Importance of Rapid STI Testing for Sexually Active Adolescent Girls

Maria Trent, MD, MPH

Faculty Disclosure

In the past 12 months, I have had the following financial relationships with the manufacturer(s) of any commercial product(s) and/or provider(s) of commercial service(s):

Associate Editor, Neinstein's Textbook of Adolescent Health: Wolters Kluwer
Research supplies through Johns Hopkins University: SpeeDx, LLC
American Academy of Pediatrics (Consultant)
Visby Medical (Consultant)

I will give a balanced presentation using the best available evidence to support my conclusions and recommendations.

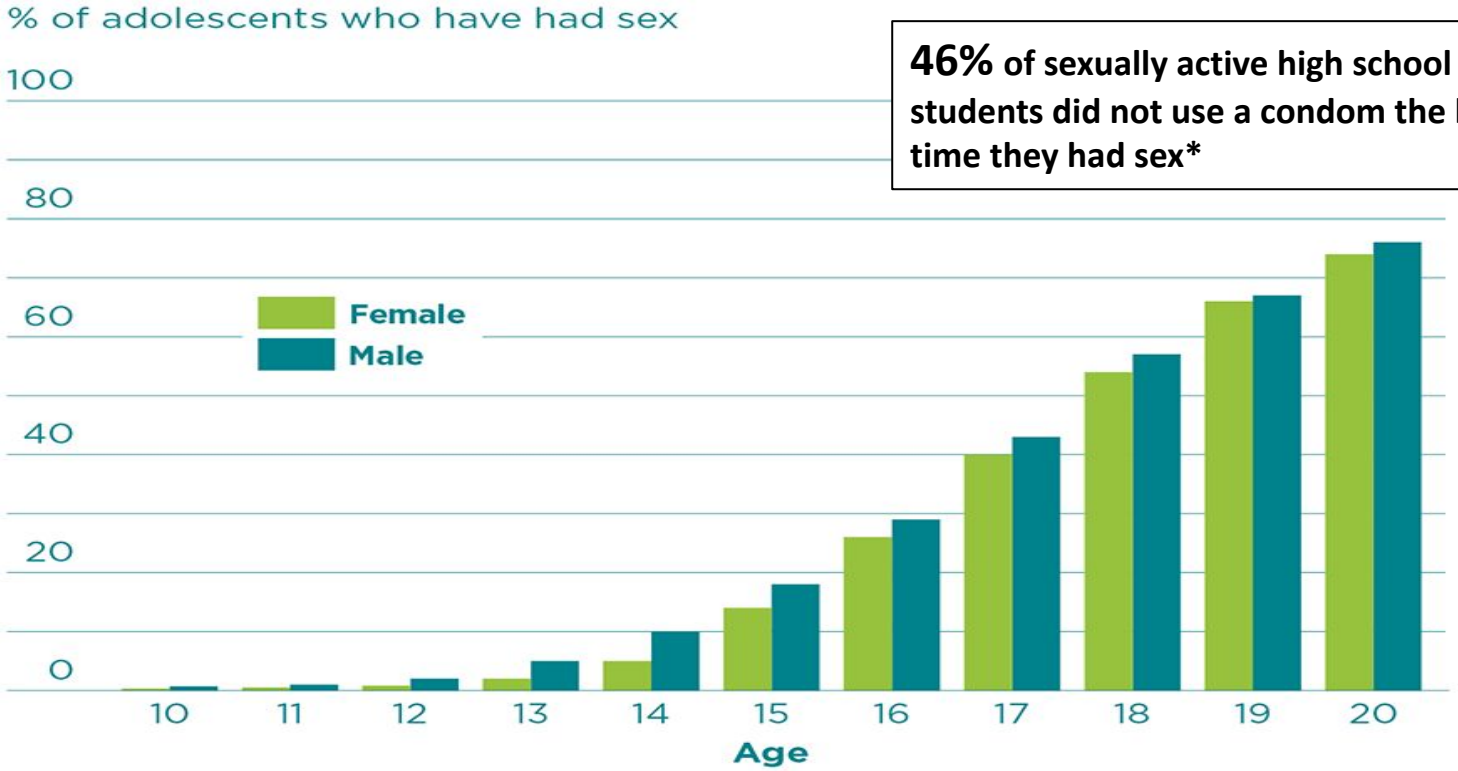
I do not intend to discuss any unapproved/investigative use of any commercial product/device in my presentation.

Learning Objectives

- Understand why and how STI screening is a critical component of optimizing adolescent health care
- Review applicable STI screening and treatment guidelines
- Demonstrate common presentations of *Chlamydia trachomatis, Neisseria gonorrhoeae,* and *Trichomonas vaginalis* using a case in practice
- Discuss practical educational and STI testing strategies for providing sexual and reproductive health care to adolescents

SEXUAL INTERCOURSE AMONG YOUNG PEOPLE IN THE U.S.

The proportion of young people who have had sexual intercourse increases rapidly with age.

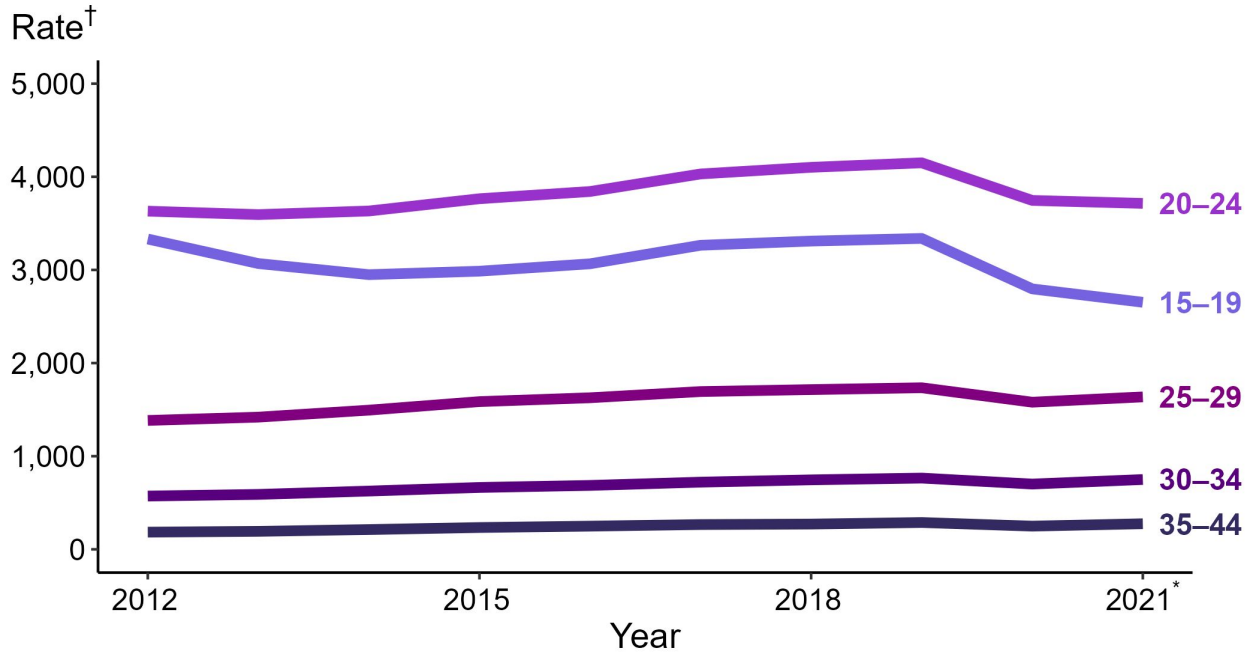


46% of sexually active high school students did not use a condom the last time they had sex*

*https://www.cdc.gov/healthyyouth/sexualbehaviors/index.htm

www.guttmacher.org

Chlamydia — Rates of Reported Cases Among Women Aged 15–44 Years by Age Group, United States, 2012–2021*

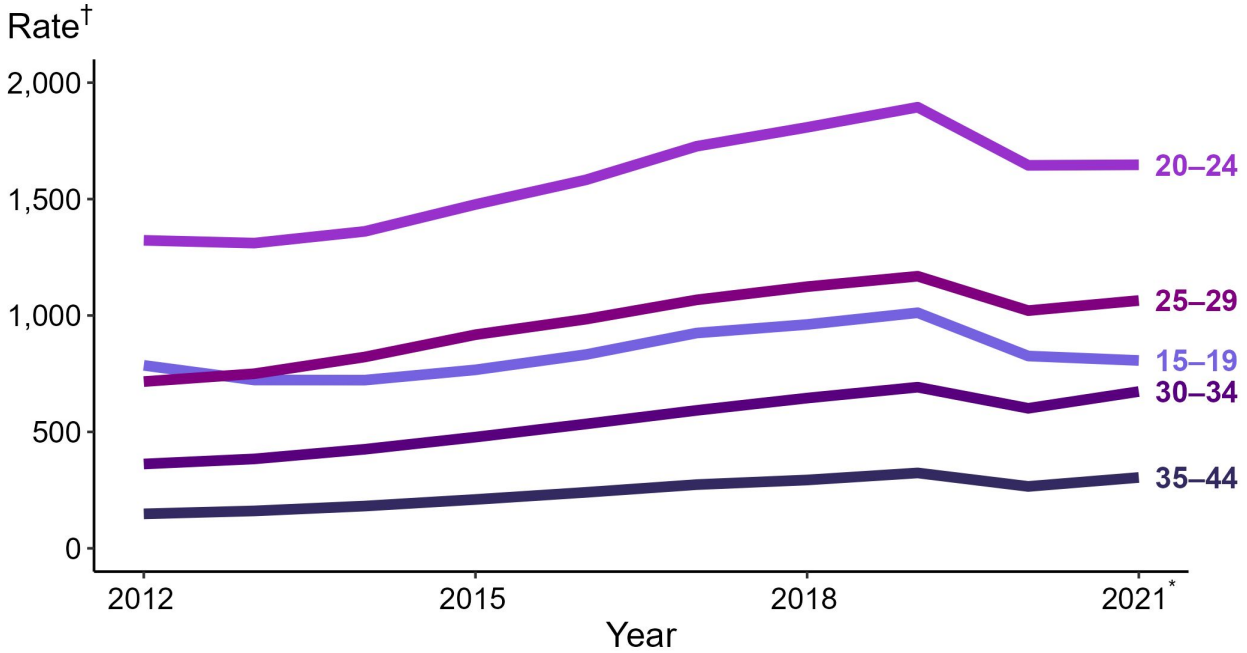


* Reported 2021 data are preliminary as of July 7, 2022

† Per 100,000

Source: Centers for Disease Control and Prevention, https://www.cdc.gov/std/statistics/default.htm, accessed 9/19/22

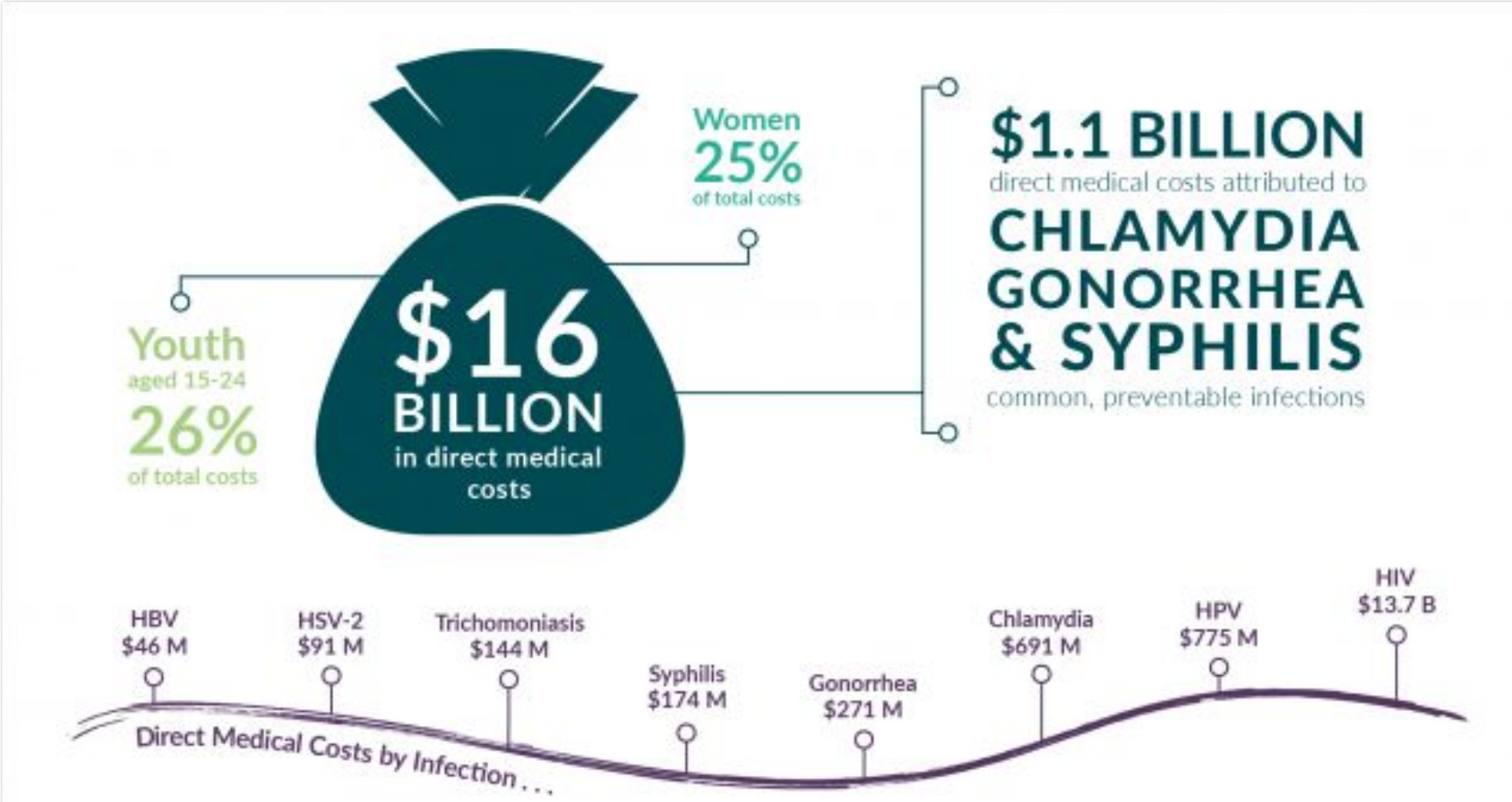
Chlamydia — Rates of Reported Cases Among Men Aged 15–44 Years by Age Group, United States, 2012–2021*



* Reported 2021 data are preliminary as of July 7, 2022

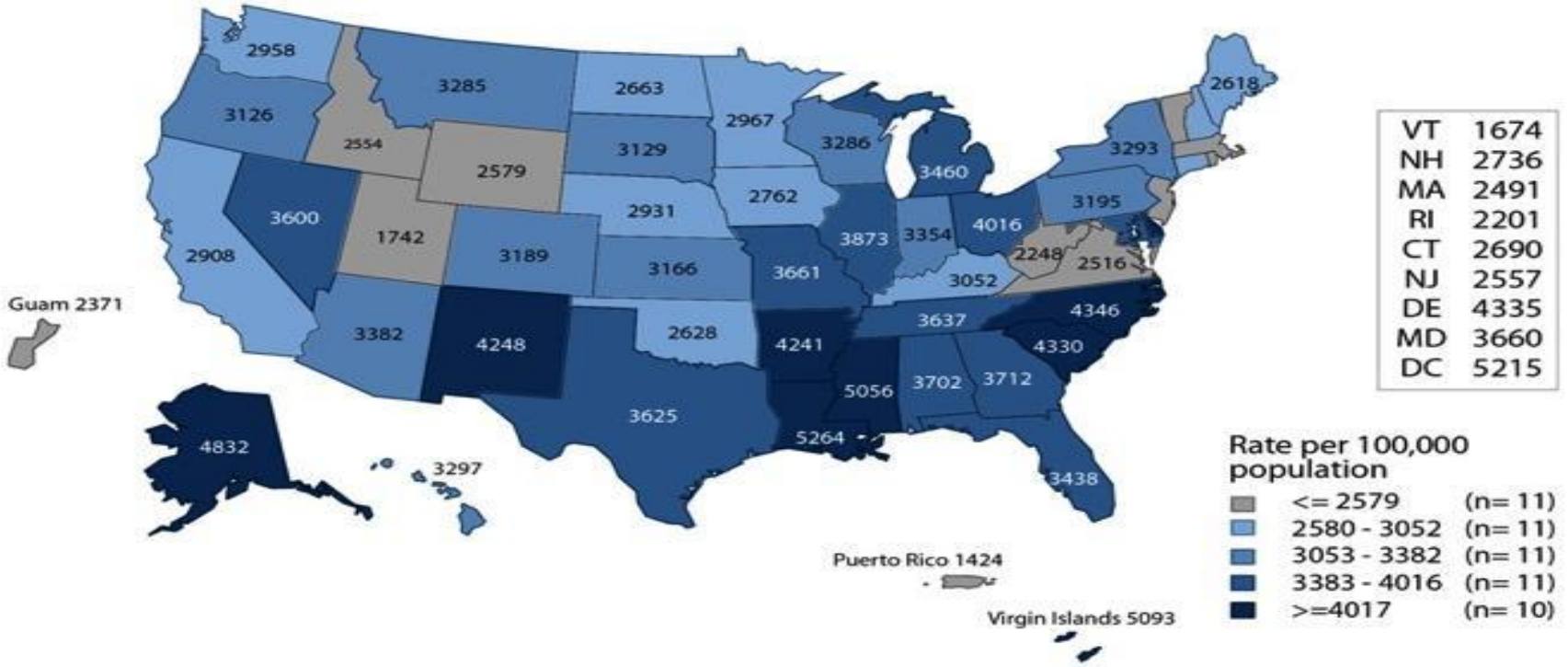
† Per 100,000

Source: Centers for Disease Control and Prevention, https://www.cdc.gov/std/statistics/default.htm, accessed 9/19/22



Source: Centers for Disease Control and Prevention, https://www.cdc.gov/std/products/infographics.htm

Chlamydia in United States, 2017



Source: Centers for Disease Control & Prevention, http://www.cdc.gov/std/stats13/figures/5.htm, Last Accessed 3/2018

Adolescent Sexual Health

Healthy sexuality is an important part of adolescent development

- Primary care providers within the medical home model play a key role in helping young people develop **healthy routines, behaviors, and relationships**
  - Important to have these conversations with adolescents on a regular basis
  - Prevent sexually transmitted infections (STIs), HIV, unintended pregnancy
- Key component of *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*, 4th Edition

Source: *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents, 4th Edition*
Source: https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/adolescent-sexual-health/Pages/default.aspx

Who is responsible for talking to adolescents about sexual health?

Parents?

- High quality parental communication
  - Delay in initiation of sexual intercourse
  - Discuss pregnancy and STI prevention with partners
  - Use contraception
  - Use condoms with last sex
- Parental conversations are increasing
  - Sexual intercourse is an area of discomfort
  - Adolescents report being embarrassed to talk about some topics with parents

Widman L, JAMA Pediatr. 2016 Jan; 170(1):52-61, Commendador K.A. *Pediatr. Nurs.* 2010;**36**:147–156, 170, Lantos H, *Int J Environ Res Public Health*. 2019;16(5):833. Ogle S, Glasier A, dd. Contraception. 2008 Apr;77(4):283-8. doi: 10.1016/j.contraception.2007.12.003. Epub 2008 Feb 12. PMID: 18342652. Photo by Jonatas Domingos on Unsplash

Parental (Adult) Distress

**"A body goes through changes during the teen years.
When you started dating, my hair turned gray.
When you started driving, I got heart palpitations..."**

Clinicians?

Young people and parents count on their health provider

PCP Visits

- Most visits (65%) had some sexual health content
- The average time of sexuality talk was 36 seconds
  - 35% 0 seconds
  - 30% 1-35 seconds
  - 35% ≥36 seconds

Alone Time with Clinicians

- Half of adolescents and young adults 13-26 have alone time to discuss sensitive topics

Critical Discussions

- Less than half of adolescents had discussion of critical health topics including sexual health

Grilo SA. J Adolesc Health. 2019 Mar;64(3):311-318., Santelli JS, Klein JD, Song X, et al. Pediatrics. 2019;143(2):e20181403, Alexander SC, *JAMA Pediatr*. 2014;168(2):163-169. Photo by Online Marketing on Unsplash

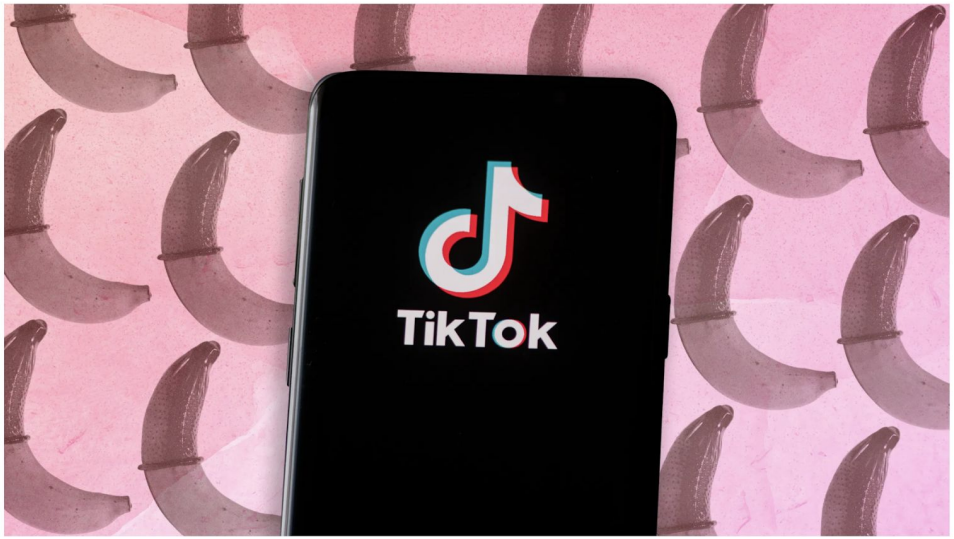
Good Sex

The TikTok Sex Ed Revolution

From licensed doctors to experienced sex therapists and sexologists, the app is creating a home for positive conversations around sex.

By Bethany Dawson

November 24, 2020



Getty Images

Source: Screenshot, https://www.glamour.com/story/tiktok-is-revolutionizing-sex-ed

STIs and COVID-19

"The COVID-19 pandemic put enormous pressure on an already strained public health infrastructure. "There were moments in 2020 when it felt like the world was standing still, but STIs weren't. The unrelenting momentum of the STI epidemic continued even as STI prevention services were disrupted."

-Jonathan Mermin, M.D., M.P.H., Director of CDC's National Center for HIV, Viral Hepatitis, STD, and TB Prevention.

Centers for Disease Control and Prevention: https://www.cdc.gov/media/releases/2022/p0412-STD-Increase.html

Perceived Risk for COVID-19? (N=194)

General 5.0 (sd 3.7)

0	1	2	3	4	5	6	7	8	9	10

During Intercourse 3.0 (sd 4.1)

- 31% COVID-19 in social circle, 8% with a death
- Adolescents & Young Adults (AYA) with COVID-19 positivity in their social circle were marginally more likely to have COVID-19 testing
  (adjusted OR 1.69, 95% CI 0.89 – 3.19, p = 0.107)
- Concern for COVID infection or COVID-19 in social circle was not associated with sexual intercourse or condom use

AYA were still sexually active during the pandemic!

Trent, M. et.al. STI/HIV World Conference, 2021

Factors Contributing to the Initial Decline in STIs Reported in 2020

- Reduced frequency of in-person healthcare services as routine visits decreased, resulting in less-frequent STI screening
- Diversion of public health staff from STI work to respond to the COVID-19 pandemic
- STI test and laboratory supply shortages
- Lapses in health insurance coverage due to unemployment
- Telemedicine practices that led to some infections not being captured in national data

Centers for Disease Control and Prevention: https://www.cdc.gov/media/releases/2022/p0412-STD-Increase.html

Sexual History

HEEADSSS

- Home
- Education/employment
- Eating
- Activities
- Drugs/alcohol
- Sexuality
- Suicide/depression/self-harm
- Safety from injury/violence

Five Ps

- Partners
- Prevention of pregnancy
- Practices
- Past history of STIs
- Protection for STIs

Communication Tip:
Adolescent-centered, non-judgmental respectful communication facilitated by open ended questions and empathy

Examination Preparation

- Patient should know what to expect and encouraged to communicate with provider during examination as needed
- Provider determines the atmosphere
- Mirrors useful to help patients understand normal versus abnormal findings
- First gynecologic/GU exam experience for young women and external genital examination for males

Preferences for STI Self-Screening

Table 1 (N=170)	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Comfortable self-collecting in a pharmacy clinic	63.5%	31.0%	4.1%	1.1%	0.6%
Collecting the vaginal specimen was easy	77.0%	22.0%	1.0%	0%	0%
STI testing at my local pharmacy was convenient	83.0%	15.0%	2.3%	0%	0%

Self-Collection of Vaginal Swab

ATTENTION: Read ALL instructions before you begin!

STEP 1

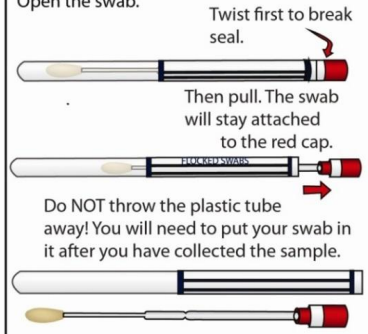
Wash your hands thoroughly.

STEP 2

Undress from the waist down. Get into a position where you can comfortably insert a swab into your vagina- such as sitting on the toilet, or standing with one foot on a chair, or any position that you would use to insert a tampon.

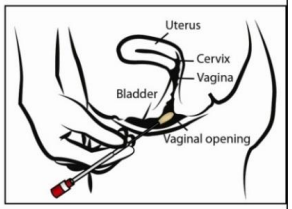
STEP 3

Take the sealed swab out of the package. Open the swab.



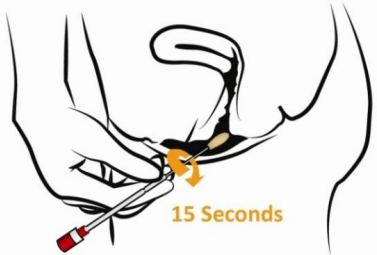
STEP 4

Insert the white tip of the swab about one inch inside the opening of your vagina.



STEP 5

Rotate the swab for 15 seconds, making sure that the swab touches the walls of your vagina so that moisture is absorbed into the swab.



STEP 6

Remove the swab from your vagina. Don't let the tip of the swab touch anything else.

STEP 7

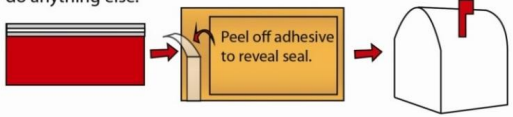
Place used swab back into the transport tube. Close tightly to prevent leakage.

STEP 8

Place closed tube into the red plastic zip-lock bag. Seal the bag.

STEP 9

Place sealed zip-lock bag into the return mailer (yellow envelope). Seal the envelope and drop it in any mailbox. It's already addressed and postage is paid, so you don't need to do anything else.



Is the Pelvic Exam Useful Anymore?

- Preventive health services/family planning*
  - Cervical cancer screening
  - STI screening
- Pregnancy (sizing & dating)*
- Menstrual disorder evaluation
- Unexplained abdominal or pelvic complaints
- Assessment of sexual assault/abuse
- Other gynecologic complaints

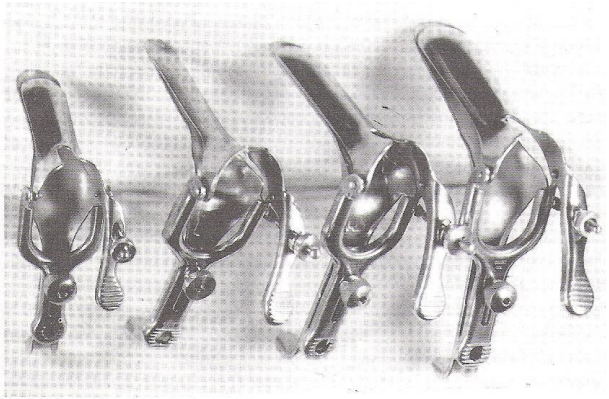
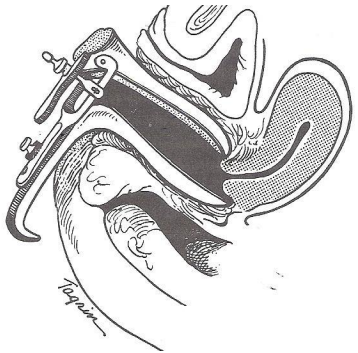
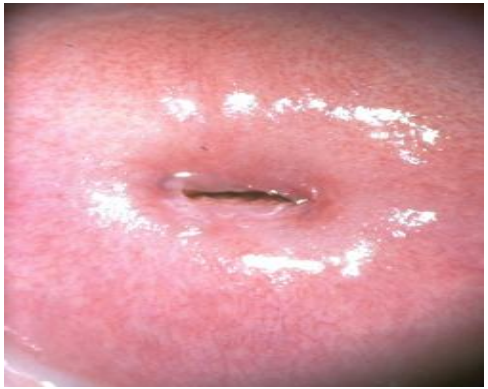


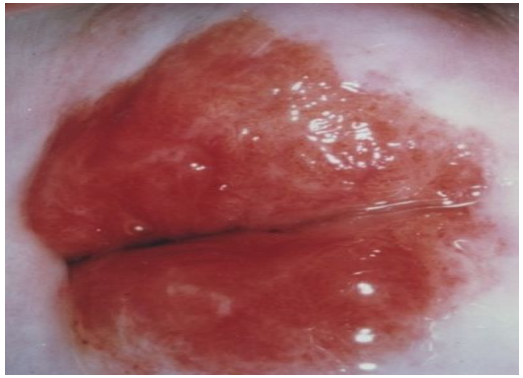
FIG. 26. Types of specula *(from left to right)*: infant, Huffman, Pederson, and Graves.

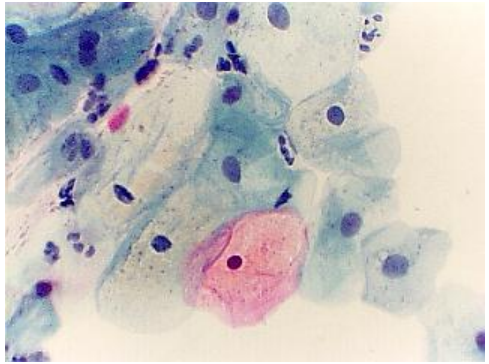


Emans,et.al. Pediatric and Adolescent Gynecology, 1998, Lippencott-Raven

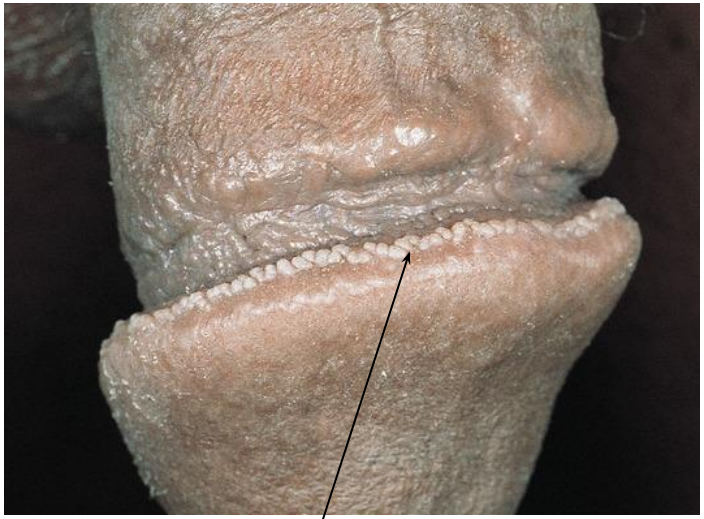
Cervix







Distinguish Variants of Normal from STIs



Pearly penile papules

Genital warts (*Condyloma acuminata*)

STI Screening Strategies

- Universal Screening
  - May not be cost-effective depending on the community STI rates
  - Parents can be prepped to expect the lab charge on the EOB
  - No pushback from insurers (anecdotally /reported in the literature)
- Targeted Screening
  - Cost-effective
  - Requires sexual health assessment by provider
  - Confidentiality cannot be assured (private insurance)
- Online /Mail Testing/Self Testing

www.iwantthekit.org

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LOGIN

IWTK I WANT THE KIT

ABOUT IWTK | WHAT IS AN STI? | TESTING | RESOURCES | RISK QUIZ

- ABOUT IWTK
- WILL ANYONE KNOW?
- RISK QUIZ
- CONTACT US

aryland, Washington DC, and Alaska can
lect a sample in the privacy and comfort
en mail it back to be tested for chlamydia,
ichomonas. It's easy to do and the results
are reliable!

GET THE STI KIT!

GET THE HIV KIT!

ENTER MY RESULTS

If you are interested but not eligible, *register here* and we will contact you if a study becomes available.

MORE INFORMATION:

Case Presentation - Megan

- Megan is a 16-year-old female who presents for a well-adolescent examination. Patient has no complaints. No significant past medical history or family history. No known drug allergies. No over-the-counter or prescription medication use.
- HEADDS assessment reveals that she lives at home with both parents, is a good student in a college-bound program at a local public high school. She reports being a cheerleader, popular among her peers, and has an upbeat mood most of the time. She denies tobacco or substance use, but recently started having sex with her first boyfriend. She uses condoms most of the time. Her parents are unaware that she has started dating/having sex. She admits that her mother has spoken with her about sex on multiple occasions, but she just doesn't want to disappoint her, LMP 1 week ago, no sex since that time.
- Physical exam completely benign. Tanner V female for breasts/pubic hair, no external genital lesions.

Managing the Decision to Have Sex

- STI/HIV Screening & Prevention
- Family Planning Counseling
- Partner Communication
  - Partner communication has been demonstrated to improve contraceptive efficacy and relationship quality
- Parental Communication
  - Communication about relationship (not the sex) is an important first step for this girl
  - Parents (mother) can be of great support in negotiating contraception

Chlamydia trachomatis (CT)

- Most common reportable bacterial sexually transmitted infection (STI) in U.S.
- Highest rates in 15- to 19-year-old adolescents regardless of demographics or location
- Health Plan Employer Data and Information Set Measure
  - Tool used by more than 90 percent of America's health plans to measure performance on important dimensions of care and service
- An adolescent and young adult woman 15-25 years should be tested for CT if she:
  - Suspects pregnancy
  - Has a history of STIs
  - Seeking/needing contraceptives
  - Seeking gynecologic services
  - Indicates sexual assault
  - Indirectly indicates she has had sexual intercourse

1) NCQA, http://www.ncqa.org/tabid/59/Default.aspx
2) CDC, http://www.cdc.gov/std/Chlamydia/hmoletter.pdf

Uncomplicated Chlamydia: Treatment

- Preferred Regimen
  - Doxycycline 100 mg BID x 7 days

- Alternative Regimens
  - Azithromycin 1g po X 1
  - Levofloxacin 500 mg q D x 7 days

SOURCE: 2021 STD Treatment Guidelines, https://www.cdc.gov/std/treatment-guidelines/chlamydia.htm

Neisseria Gonorrhoeae

- Common bacterial infection transmitted during sexual intercourse (vaginal, oral, anal)
  - pharyngitis
  - vaginitis/cervicitis--> PID
  - proctitis
  - peritonitis, arthritis, and disseminated disease can occur
- Newborn infection through maternal transmission
  - opthalmia neonatorum
- 50% of infected women have no symptoms

Diagnosis

- Gram stain (cervical/urethral)
- Culture: endocervical, urethral, rectal, pharyngeal
- Skin lesion aspiration
- Gene probe: urine vs. endocervical
- Nucleic acid amplification testing

Uncomplicated Gonococcal Infection: **Treatment**

- Recommended regimens (urethritis, cervicitis, rectum pharyngitis)
  - **Ceftriaxone 500 mg IM**
  - If CT not excluded, add doxycycline 100 mg orally 2 times/day for 7 days.
- Alternatives
  - Allergy: Gentamicin 240 mg IM in a single dose PLUS Azithromycin 2 g orally x 1
  - Ceftriaxone unavailable: Cefixime 800 mg orally x 1
- HIV counseling and testing
- Partner notification, treatment w/ abstinence for 7 days until treated (14 days for alternative regimens)

SOURCE: 2021 STD Treatment Guidelines, https://www.cdc.gov/std/treatment-guidelines/gonorrhea-adults.htm

Megan's Case Continued

- Asymptomatic screening for Chlamydia trachomatis (CT) and Neisseria Gonorrhoeae (GC) is positive for CT
- Megan finally returns with her BF for treatment after you play phone tag for a week
- Megan's mom called once in the interim because she wanted to know what the call was about
- Megan's exam has changed. She has abdominal pain and CMT on bimanual examination
- Megan's 17-year-old BF (Ryan), is also your patient and requests to be screened and treated for a 'drip'
- You learn during your visit with Ryan that he too is doing well with school/sports, but he engages in high-risk sexual behaviors outside of his relationship with Megan. He also discloses that while he likes Megan, she is not his main partner, that his other partner just found out she was pregnant, and that he is terrified about how to manage his relationships
- Megan requires treatment for PID

Megan & Ryan

Megan's Care

- Treatment for PID
  - Antibiotics
  - Partner treatment
  - Sexual abstinence
  - 72-hour follow-up
- Wants help to disclose to her mother
  - Mom to come to follow-up visit
- Encourage her to speak with Ryan about their relationship and how CT became a part of it
- Family planning & risk reduction counseling

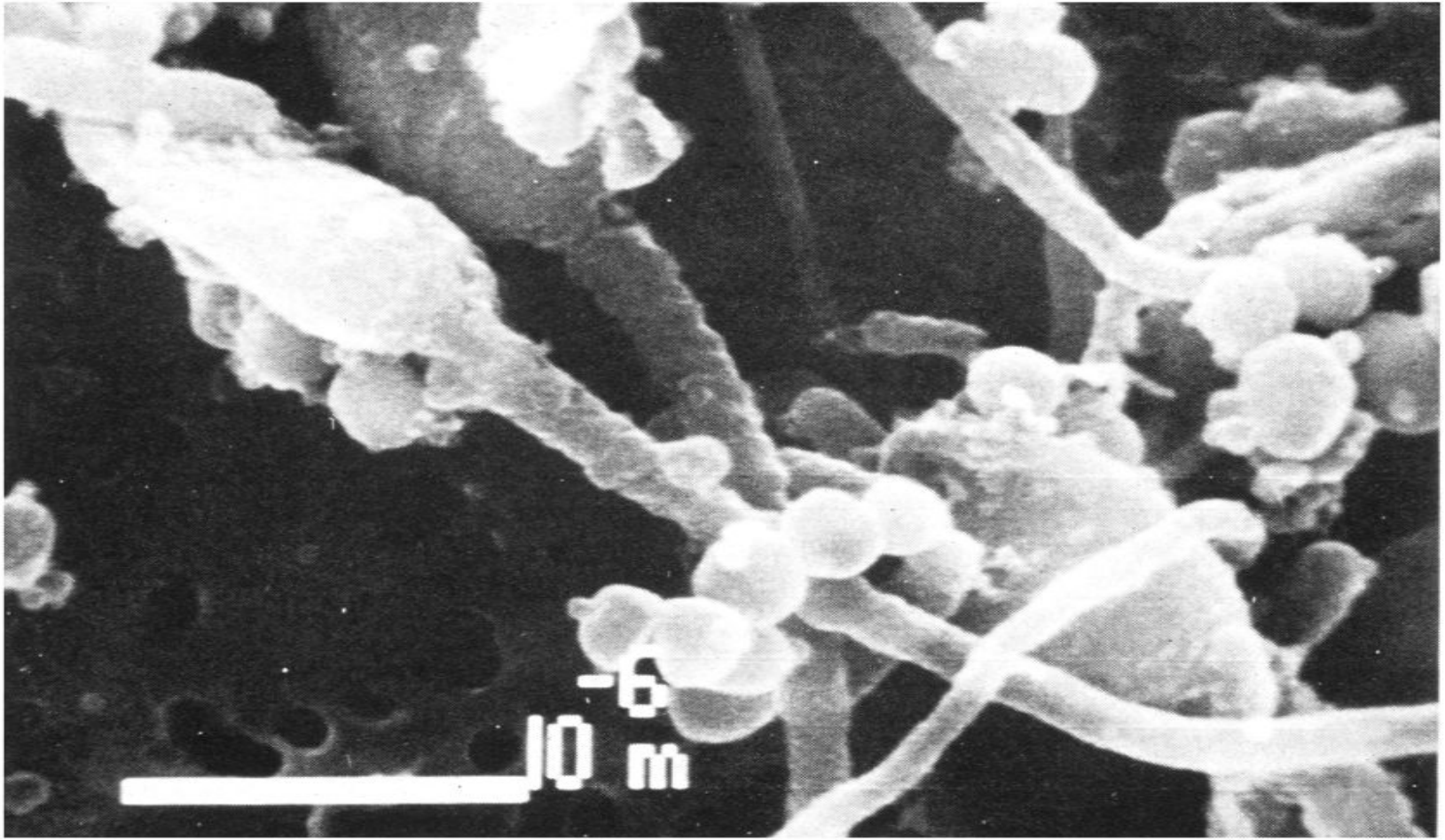
Ryan's Care

- Affirm the positives:
  - He's in for treatment
  - He's concerned about his partner(s)
  - He's doing well in other areas
- He needs help managing decisions:
  - Screen and treat for STIs
  - Discuss partner notification
    - CT poses significant health risks for pregnant partner
  - Family planning, pregnancy, and risk reduction counseling
  - Encourage him to communicate with Megan about the situation—it will eventually come out
  - Encourage parental involvement
- He still needs well care:
  - Schedule routine physical examination & give influenza immunization

PID Epidemiology

- Affects >800,000 women per year in the US (20% adolescents)
- Accounts for 300,000 hospitalizations annually
- Leads to more than 2 million outpatient visits annually
- Causes one or more long term sequelae in ¼ of patients
  - Infertility
    - 80% of urban teens say fertility somewhat or very important regardless of gender*
  - Ectopic pregnancy
  - Chronic pelvic pain

***Trent** M, Millstein SG, Ellen JM. J Adolesc Health. 2006 Mar;38(3):282-7.



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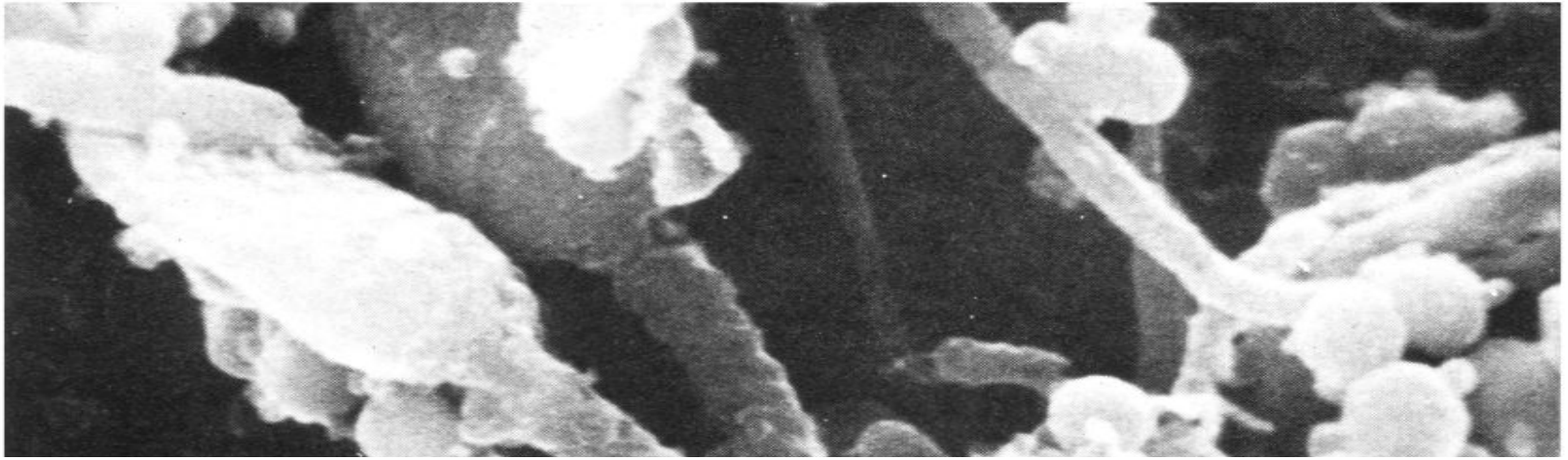
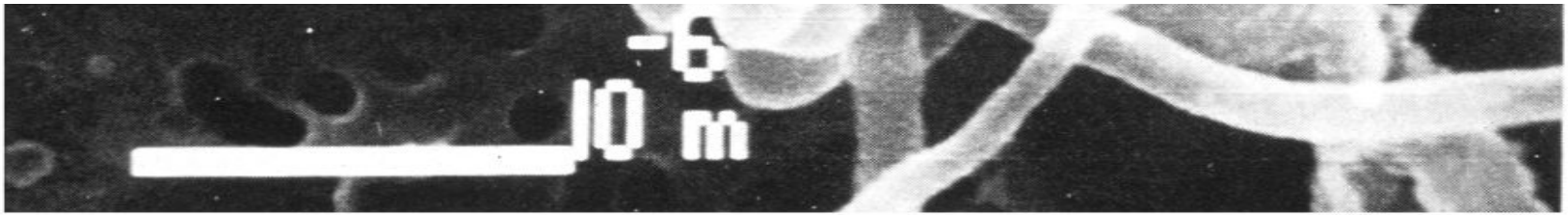
Oakland University sperm motility lab, http://www2.oakland.edu/biology/lindemann/spermfacts.htm



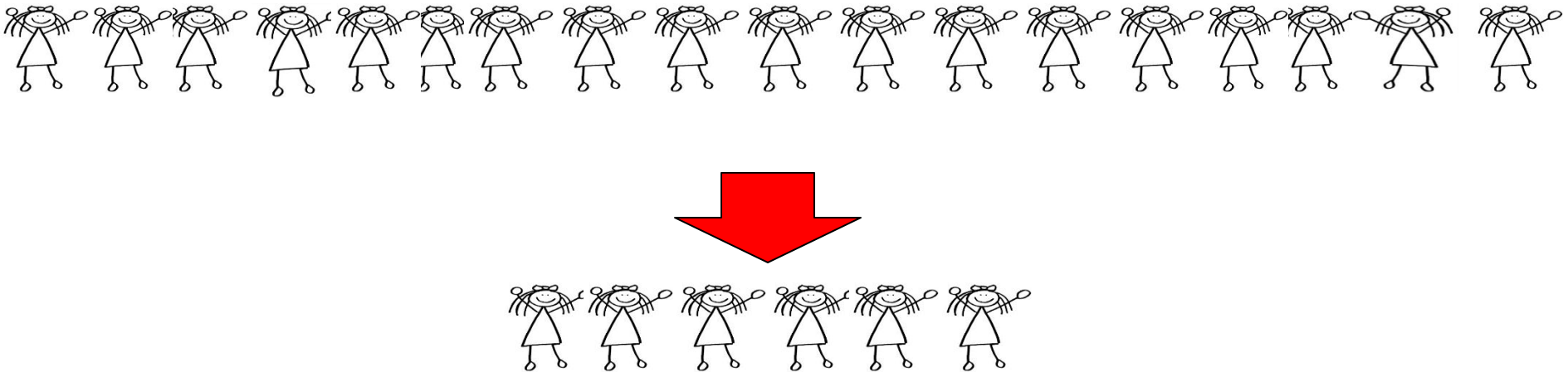
Average sperm count per ejaculate ~280 million
Travel time to female fallopian tube ~5-68 minutes
PID RISK: 1:8 for 15y compared with 1:80 in 25y



Original magnification x 30,000

Oakland University sperm motility lab, http://www2.oakland.edu/biology/lindemann/spermfacts.htm

National Provider Adherence to CDC Guidelines for PID



~60,000 girls
Receive care per CDC Guidelines

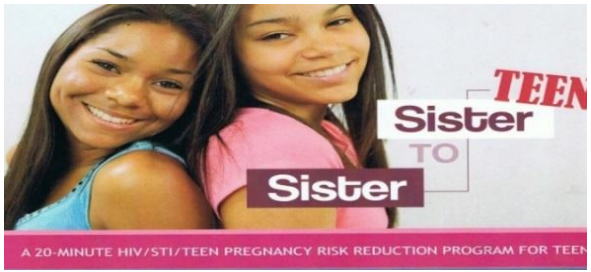
Goyal M, Hersh A, Luan X, Localio R, Trent M, Zaoutis T JAMA Pediatr. 2013 Jul;167(7):672-3
Shih TY, Gaydos, Rothman RE, Hseih YH. Sex Trans Dis, 2011, 38 (4): 299-305

Prevention of Recurrent Disease is Critical

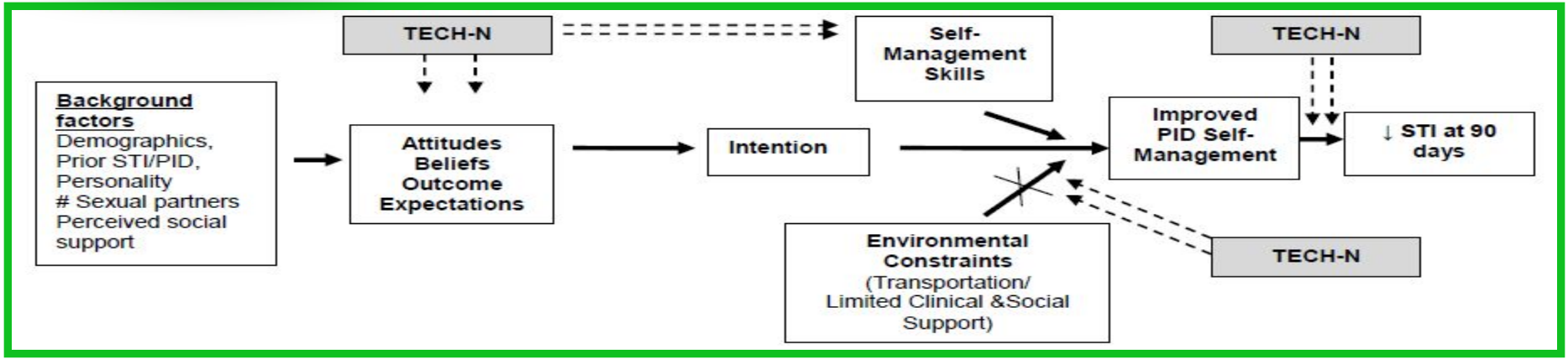
Adolescent Girls ≤ 19 years (Mean 18.0 ± 1)				
	Recurrent PID (N = 50)	**No Recurrent PID (N =149)**	**OR (95% CI)**	**Adjusted OR (95% CI)***
Pregnancy**	34 (68.0)	108 (72.5)	0.8 (0.4 – 1.6)	1.1 (0.5 – 2.2)
Live Birth	22 (44.0)	80 (53.7)	0.7 (0.4 – 1.3)	0.9 (0.4 – 1.7)
Infertility	13 (26.0)	23 (15.4)	1.9 (0.9 – 4.2)	1.9 (0.8 – 4.4)
Chronic pelvic pain	**34 (68.0)**	**44 (30.1)**	**4.9 (2.5 – 9.8)**	**5.0 (2.3 – 10.6)**

Trent, et.al. Sex Transm Dis. 2011 Sep;38(9):879-81

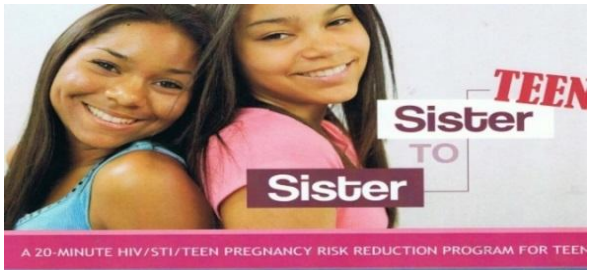
Technology Enhanced Community Health-Nursing RCT (R01 NR13507)



RESPECT YOURSELF!
PROTECT YOURSELF!
BECAUSE YOU ARE WORTH IT!!!



Technology Enhanced Community Health-Nursing RCT (R01 NR13507)



RESPECT YOURSELF!
PROTECT YOURSELF!
BECAUSE YOU ARE WORTH IT!!!

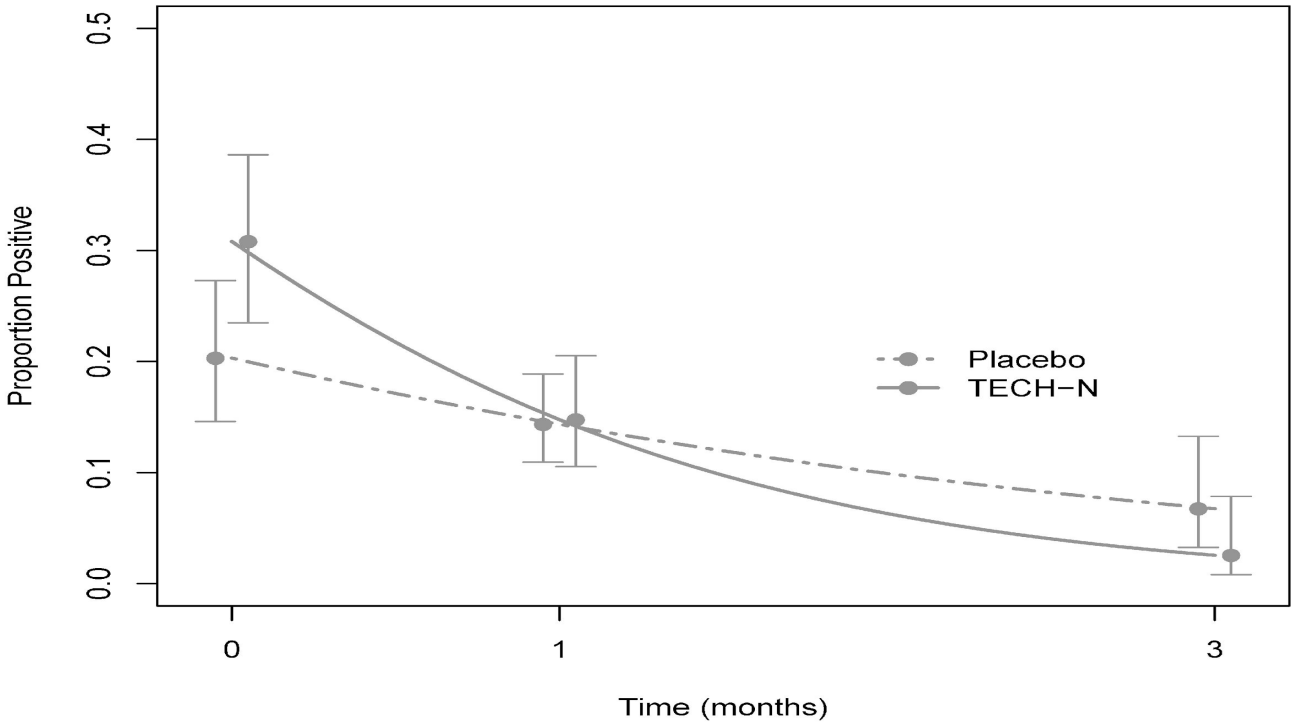
N=292

95% Retention

**Efficacy for Delivery of CDC Rec F/U

AOR: 86.3 (34.91, 213.50) < 0.001

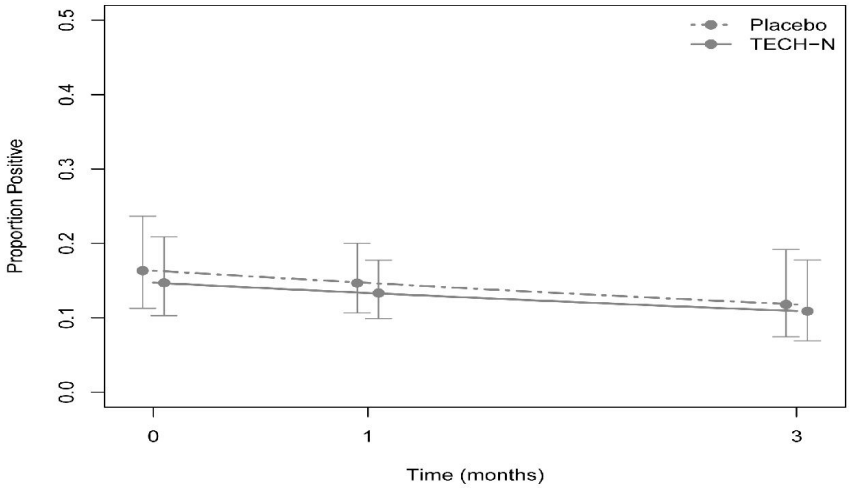
GC/CT Positivity Over Time (GEE)



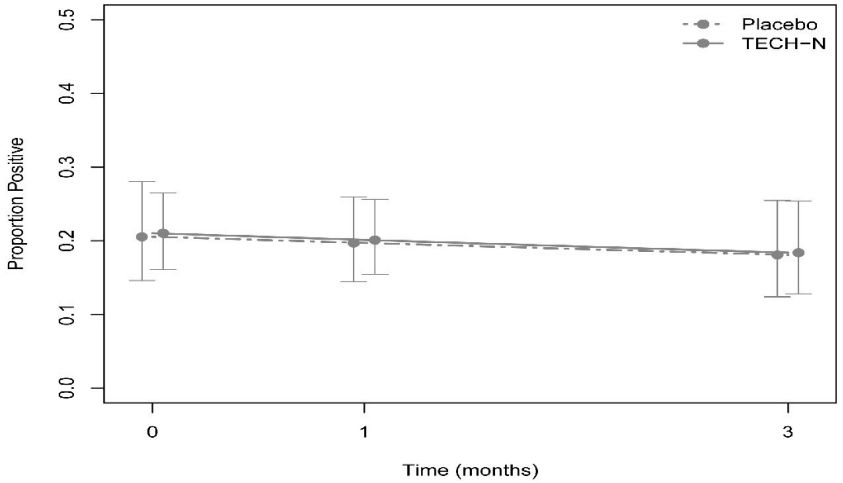
TECH-N participants experienced a **28%** decline from baseline STI positivity compared with **14%** in control group at 90-days (p=0.04)

Trent, TECH-N, 2018

TV/MG Positivity Over Time



TECH-N participants experienced a **2.6%** decline from baseline TV positivity compared with **2.5%** in control group at 90-days (p=0.944)



TECH-N participants experienced a **3.8%** decline from baseline MG positivity compared with **4.5%** in control group at 90-days (p=0.975)

Non-PID Sample

Table 1 Symptoms, risk score and STI results

	Overall (n=483)	Pregnant (n=166)	Not Pregnant (n=317)	OR* (95% CI)	P Value
Symptoms; N (%)					0.002†
None	287 (59%)	115 (69%)	172 (54%)	(reference)	
1–2	149 (31%)	43 (26%)	106 (33%)	1.65 (1.08 to 2.52)	
3+	47 (10%)	8 (5%)	39 (12%)	3.26 (1.47 to 7.23)	
Risk score (0–10); mean (SD)	4.0 (1.4)	4.0 (1.0)	4.0 (1.6)		0.779‡
STI positivity; N (%)					
Mycoplasma genitalium	75 (16%)	28 (17%)	47 (15%)	0.87 (0.52 to 1.45)	0.602†
Trichomonas vaginalis	43 (9%)	14 (9%)	29 (9%)	1.09 (0.56 to 2.13)	0.790†
Chlamydia trachomatis	39 (8%)	15 (9%)	24 (8%)	0.83 (0.42 to 1.62)	0.592†
Neisseria gonorrhoeae	7 (1%)	2 (1%)	5 (2%)	1.35 (0.22 to 14.32)	0.710§
Any STI	135 (28%)	49 (30%)	86 (27%)	0.89 (0.59 to 1.35)¶	0.583†
More than one STI	23 (5%)	7 (4%)	16 (5%)	1.21 (0.49 to 3.00)**	0.677†

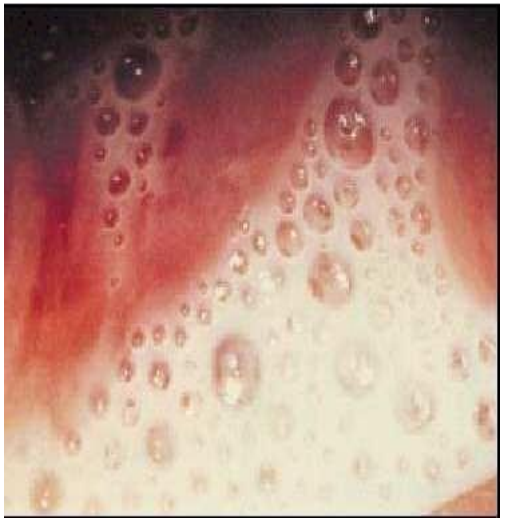
*For women who are not pregnant relative to those who are pregnant.
†Significance determined by χ^2 test.
‡Significance determined by Student's t-test.
§Significance determined by Fisher's exact test.
¶Reference no STI.
**Reference no or single STI.

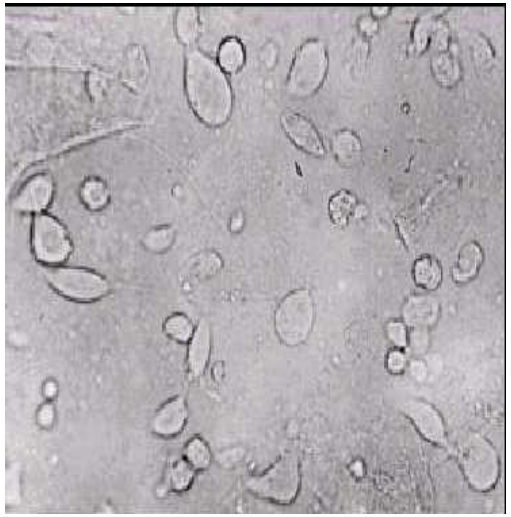
Trent M, *et al*. *Sex Transm Infect* 2018;**0**:1–3. doi:10.1136/sextrans-2017-053367

Trichomoniasis

- Diffuse, malodorous, yellow-green discharge with vulvar irritation, severe pruritis, or post coital bleeding
- Usually sexually acquired
- Infection through fomites possible but not proven (may survive several hours in urine or on wet towel)

Clinical Findings of *Trichomonas vaginalis*





- Flagellated parasites dancing under coverslip
- Increase leukocytes
- pH >4.5
- 10% KOH gives fishy odor → + Whiff test
- Larger than sperm

Trichomoniasis Treatment

Recommended Regimen

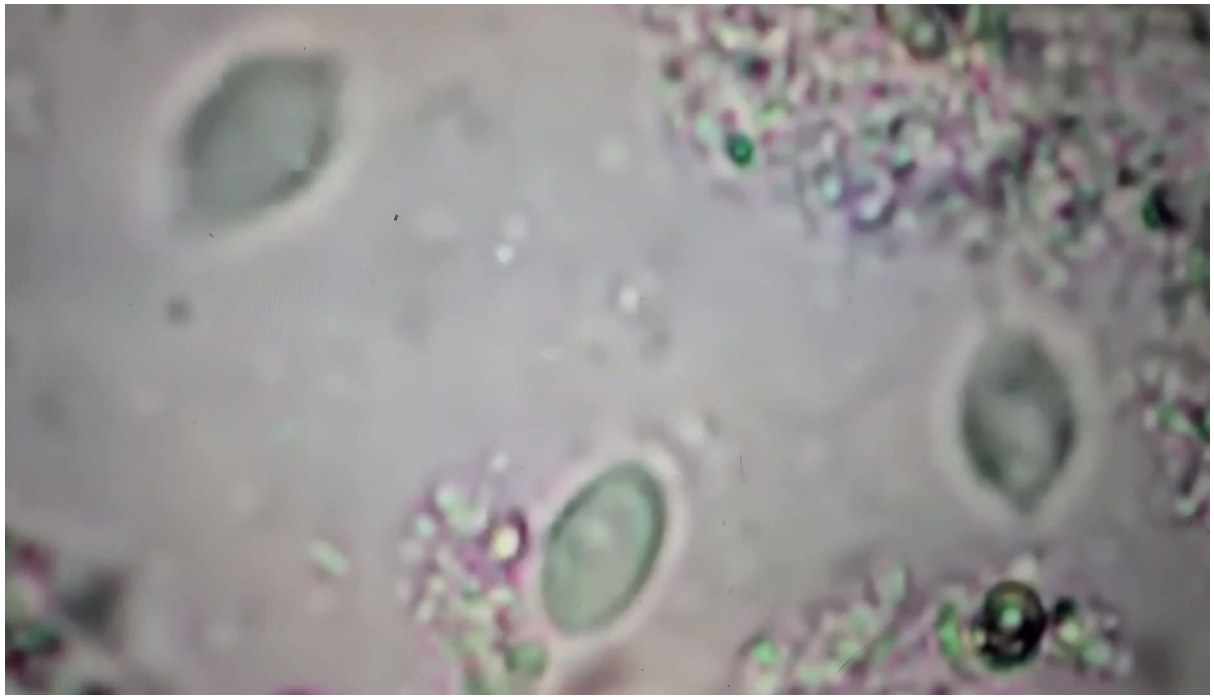
- **Metronidazole** 500 mg 2 times/day for 7 days (Women)
- Metronidazole 2 g PO x 1 (Men)

OR

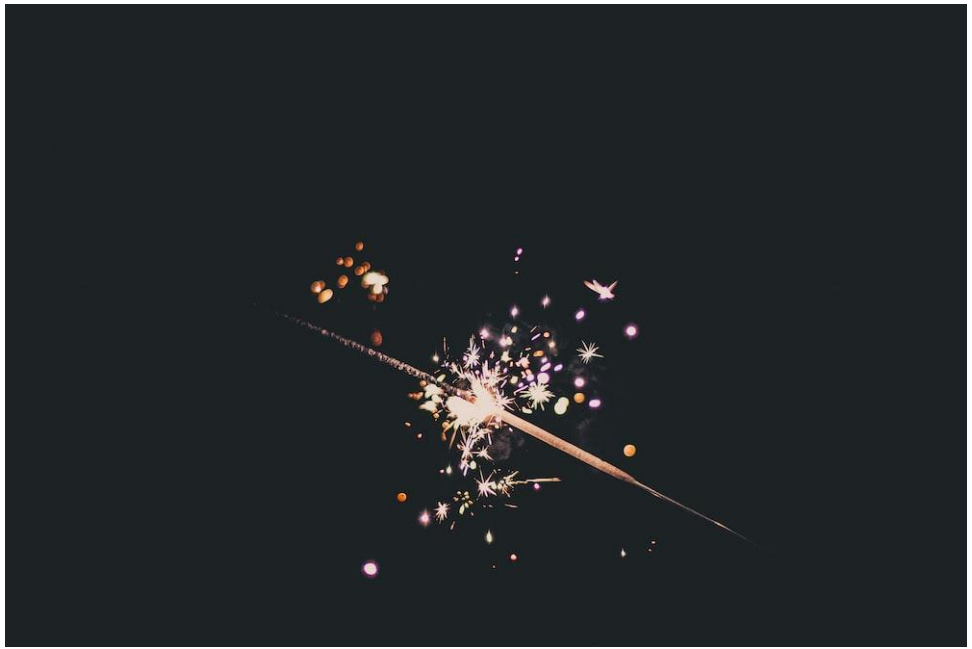
- Tinidazole 2 g PO x 1

SOURCE: 2021 STD Treatment Guidelines, https://www.cdc.gov/std/treatment-guidelines/trichomoniasis.htm

The Public Does Not Understand Disease or Impact → No Public Health Control



What if……



- No phone tag
- Fewer confidentiality hassles
- Accurate real time diagnosis in less than 30 minutes
- Easy staff workflow (15 sec to process)
- Can move beyond traditional care sites
- Prevention of PID - stop infections before they progress

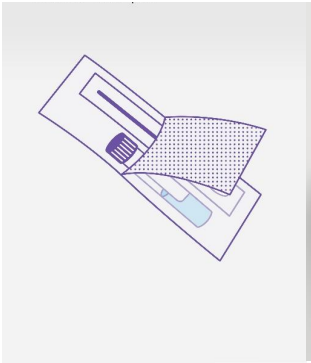
Photo by Jez Timms on Unsplash


Sexual Health
CONTROL
CHLAMYDIA
GONORRHOEAE
TRICHOMONAS
PCR
1
2
3

Sexual Health Test

Rapid PCR POCT for CT, NG, and TV in <30 minutes
Self-collected female vaginal swabs

Step 1:
Collect Sample



Step 2:
Input Sample

Step 3:
Run Test

Close button 1

Press buttons 1, 2, 3

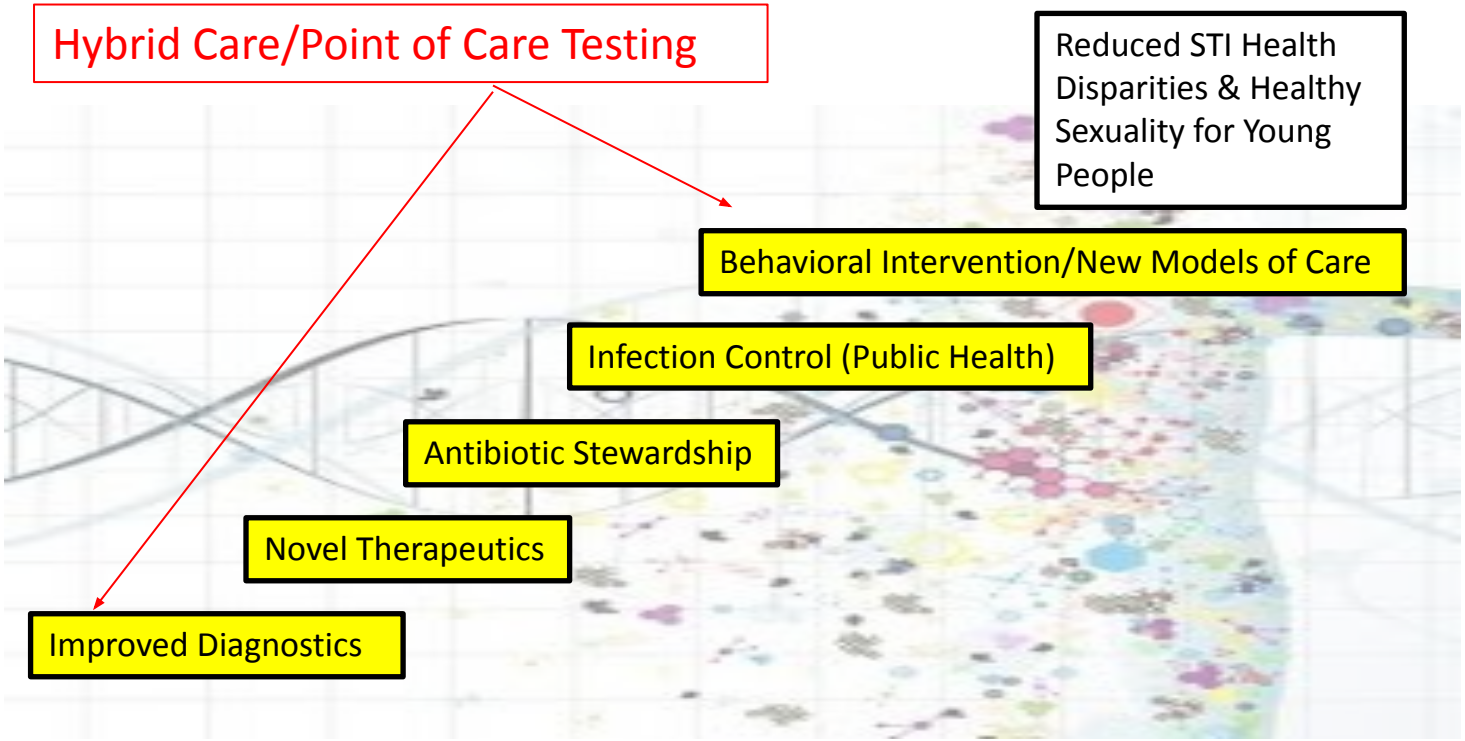
Step 4:
Read Results

Evaluable Clinical Trial Subjects

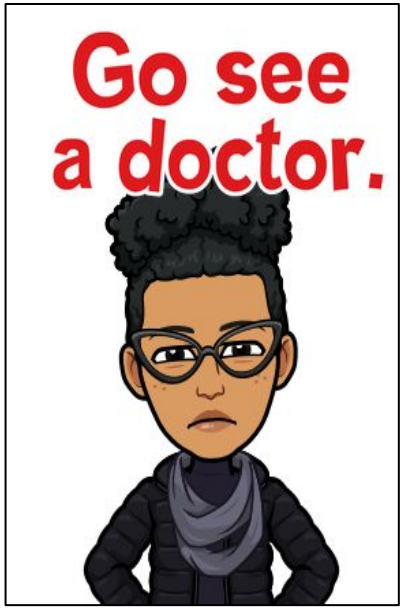
Organism / Prevalence	Performance		
	Sensitivity	Specificity	Total N
CT 8.47%	97.44%	97.80%	1795
NG 2.43%	97.78%	99.09%	1807
TV 7.89%	99.30%	96.78%	1786

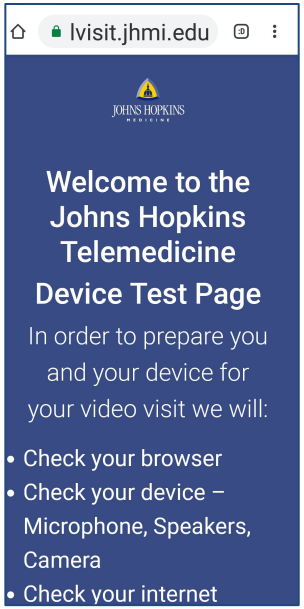
Morris SR, et al. A Cross Sectional Study of Performance of a single use rapid point-of-care PCR device for the detection of *Neisseria gonorrhoeae, Chlamydia trachomatis* and *Trichomonas vaginalis.* Lancet ID 21:668-676, 2021 DOI: https://doi.org/10.1016/S1473-3099 (20)30734-9.

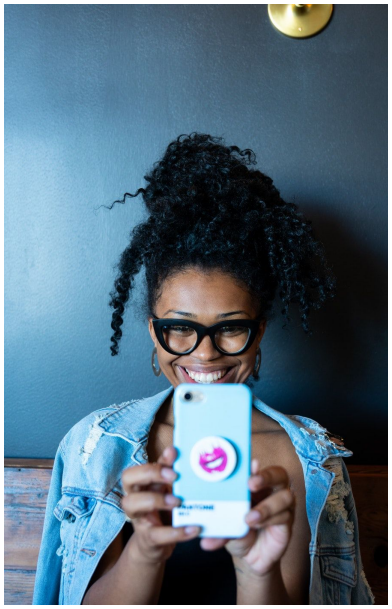
Offer Precision STI Care



Innovation Will Optimize Workflows and Health Care Quality







Summary

- Adolescents and emerging adults are at risk for STIs
- Careful clinical history- taking and examination are critical part of high quality care delivery
- Routine screening is critical for prevention of complications
- Using point-of-care testing may optimize care outcomes for patients

Questions/Conversation