consequences for Females

- Detected in **10-30%** of women with clinical cervicitis.[1]
- Identified in up to **22%** of pelvic inflammatory disease (PID) cases.[1]
- Persons **<34 years** of age are the most likely to be affected by M. genitalium.[2]

2x

Twofold increased risk of cervicitis, PID, infertility and adverse pregnancy outcomes with *M. genitalium* infection.[3,4]

1. CDC. Sexually Transmitted Diseases and Treatment Guidelines: Mycoplasma genitalium. Last reviewed June 4, 2015. Accessed October 15, 2020. http://www.cdc.gov/std/tg2015/emerging.htm. 2. Manhart LE, Gaydos CA, Taylor SN, et al. Characteristics of Mycoplasma genitalium Urogenital Infections in a Diverse Patient Sample from the United States: Results from the Aptima Mycoplasma genitalium Evaluation Study (AMES). J Clin Microbiol. 2020;58(7):e00165-20. Published 2020 Jun 24. doi:10.1128/JCM.00165-20 3. Falk L et al. Symptomatic urethritis is more prevalent in men infected with *Mycoplasma genitalium* than with Chlamydia trachomatis. Sex Transm Infect 2004;80:289-293. 4. Rebecca Lis, Ali Rowhani-Rahbar, and Lisa E. Manhart, et al. Mycoplasma genitalium Infection and Female Reproductive Tract Disease: A Meta-analysis. Clinical Infectious Diseases® 2015;61(3):418–26

M. gen Can Lead to Health Consequences for Males

- More likely to exhibit symptoms of an *M. genitalium* infection[1]
- Responsible for **30%** of persistent or recurrent urethritis in men[1,2]
- 73% of *M.gen* positive men show symptoms of urethritis[3]

25%

M.gen present in up to **25% of** men with **acute NGU** and over **>33%** of men with **NCNGU[2]**

1. CDC. Sexually Transmitted Diseases and Treatment Guidelines: Mycoplasma genitalium. Last reviewed June 4, 2015. Accessed October 15, 2020. http://www.cdc.gov/std/tg2015/emerging.htm. 2. Taylor-Robinson D, et al. *Mycoplasma genitalium*: from Chrysalis to Multicolored Butterfly. *Clin Microbiol Rev.* 2011;24(3):498-514. doi:10.1128/CMR.00006-11. 3. Falk L et al. Symptomatic urethritis is more prevalent in men infected with *Mycoplasma genitalium* than with Chlamydia trachomatis. Sex Transm Infect 2004;80:289-293.

Recommended M. gen testing populations

Whom to Test	Whom to Test
Testing is recommended for women with recurrent cervicitis and should be considered in women with PID	Testing is recommended for men with recurrent non-gonococcal urethritis

Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70

rRNA is Needed to Detect M. gen

CDC recommends NAATs to detect M. gen

M.gen can be difficult to detect because the bacterial organism load is low compared to other STIs commonly tested for. This means a highly sensitive rRNA test is needed for accurate diagnosis

RNA-based tests identified the

40%

of patients missed by a DNA based test.

1. Frølund M, et al. Urethretis-associated pathogens in urine from men with non-gonococcal urethritis: a case-control study. *Acta Derm Venereol*. 2016;96(5):689-694 **2.** Le Roy C, et al. French prospective clinical evaluation of the Aptima Mycoplasma genitalium CE-IVD assay and macrolide resistance detection using three distinct assays. JClin Microbiol. 2017;55(11):3194-3200.

Mycoplasma genitalium Treatment

Recommended Regimens if Resistance Testing Is Available

If macrolide sensitive:	If macrolide resistant:
Doxycycline 100 mg orally 2x/day for 7 days Followed by **Azithromycin** 1g orally initial dose, followed by 500 mg orally 1x/day for an additional 3 days (2.5g total)	**Doxycycline** 100 mg orally 2x/day for 7 days Followed by **Moxifloxacin** 400 mg orally 1x/daily for 7 days

Recommended Regimens if Resistance Testing Is NOT Available

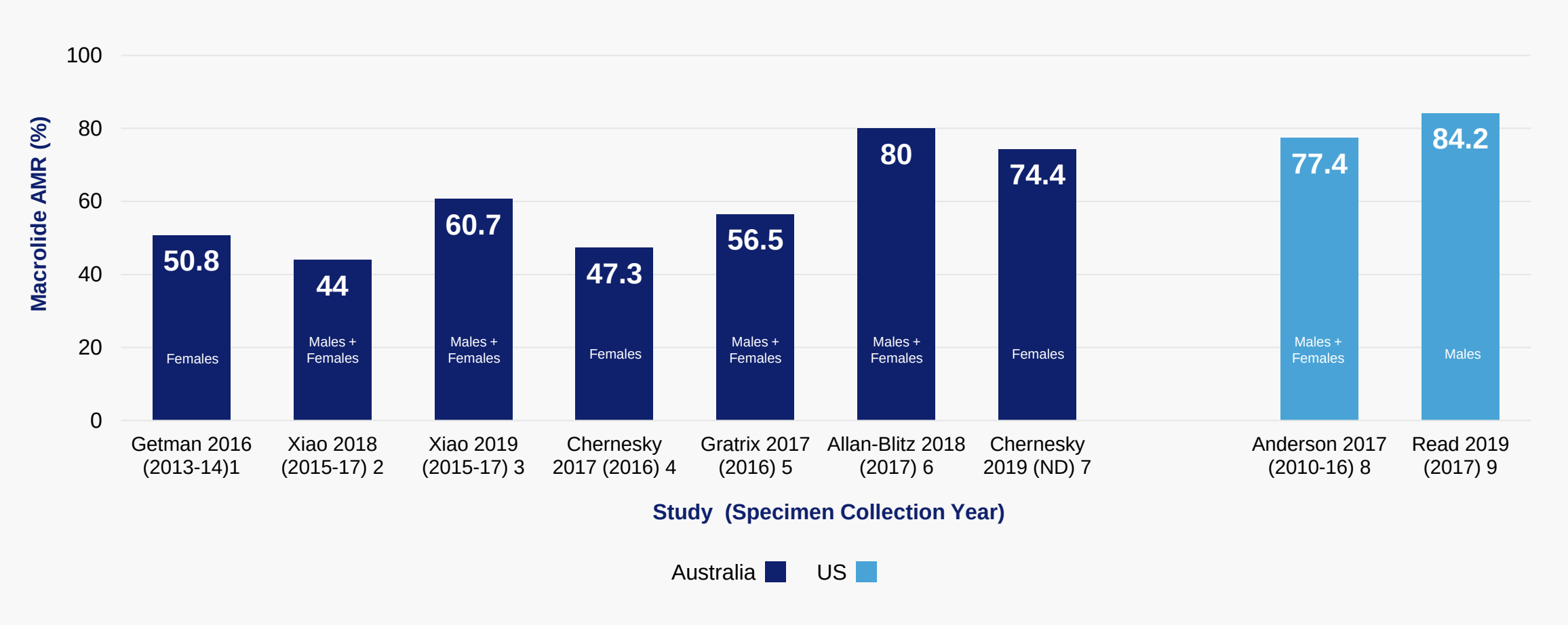
Doxycycline
100 mg orally 2x/day for 7 days

Followed by

Moxifloxacin
400 mg orally 1x/daily for 7 days

Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70

Macrolide Antimicrobial Resistance



1. Getman et al, Mycoplasma genitalium prevalence, coinfection, and macrolide antibiotic resistance frequency in a multicenter clinical study cohort in the United States. *J Clin Microbiol* 2016 Sep; 54(9): 2278-83. 2. Xiao L et al. Evaluation of a real-time PCR assay for detection of Mycoplasma genitalium and macrolide resistance-mediating mutations from clinical specimens. *Diagn Microbiol Infect Dis* 2018 Jun; 91(2): 123-5. 3. Xiao L, Waites KB, Van Der Pol B, Aaron KJ, Hook EW 3rd, Geisler WM. Mycoplasma genitalium Infections With Macrolide and Fluoroquinolone Resistance-Associated Mutations in Heterosexual African American Couples in Alabama. *Sex Transm Dis.* 2019;46(1):18-24. 4. Chernesky MA et al. Mycoplasma gentialium antibiotic resistance-mediating mutations in Canadian women with or without Chlamydia trachomatis infection. *Sex Transm Dis* 2017 Jul; 44(7): 433-5. 5. Gratrix J. Prevalence and antibiotic resistance of Mycoplasma genitalium among STI clinic attendees in Western Canada: a cross-sectional analysis. *BMJ Open* 2017 Jul 10; 7(7):e016300. 6. Allan-Blitz LT et al. Prevalence of Mycoplasma gentialium and azithromycin-resistant infections among remnant clinical specimens, Los Angeles. *Sex Transm Dis* 2018 Sep; 45(9): 632-5. 7. Chernesky MA et al. Mycoplasma genitalium, Chlamydia trachomatis, and Neisseria gonorrhoeae detected with Aptima assays performed on self-obtained vaginal swabs and urine collected at home and in a clinic. *Sex Transm Dis* 2019 Sep; 46(9): e87-e89. 8. Anderson T et al. Mycoplasma genitalium macrolide and fluoroquinolone resistance detection and clinical implications in a selected cohort in New Zealand. *J Clin Microbiol* 2017 Nov; 55(11): 3242-8. 9. Read TRH et al. Symptoms, sites, and significance of Mycoplasma genitalium in men who have sex with men. *Emerg Infect Dis* 2019 Apr; 25(4): 719-27.

Medical Education

Collection Kits for STI Testing

Aptima® Multitest Swab

One sample. Multiple results. Maximum efficiency

Additional Collection Kits

ThinPrep® Pap Test
Transport vial

Aptima® Unisex Swab
Endocervical swab

Urethral swab

Aptima® Urine Collection
First-catch urine specimen

Medical Education

Call to Action

Universal Screening for CT/GC is more effective than a risk-based approach.

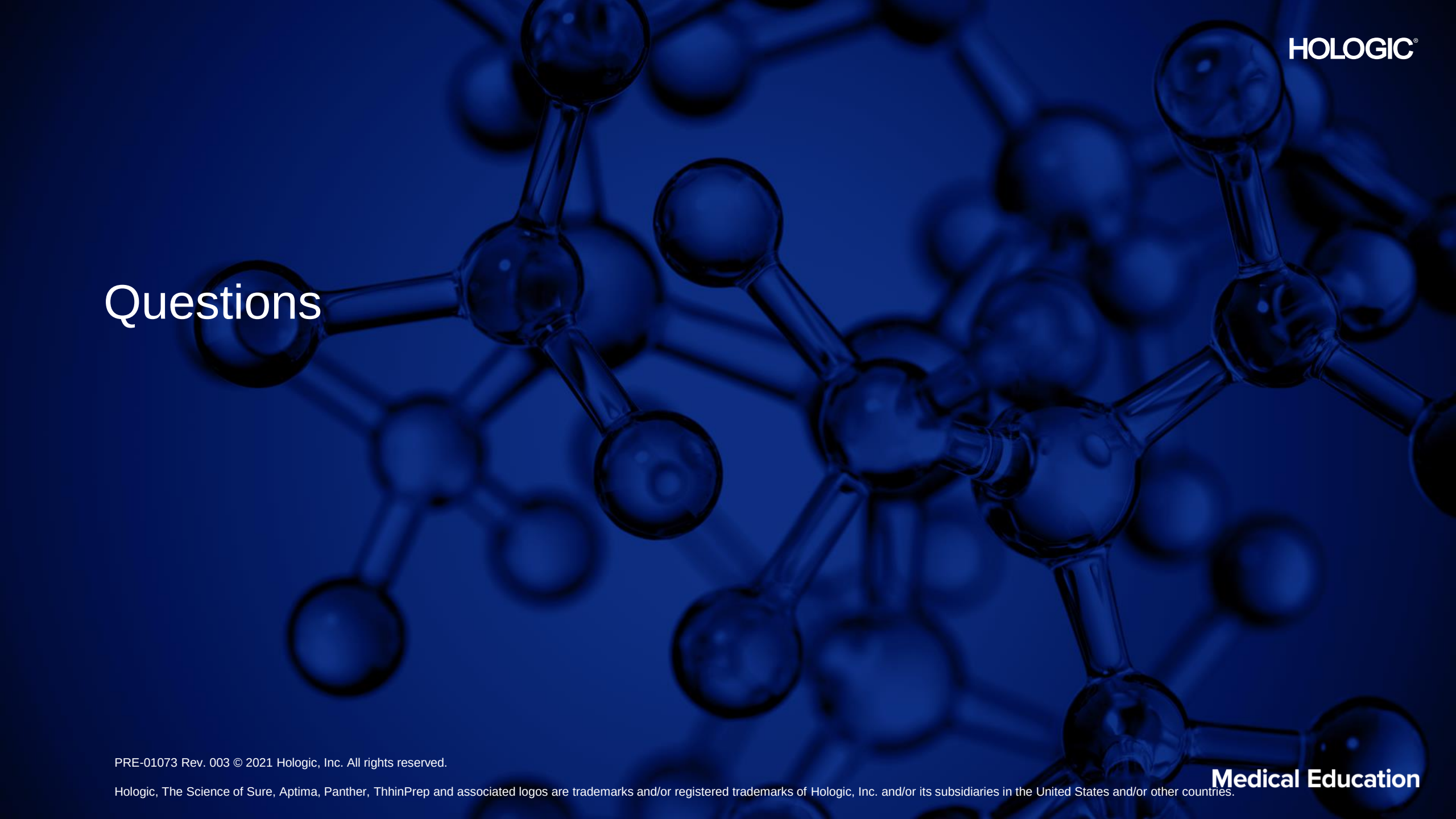
- CDC recommends screening sexually active women **or all women** 15−24 years of age[1]

Prevent serious adverse health consequences and preserve fertility by screening for all STIs that have similar symptoms

M. gen testing is recommended for women with recurrent cervicitis and should be considered in women with PID[1]

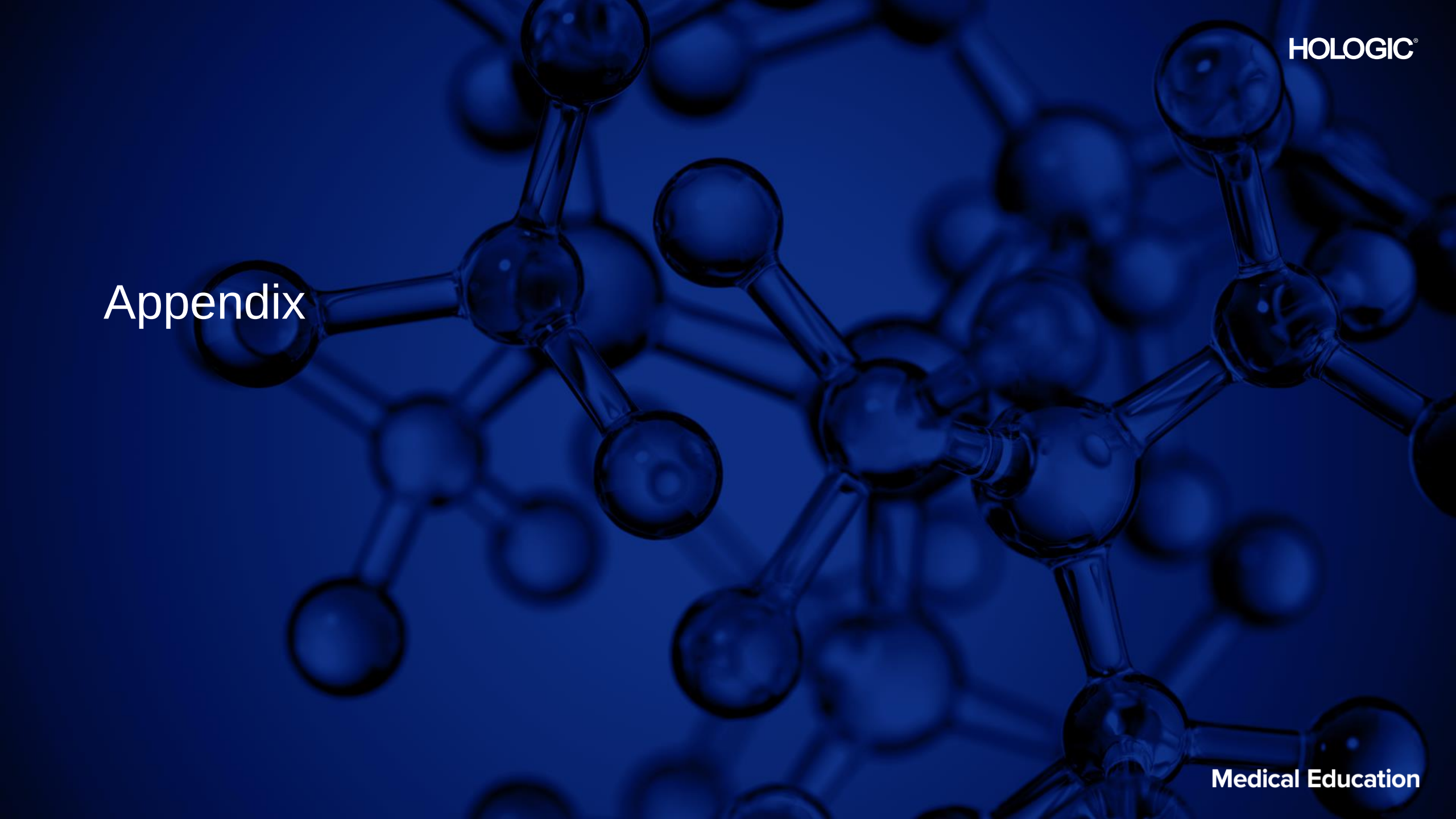
Check with your lab and utilize the Aptima® Multitest Swab for all STI collection, if available

Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70



Questions

Medical Education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Appendix
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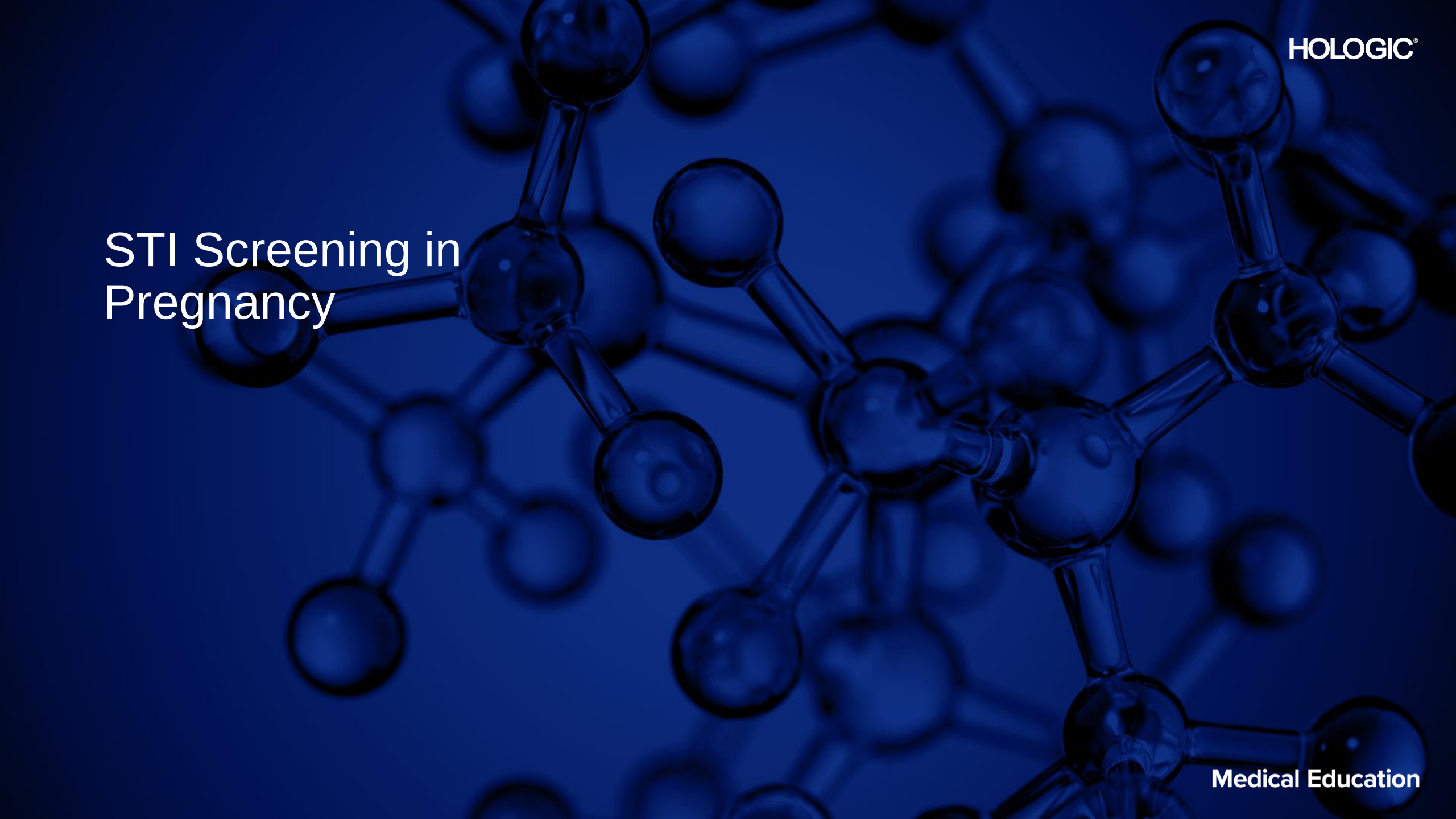
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STI Screening in Pregnancy
Medical Education

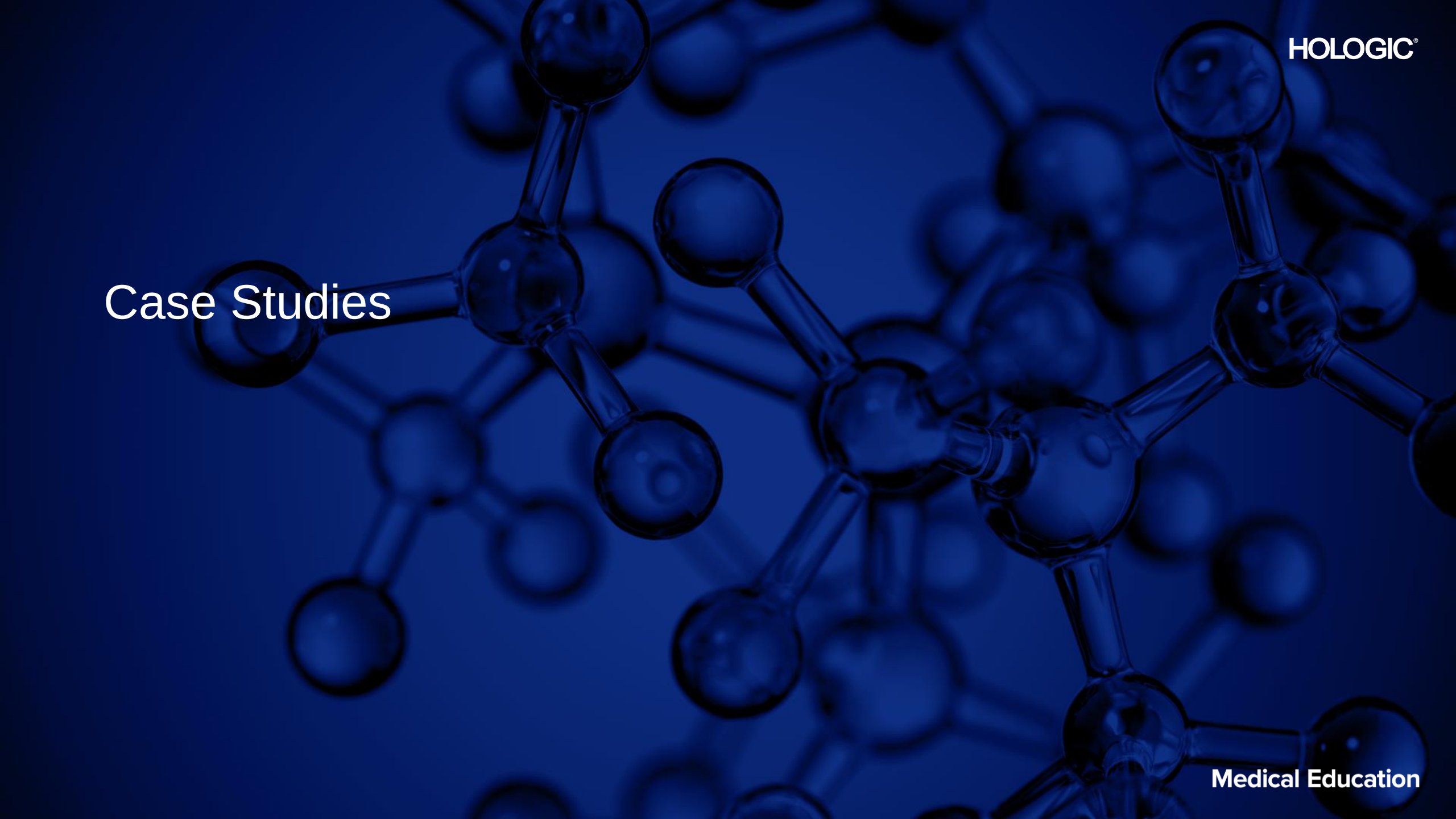
Pregnancy

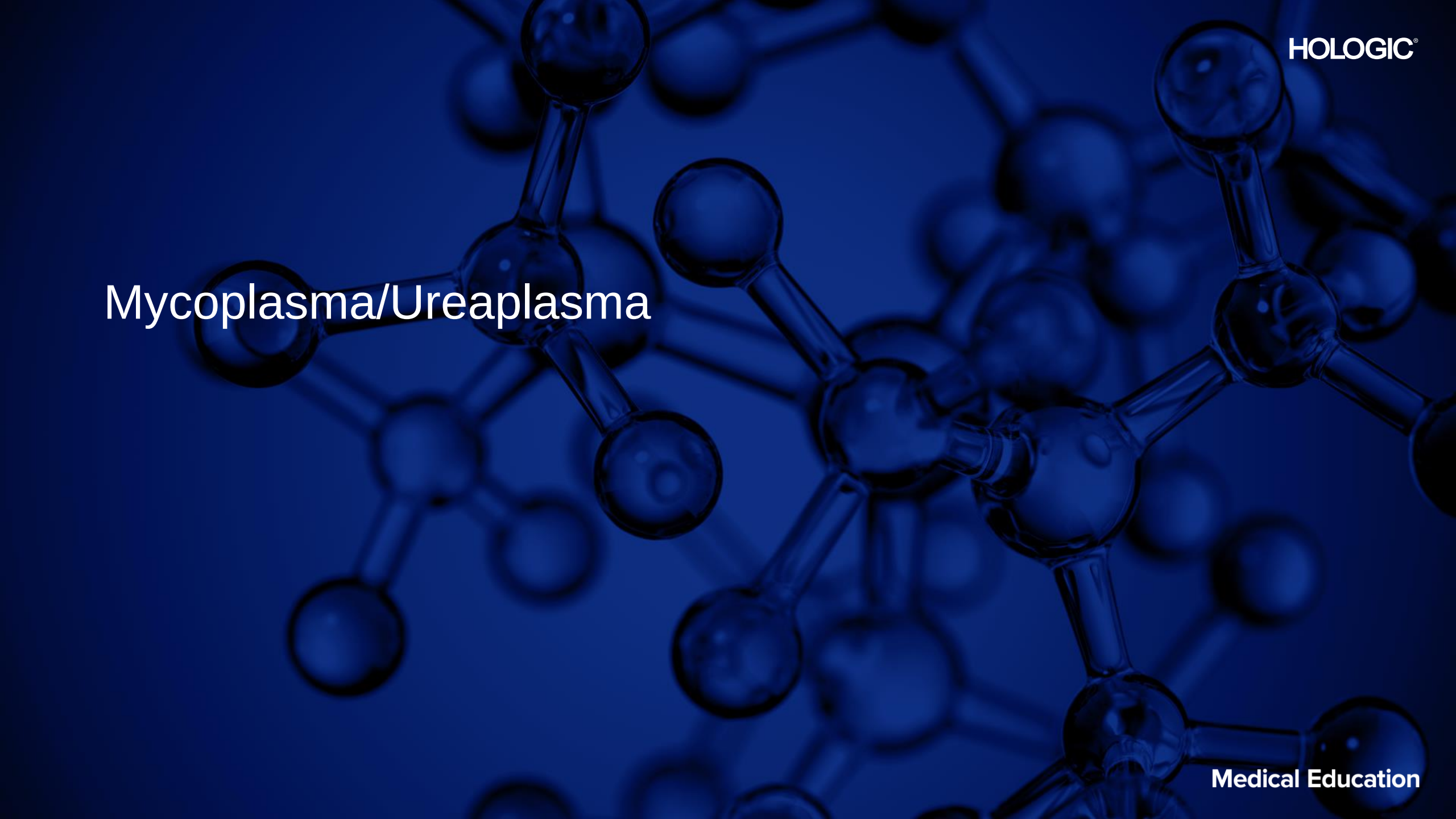
Recommended CDC and ACOG Screenings for Chlamydia and Gonorrhea[1,2*]

	Chlamydia (CT)	Gonorrhea (NG)
SCREENING at First Prenatal Visit	✓ <25 years of age	✓ <25 years of age ✓ ≥25 with risk factors
RETEST in Third Trimester	✓ <25 years of age ✓ ≥25 with risk factors	✓ X No recommendation
	✓ **Test of cure** after treatment ✓ **Retest** in 3 months	✓ **Retest** 3 months after treatment

* High risk is defined as less than 25 years of age or have new or multiple sexual partners

1. Workowski, et al. Sexually Transmitted Infections Treatment Guidelines 2021. MMWR Recomm Rep 2021;70. 2. ACOG. Chlamydia, Gonorrhea, and Syphilis. Published February 2019. Accessed October 15, 2020. https://www.acog.org/womens-health/faqs/chlamydia-gonorrhea-and-syphilis


HOLOGIC®
Case Studies
Medical Education



Mycoplasma/Ureaplasma

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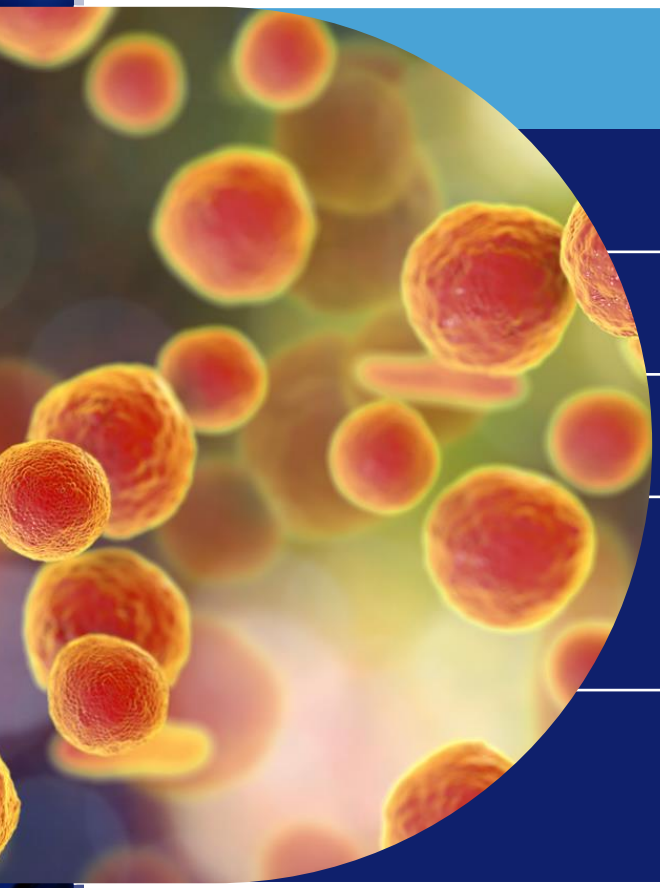
Mycoplasma genitalium is Not Like Other Mycoplasmas/Ureaplasmas



	Anatomic Site	Pathogen or Commensal
M. genitalium	Urogenital tract	Pathogen (STI)
M. hominis	Urogenital tract	Occurs more frequently with BV[1]
M. pneumoniae	Respiratory tract	Pathogen
U. parvum	Urogenital tract	• Commensal • Pathogenic in immunocompromised persons
U. urealyticum	Urogenital tract	• Commensal • Pathogenic in immunocompromised persons

Table adapted from Waites KB, Talkington DF. Mycoplasma pneumoniae and its role as a human pathogen. *Clin Microbiol* Rev. 2004; 17: 697-728.

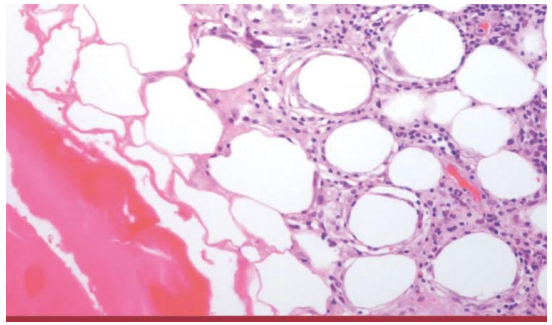
Testing for Other Mycoplasmas

IUSTI Recommendations on Ureaplasmas/*M.hominis* Testing

REVIEW ARTICLE

Should we be testing for urogenital *Mycoplasma hominis*, *Ureaplasma parvum* and *Ureaplasma urealyticum* in men and women? – a position statement from the European STI Guidelines Editorial Board

P. Horner,[1,2] G. Donders,[3] M. Cusini,[4] M. Gomberg,[5] J.S. Jensen,[6] M. Unemo[7,*]



"Routine testing and treatment of asymptomatic or symptomatic men and women for ***M. hominis, U. urealyticum and U. parvum*** **are not recommended**.

Asymptomatic carriage of these bacteria **is common**, and the majority of individuals **do not develop any disease**.

Extensive testing, detection and subsequent antimicrobial treatment of urogenital *M. hominis, U. parvum and U. urealyticum*…result in a substantial burden and economic cost for society and individuals, particularly women."

Horner P, et al. Should we be testing for urogenital Mycoplasma hominis, Ureaplasma parvum and Ureaplasma urealyticum in men and women? – a position statement from the European STI Guidelines Editorial Board. *J Eur Acad Dermatol Venereol*. 2018 Nov; 32(11): 1845-51.