



# STI 101: GONORRHEA (GC), CHLAMYDIA (CT), AND COMMON STI SYNDROMES

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Training Center

# PTC Disclaimer

**Some terms in this presentation may have been modified to align with executive order requirements that this CDC-funded grant has received.**

# Why Train on STIs

- Gaps: Few standardized trainings in medical training programs to address sexual health communication, cultural sensitivity, and counseling.
- Goals for this training are to:
  - Bridge the gap in knowledge and confidence around sexual health
  - Improve patient centered care
  - Identify opportunities for interventions

# STI Care



**Sexual History  
and Physical  
Examination**



**Prevention**



**Screening**



**Partner  
Services**



**Evaluation of  
STD Related  
Conditions**



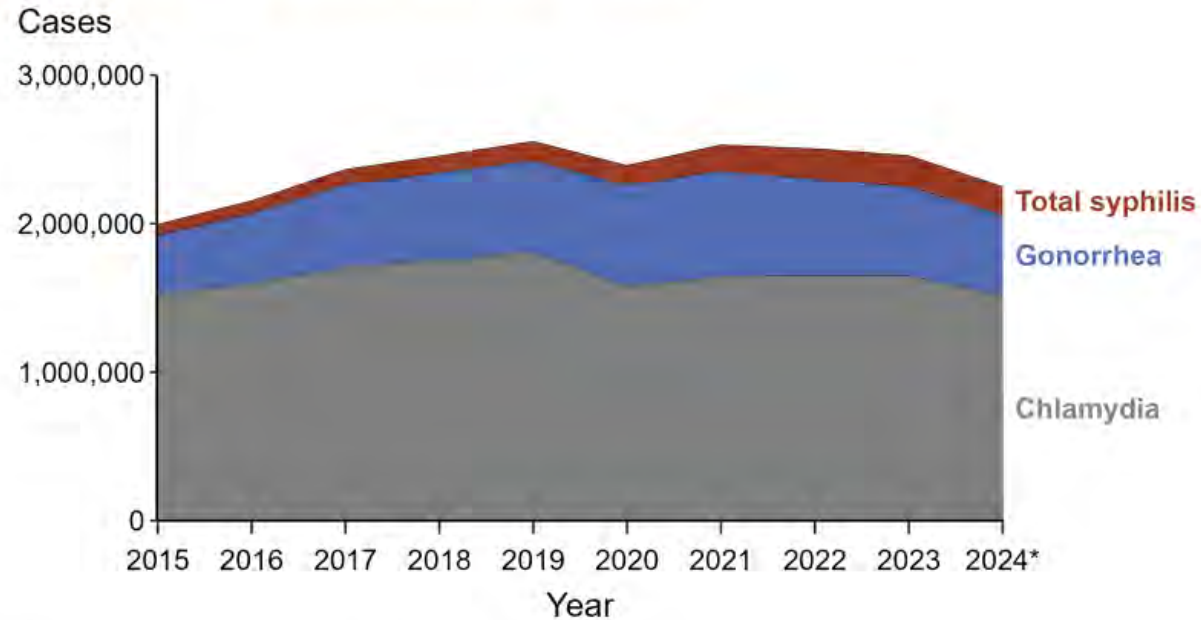
**Laboratory**



**Treatment**

# STI Epidemiology

## Sexually Transmitted Infections (STIs) — Reported Cases by STI and Year, United States, 2015–2024

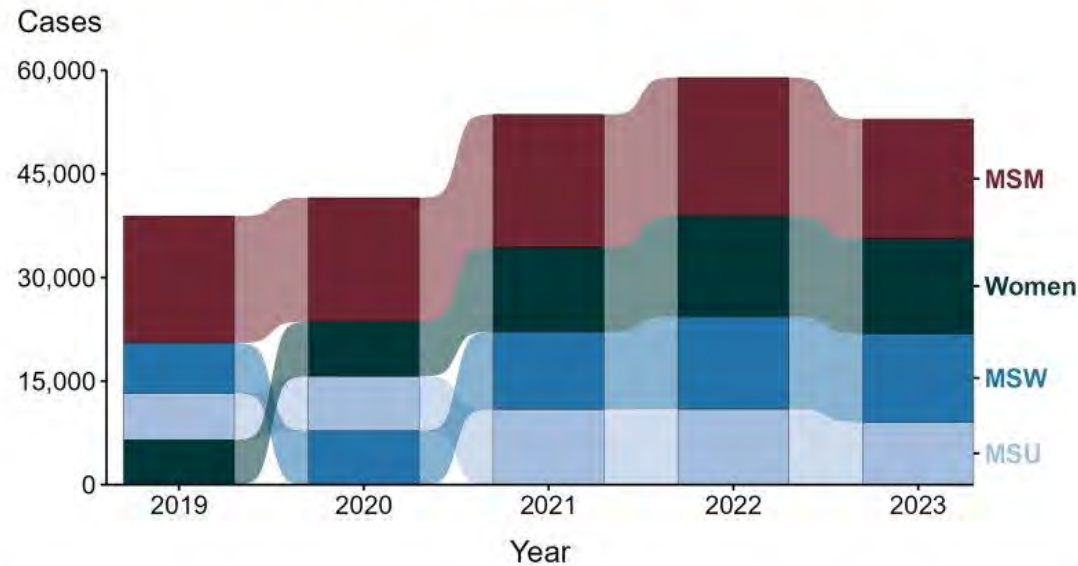


\* 2024 data are provisional as of August 14, 2025.

**NOTE:** "Total syphilis" includes all stages of syphilis and congenital syphilis.

# STI Trends by Sex and Partners

## Primary and Secondary Syphilis — Reported Cases by Sex and Sex of Sex Partners, United States, 2019–2023

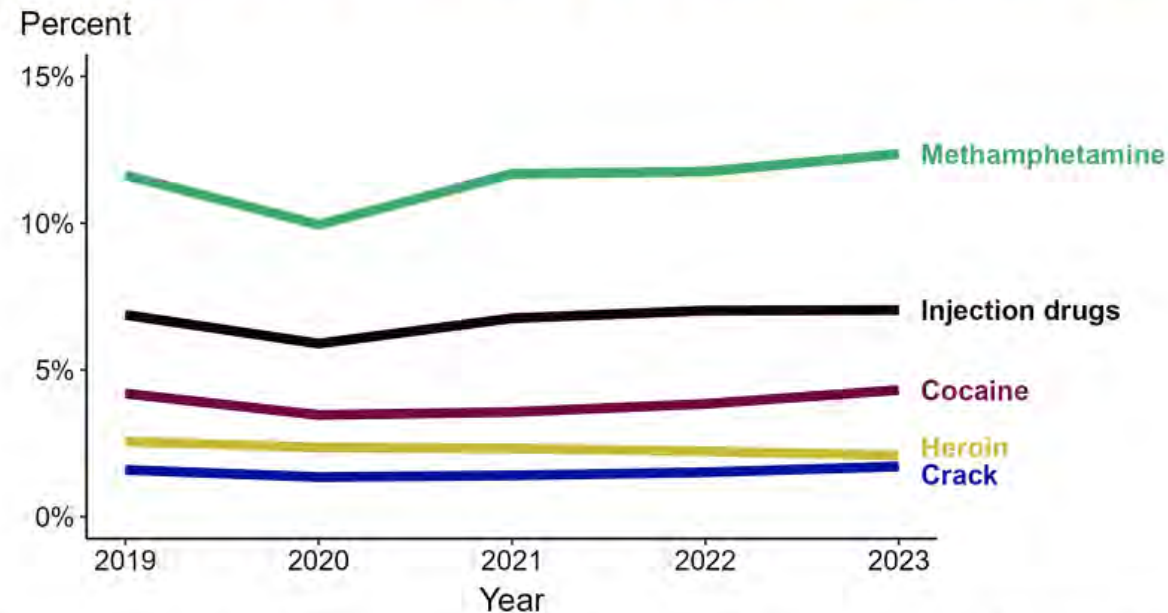


**ACRONYMS:** MSM = Men who have sex with men; MSU = Men with unknown sex of sex partners; MSW = Men who have sex with women only

**NOTE:** During 2019 to 2023, 0.2% of cases were reported with unknown or missing sex and were not displayed in this figure.

# STI Trends by Substance Use

## Primary and Secondary Syphilis — Percentage of Cases Reporting Selected Substance Use Behaviors\*, United States, 2019–2023



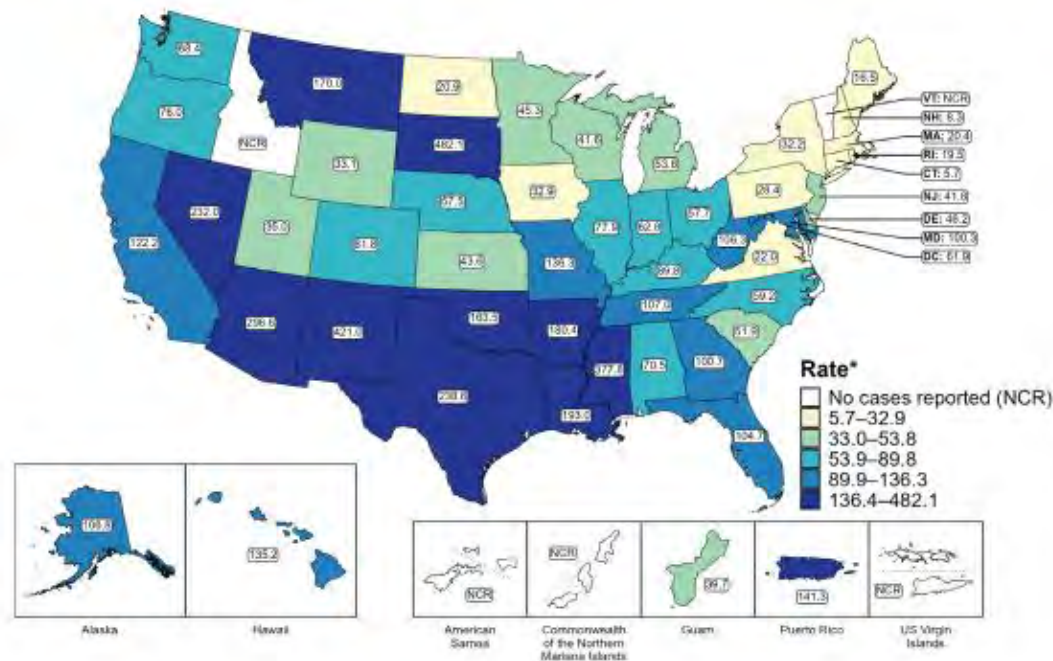
\*Percentage reporting injection drug use, methamphetamine use, heroin use, crack use, or cocaine use within the last 12 months calculated among cases with known data (cases with missing or unknown responses were excluded from the denominator).

Note: Substance-use categories are not mutually exclusive and display the data as they were received by CDC. "Injection drugs" is a distinctly reported category and is not substance-specific.

3

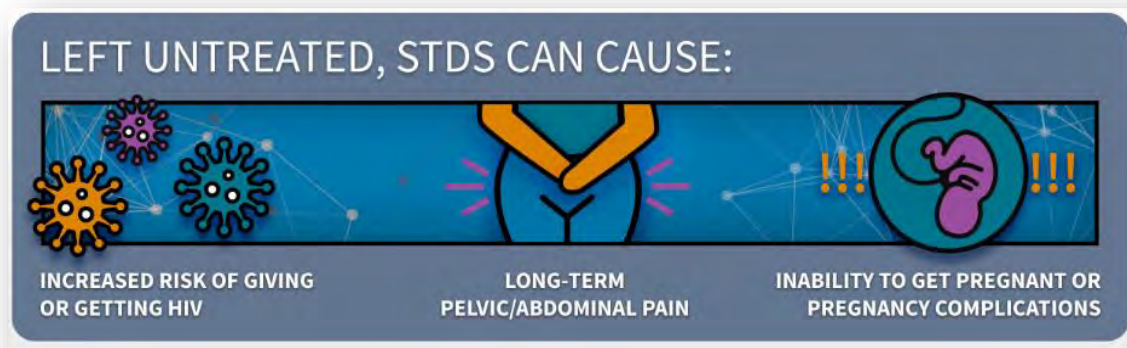
# STI Trends by Jurisdiction, USA

Congenital Syphilis — Rates of Reported Cases by Jurisdiction, United States and Territories, 2023



• 2023 STI surveillance report. P 96. [CDC.gov/sti-statistics/media/pdf](https://www.cdc.gov/sti-statistics/media/pdf)

# STIs are Not Benign



- Pelvic inflammatory disease
- Chronic pelvic pain
- Infertility
- Adverse pregnancy outcomes
  - Prematurity
  - Stillbirth
- Urethral strictures
- Gastrointestinal fistulas
- Peri-rectal abscesses
- Severe complications of syphilis
  - Permanent hearing or vision impairment

# Sexual History Taking... Again

- 16-year-old
- Presents to clinic as a walk-in
- Feels like he just wants to get tested for STIs
- No specific complaints



# Guidelines for Physical Examination

## General Techniques

- Introduce yourself and persons in the room
- Discuss the purpose and procedures being done
- Address anxiety, discomfort with exam
- Avoid provoking or suggestive language
- Talk before touch
- Hand hygiene and glove – do not touch anything after gloving

## Male Genital Exam

- General:
  - Acknowledge piercings, tattoos, and scars
  - Verbalize steps of the exam
  - In case of inappropriate/threatening behavior, leave room, get another examiner. Safety first
  - Maintain drapes for modesty
- Ordered approach to exam
  - Palpate inguinal nodes
  - Palpate scrotal contents: testes, epididymis, spermatic cord
  - Inspect skin (glans, foreskin, coronal sulcus, shaft, scrotum), meatus
  - External anal exam

# Jack's History: 5 P's CDC

- Partners
  - 6 male partners in the past 2 months
    - Meets partners on an app
  - 1 regular female partner
- Practices
  - Oral (gives and receives), vaginal and anal intercourse (insertive and receptive)
- Protection from STIs
  - Condoms “sometimes”, doesn't like the sensation
- Past history of STIs
  - Chlamydia in the past
- Pregnancy intention
  - Doesn't want kids but does not know what his female partner uses



# Testing for Jack?

- 3 Site Screening
  - Swabs and urine
    - Oral, anal and urine
  - Blood
    - HIV, Hep C, RPR
    - Immunization: Hep A, B, HPV, Mpox



# General STI Screening Recommendations

Population	Recommendations
Men who have sex with men	At least annually, <b>test at each site of exposure</b> (urethra, rectum) for sexually active MSM regardless of condom use or every 3-6 months if at increased risk.
Patients taking PrEP	<b>All patients</b> starting and taking oral PrEP should have genitourinary and extra-genital testing performed at baseline and <b>every 3 months</b> .
Persons living with HIV	For sexually active individuals, screen at first HIV evaluation and at least annually thereafter. <b>More frequent screening</b> might be appropriate depending on individual risk behaviors and local epidemiology
Non-pregnant Women	<b>Test at least annually</b> for sexually active women under 25 years of age and those aged 25 years and older if at increased risk Rectal chlamydial testing can be considered in females <b>based on sexual behaviors and exposure</b> through shared clinical decision making.
Men who have sex with women***	Consider screening young men in high prevalence clinical settings (adolescent and STI clinics and correctional facilities)
Pregnant Women	All pregnant women under 25 years of age and those aged 25 years and older if at increased risk. <b>retest during 3rd trimester</b> if under 25 years of age or at risk.

# Why an Emphasis on Extragenital Testing

Missed  
Diagnosis

Change in  
Management

ORIGINAL STUDY

## Extragenital Gonorrhea and Chlamydia Among Men and Women According to Type of Sexual Exposure

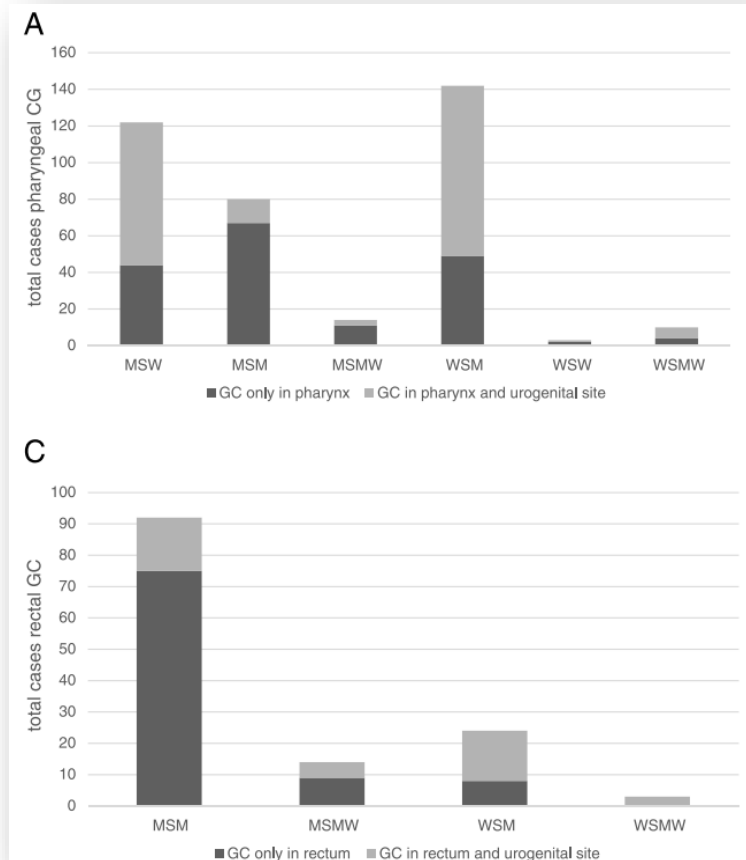
*David M. Bamberger, MD,\*†‡ Georgia Graham, MD,\*§  
Lesha Dennis, BA,† and Mary M. Gerkovich, PhD‡*

- Kansas City Department of Health STD Clinics - 9,646 clinical encounters

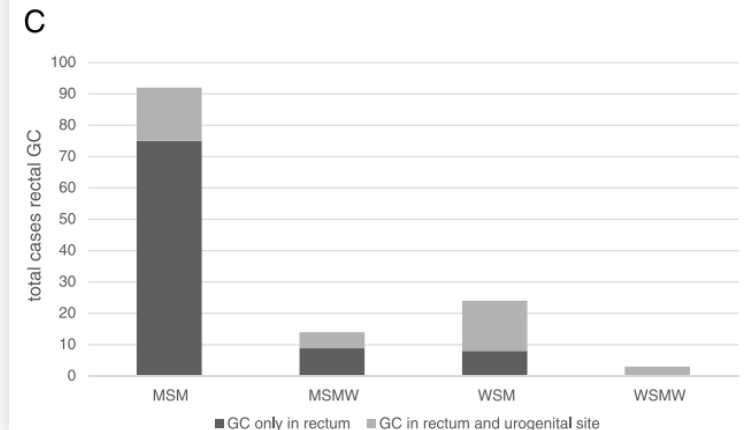
# Emphasis on Extragenital Testing

Pharyngeal

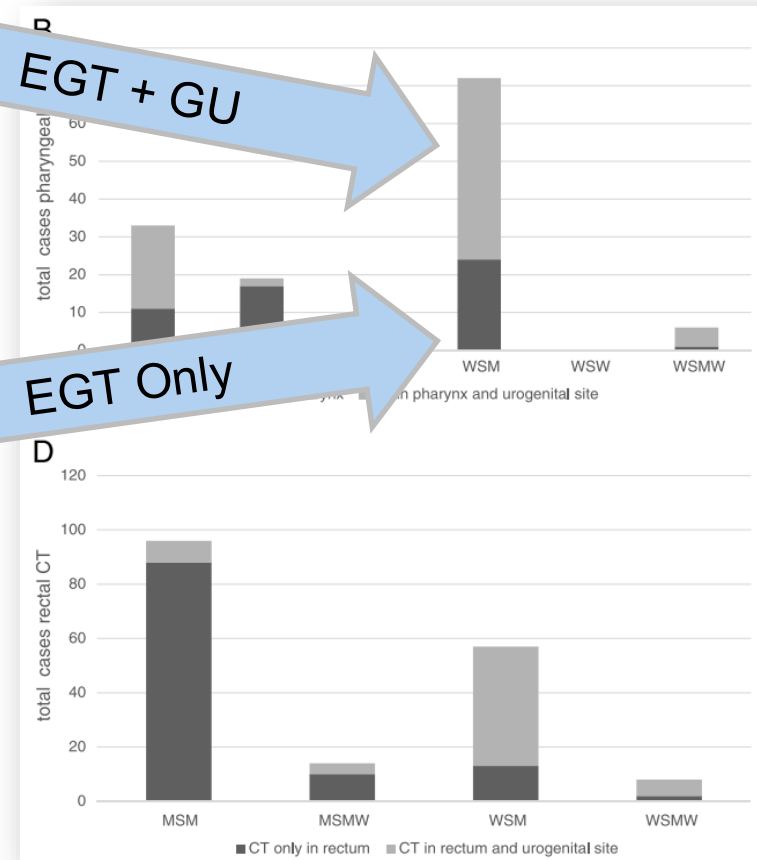
## Gonorrhea



Rectal



## Chlamydia



EGT + GU

EGT Only

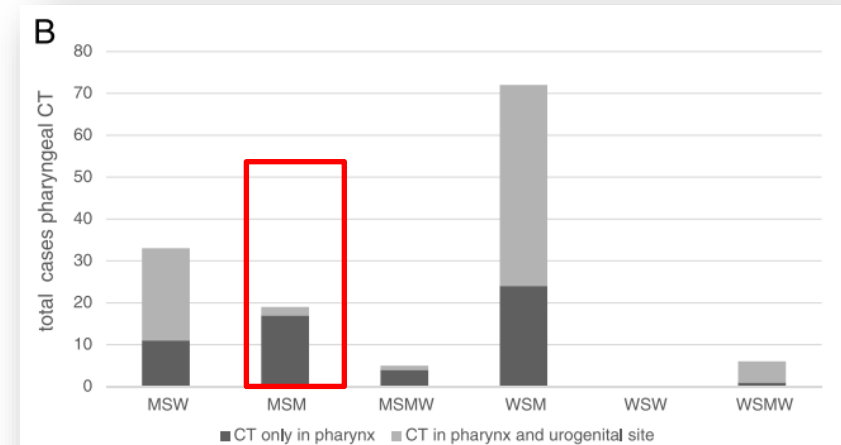
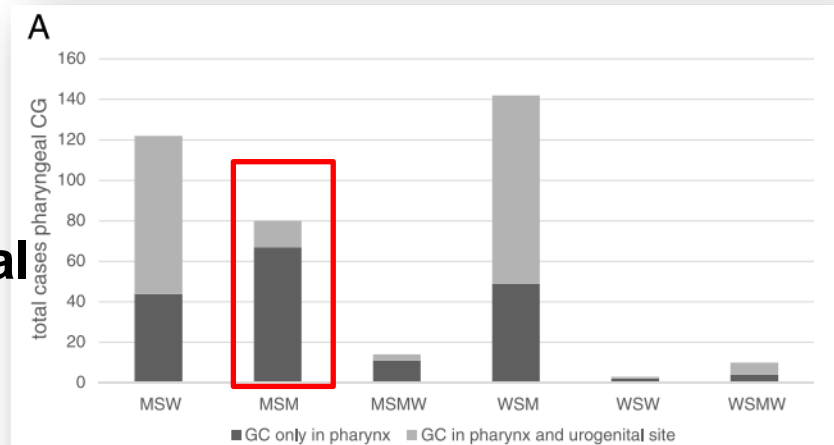
- Bamberger DM, Graham G, Dennis L, Gerkovich MM. Extragenital Gonorrhea and Chlamydia Among Men and Women According to Type of Sexual Exposure. Sex Transm Dis. 2019 May;46(5):329-334. doi: 10.1097/OLQ.0000000000000967. PMID: 30676485.

# Emphasis on Extragenital Testing

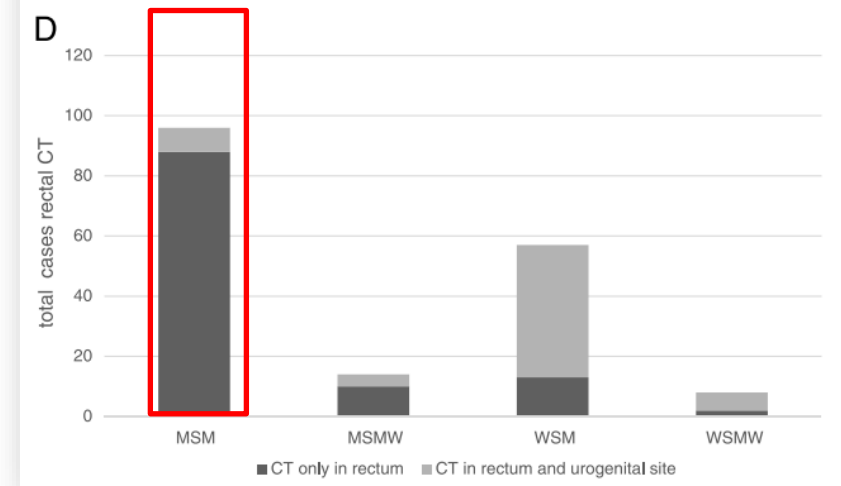
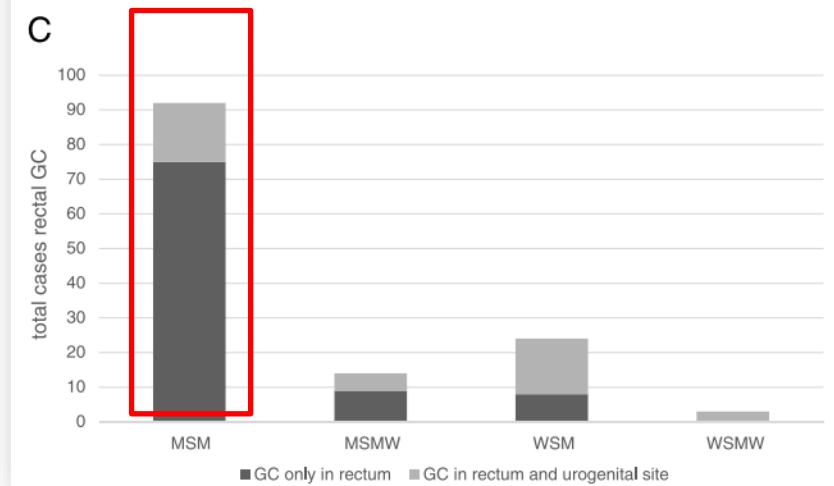
## Gonorrhea

## Chlamydia

Pharyngeal



Rectal



# Emphasis on Extragenital Testing

Missed  
Diagnosis

Change in  
Management

- **Most cases** of GC and CT in MSM would have been **missed** had extragenital testing not been performed
- A **third of cases** of extragenital GC and CT in **MSW and WSM** would have been missed had only urogenital testing been performed

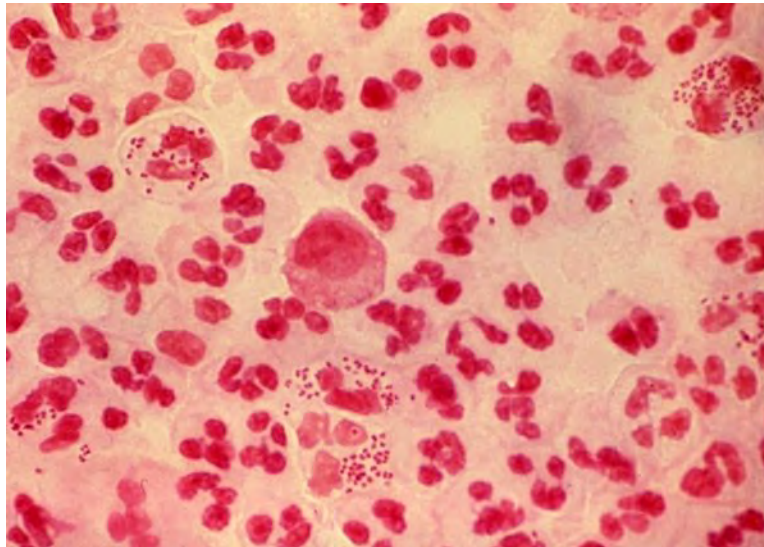
# Jack's Work-Up

- Well, he does have some discharge
- It's mild and comes and goes
- Let's do a gram stain then...

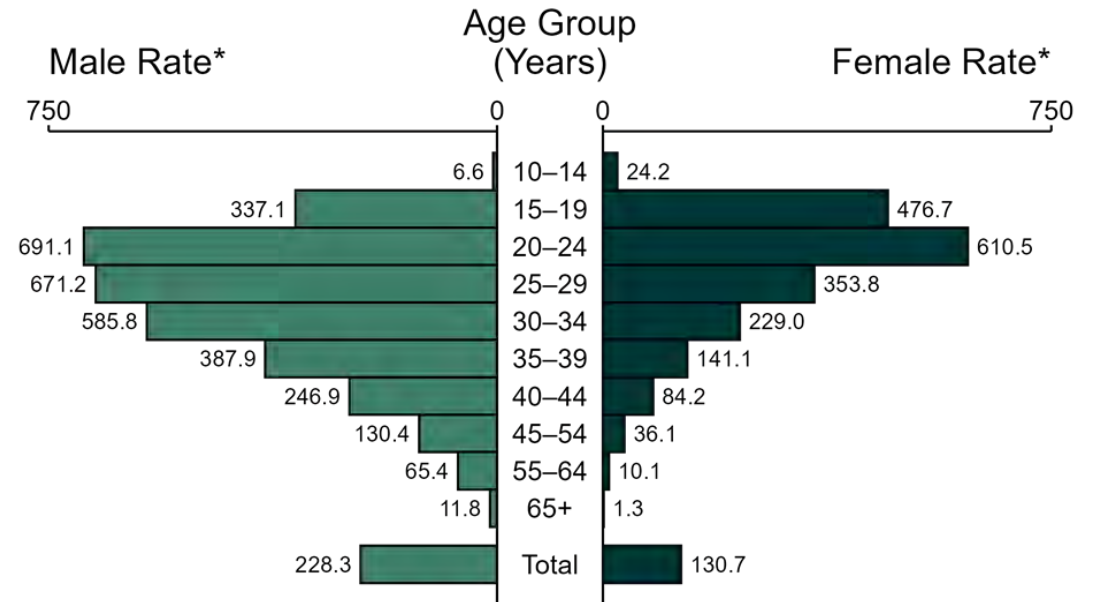


# Gonorrhea (*Neisseria gonorrhoeae*)

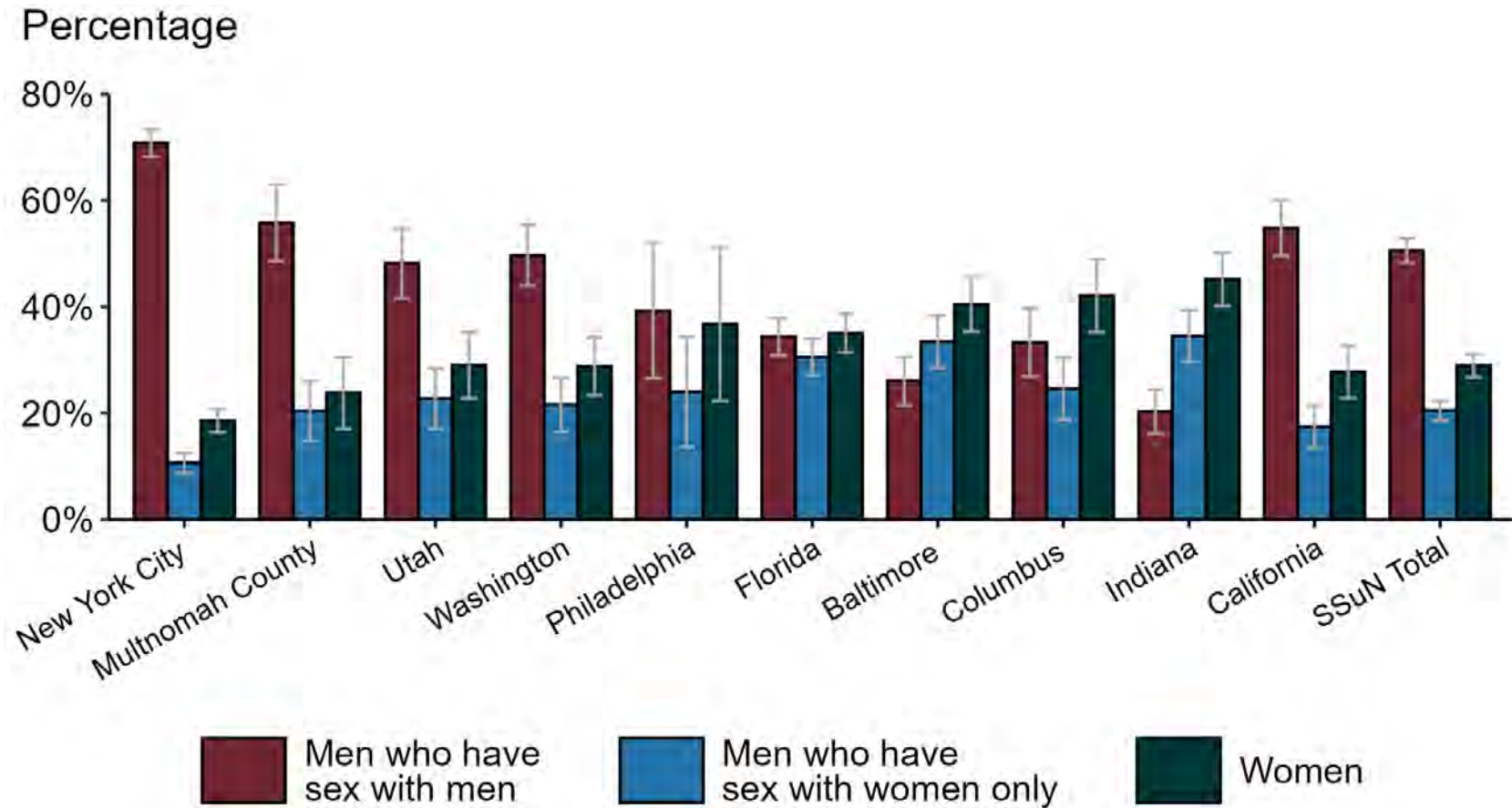
**Gram stain from urethral discharge**  
**Gram-negative intracellular diplococci**



**Rates of Reported Cases by Age Group and Sex, United States, 2023**



# Gonorrhea — Estimated Proportion of Cases by Sex and Sex of Sex Partners and Jurisdiction, STI Surveillance Network (SSuN), 2023



**NOTE:** Estimate based on weighted analysis of data on sex of sex partners obtained from interviews (n=5,705) conducted among a random sample of gonorrhea cases reported to participating SSuN jurisdictions during January to December 2023. Includes ten SSuN sites reporting completed case investigations in 2023 for at least 1% of all reported cases.

# What is the Best Treatment for His Positive Gonorrhea Test?

- Ceftriaxone 250 mg IM once
- Ceftriaxone 500 mg IM once
- Ceftriaxone 250 mg IM once with azithromycin 1 gram by mouth once
- Ceftriaxone 500 mg IM once with doxycycline 100 mg by mouth twice daily for 7 days

# Gonorrhea Treatment Guidelines

Ceftriaxone **500** mg IM x 1  
for persons weighing <150kg\*

\*For persons weighing  $\geq 150$ kg, 1 g of IM ceftriaxone should be administered

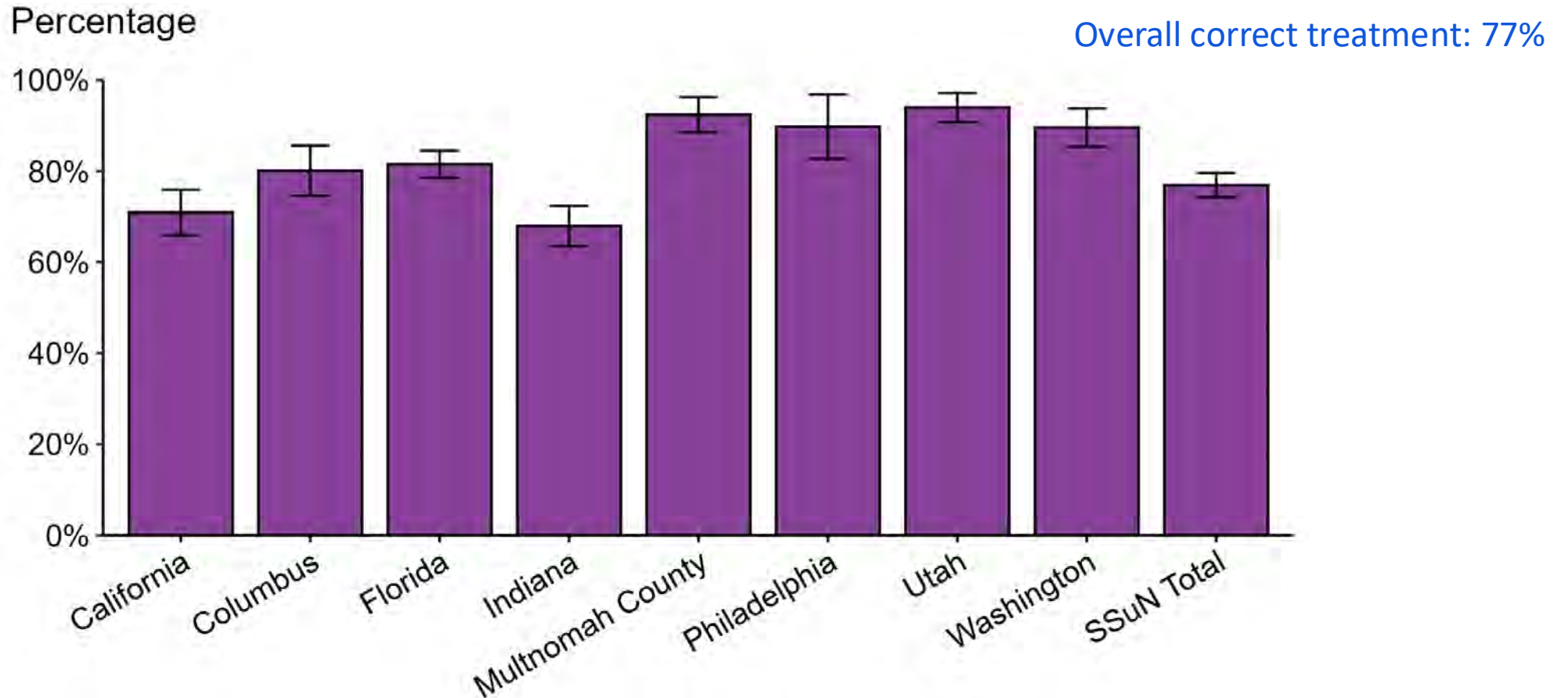
If chlamydia has **not** been excluded, treat for chlamydia with:

Doxycycline 100 mg PO twice  
daily x 7 days

\*For pregnancy, allergy, or concern for non-adherence 1g PO Azithromycin can be used

No longer recommending dual therapy with azithromycin

# Gonorrhea — Estimated Proportion of Cases Treated with Recommended Regimen by Jurisdiction, STI Surveillance Network (SSuN), 2023



**NOTE:** Includes SSuN jurisdictions with treatment and dosage data ascertained for at least 80% of sampled, investigated cases. In 2023, the recommended treatment for uncomplicated gonorrhea was ceftriaxone 500 mg, intramuscular.

# Alternative Gonorrhea Treatment

Uncomplicated infections of the cervix, urethra, and rectum if ceftriaxone is not available.:

**IF** chlamydia has not been excluded, treat for chlamydia with:

Cefixime 800 mg PO x 1

Doxycycline 100 mg PO  
BID x 7 days

For pregnancy, allergy, or concern for non-adherence, 1g PO azithromycin x 1 can be used

**Cephalosporin allergy: Gentamicin 240 mg IM + azithromycin 2 g PO**

**No reliable alternative treatments are available for pharyngeal gonorrhea**

# Why Make This Change for Gonorrhea

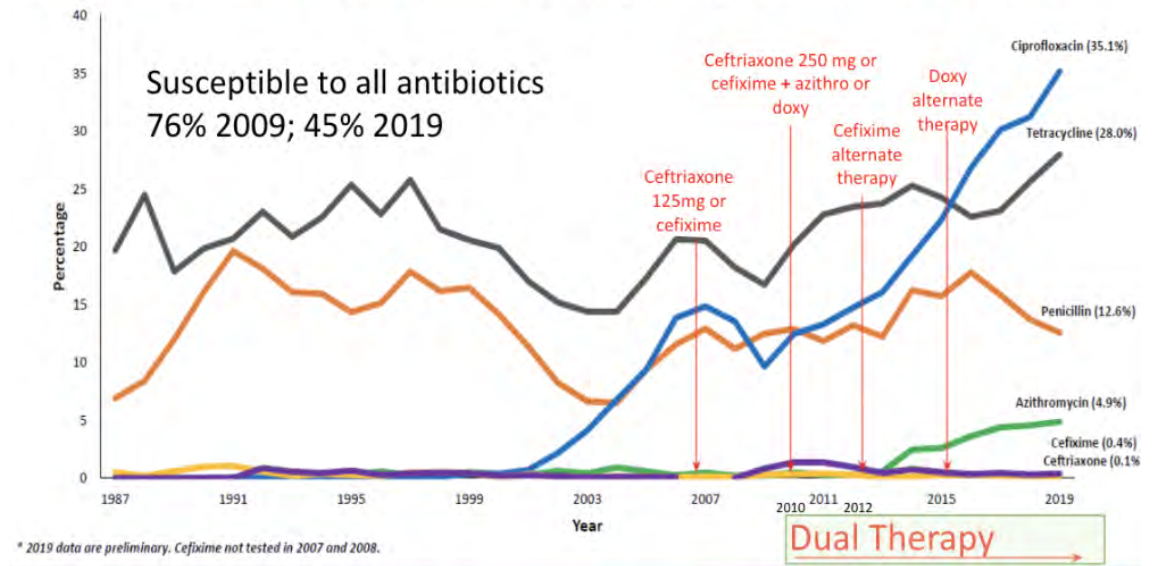
1. Antimicrobial stewardship
  - a) *N. gonorrhoeae* resistance
  - b) Rising resistance in other pathogens
  - c) Selection for non-macrolide resistance
2. Pharmacokinetics and pharmacodynamics
  - a) Rising MICs = Increase Dose Needed
  - b) Pharynx



# Antimicrobial Stewardship

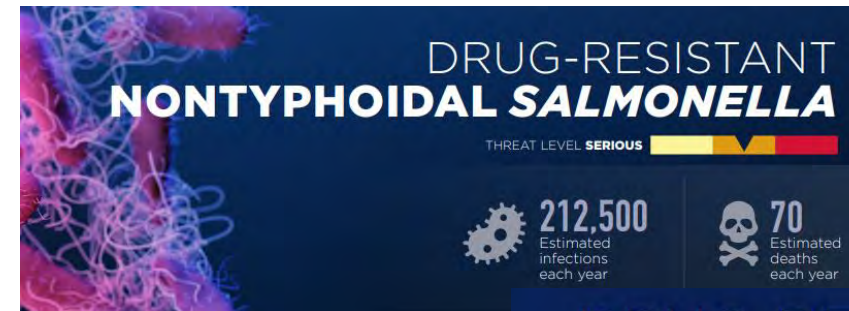
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Prevalence of Tetracycline, Penicillin, or Fluoroquinolone Resistance or Cefixime, Ceftriaxone or Azithromycin Decreased Susceptibility, by Year, GISP, 1987–2019\*



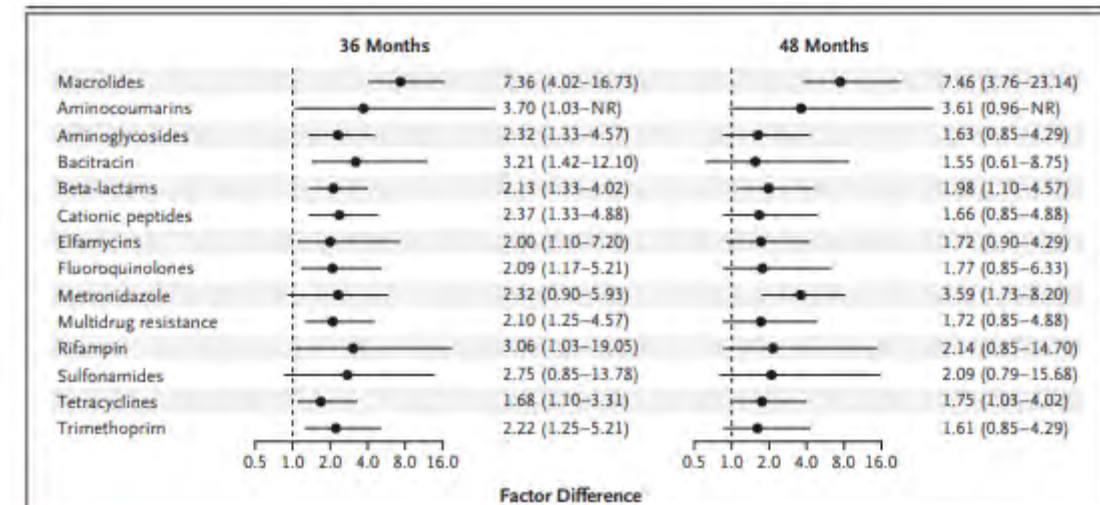
# Antimicrobial Stewardship

1. Antimicrobial stewardship
  - a) *N. gonorrhoeae* resistance
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2. Pharmacokinetics and pharmacodynamics
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# Antimicrobial Stewardship

1. Antimicrobial stewardship
  - a) *N. gonorrhoeae* resistance
  - b) Rising resistance in other pathogens
  - c) **Selection for macrolide and non-macrolide resistance**
2. Pharmacokinetics and pharmacodynamics
  - a) Rising MICs = Increase Dose Needed
  - b) Pharynx



**Figure 4. Antibiotic-Resistance Determinants in the Gut of Children at the 36-Month and 48-Month Samples.**

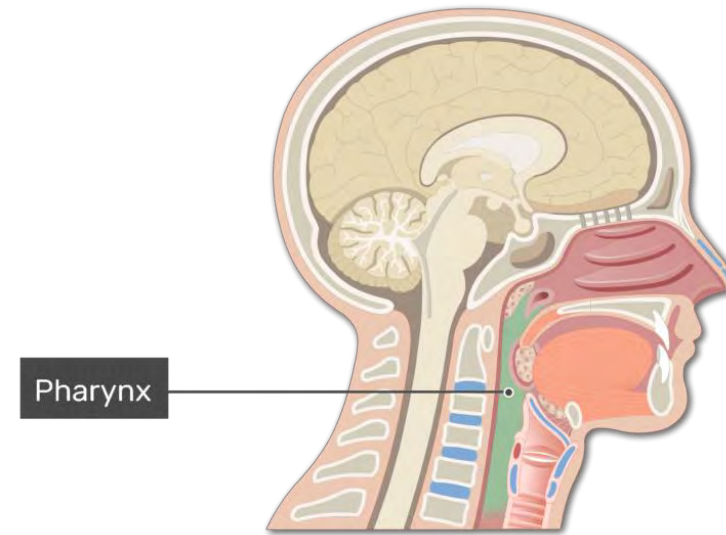
The difference in antibiotic-resistance determinants in the azithromycin-treated group as compared with the group that received placebo is shown, with associated 95% confidence intervals. The 36-month samples were obtained 6 months after the sixth distribution, and the 48-month samples were obtained 6 months after the eighth distribution. NR denotes not reached.

# Pharmacokinetics and Pharmacodynamics

1. Antimicrobial stewardship
  - a) *N. gonorrhoeae* resistance
  - b) Rising resistance in other pathogens
  - c) Selection for non-macrolide resistance
2. Pharmacokinetics and pharmacodynamics
  - a) **Rising MICs = Increase Dose Needed**
  - b) Pharynx
    - Ceftriaxone levels need to be  $>$  GC strain MIC for ~24 hours
    - Increasing MIC means increasing dosage needed

# Pharmacokinetics and Pharmacodynamics

1. Antimicrobial stewardship
    - a) *N. gonorrhoeae* resistance
    - b) Rising resistance in other pathogens
    - c) Selection for non-macrolide resistance
  2. Pharmacokinetics and pharmacodynamics
    - a) Rising MICs = Increase Dose Needed
    - b) **Pharynx**
- Screened less
  - Ceftriaxone concentrations more variable
    - *N. gonorrhoeae* likely requires longer times above the strain's MIC



**To:** Sexual Health Clinics, Family Planning Providers, Hospitals, Emergency Rooms, Community Health Centers, Urgent Care Centers, College Health Centers, Local Health Departments, Community Based Organizations, Internal Medicine, Obstetrics and Gynecology, Pediatric, Adolescent Medicine, Dermatology, Family Medicine, Infectious Disease, Primary Care Providers and Clinical Labs

**From:** New York State Department of Health, AIDS Institute, Office of Sexual Health and Epidemiology and the Office of the Medical Director

**Date:** June 2, 2026

Dear Colleagues:

In December of 2025, the Food and Drug Association (FDA) [announced](#) approval of two new oral medicines to treat uncomplicated urogenital gonorrhea: **Nuzolvence** (zoliflodacin) and **Blujepa** (gepolidacin).

## Geptidacin (BLUJEPA):

- Mech of action: triazaacenaphthylene bacterial type II topoisomerase inhibitor
- Indication: >12 yo; >40kg; UTI and uncomplicated NG
- Dose: 1500 mg BID x 5 days (2 tablets BID)
- Contraindication & warnings
  - Prolongs QT
  - Avoid in hepatic and renal impairment or those on other cyp 3A inhibitors
  - Dysarthria (acetylcholinesterase inhibition)

Uncomplicated, non- susceptible NG or when standard of care is contraindicated

## • Zoliflodacin (NUZOLVENCE)

- Mech of action: spiropyrimidinetrione bacterial type II topoisomerase inhibitor
- Indication: >12 years of age, > 77 pounds or 35kg
- Dose: 3 gram (packet reconstituted), single dose (empty stomach for <50kg or with food for >50kg)
- Contraindications and warnings:
  - Avoid in pregnancy
  - Causes testicular toxicity in animals

# When Should the Patient Follow-Up for Retesting?

- 1-2 weeks
- 4 weeks
- 8 weeks
- 12 weeks
- 24 weeks

# Gonorrhea Follow-Up

Abstain from sex until 7 days after completing treatment

Assess for treatment failure if persistent symptoms at 3-5 days with culture (with AST) and NAAT

**Test of cure recommended for all pharyngeal infections at 7-14 days**

Test of cure at 4 weeks if pregnant

Rescreen everyone at 3 months for re-infection

# Test of Cure for Pharyngeal Infections

- Persistent nonviable organisms may cause a false positive NAAT
- Reinfection from re-exposure is a common cause of persistent positive GC tests

## RNA NAAT

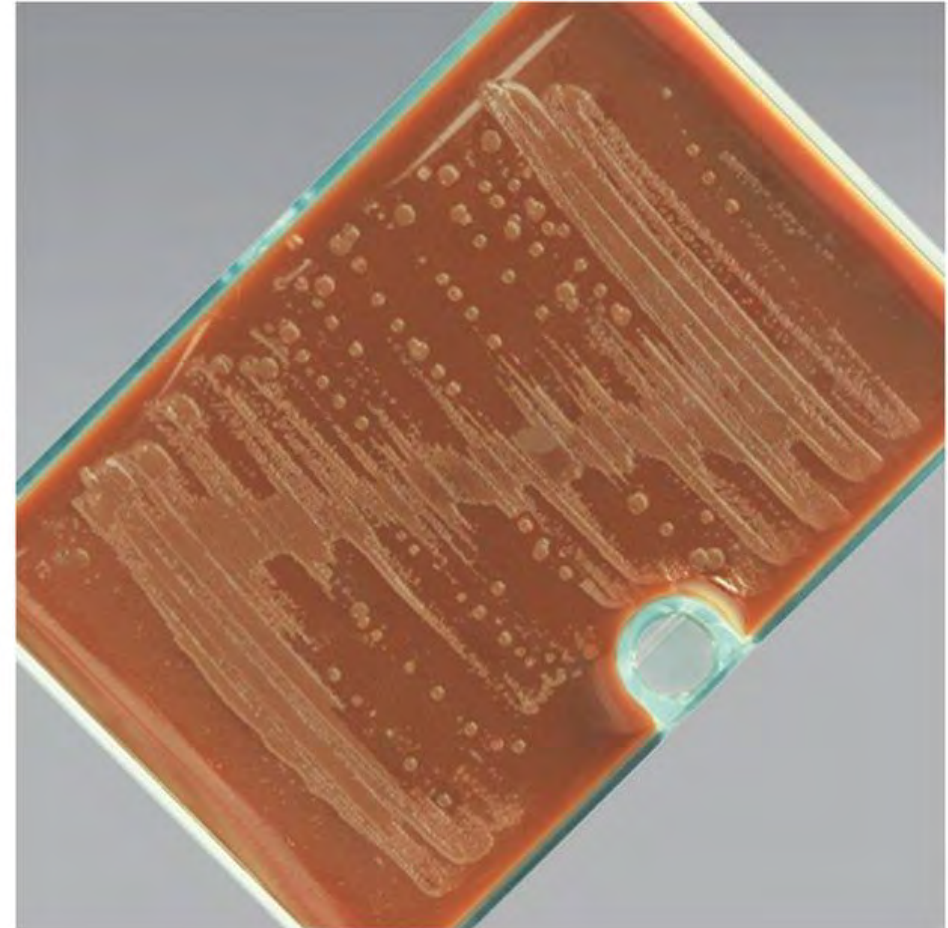
TOC Pharynx*	N	Persistent RNA NAAT N (%)	OR (95% CI)
0-7 days	309	27 (8.7)	1 -----
8-14 days	367	8 (2.2)	0.23 (0.1-0.52)
15-28 days	105	1 (1.0)	0.10 (0.01-0.75)

## DNA NAAT

Pharyngeal GC persistence--DNA NAAT	% (95% CI)
7 days	13 (6.4-19.6)
14 days	8 (2.7-13.3)
All cultures negative	

# What if This Patient's Test of Cure Were Positive?

- Most suspected treatment failures are reinfections
- If re-infection is unlikely:
  - Obtain simultaneous NAAT and gonorrhea culture
  - Alert public health authorities
  - Treat with either ceftriaxone or gentamicin/azithromycin



# Case 2: Jill

- An 18-year-old female in New York City
- She is sexually active with several male partners
  - One of them was recently diagnosed with chlamydia



# What Do You Ask Jill?

## 5Ps

- Partners
- Practices
- Protection from STIs
- Past history of STIs
- Pregnancy intention



# Jill's History

- Partners
  - 6 male partners in the past 2 months
  - 1 female partner
- Practices
  - Oral (gives and receives), vaginal and anal intercourse “a few times”
- Protection from STIs
  - Condoms 50% of the time, never for oral sex
- Past history of STIs
  - Chlamydia x 2 in the past
- Pregnancy intention
  - Does not want kids
  - Uses oral contraceptives (when she remembers to take them)

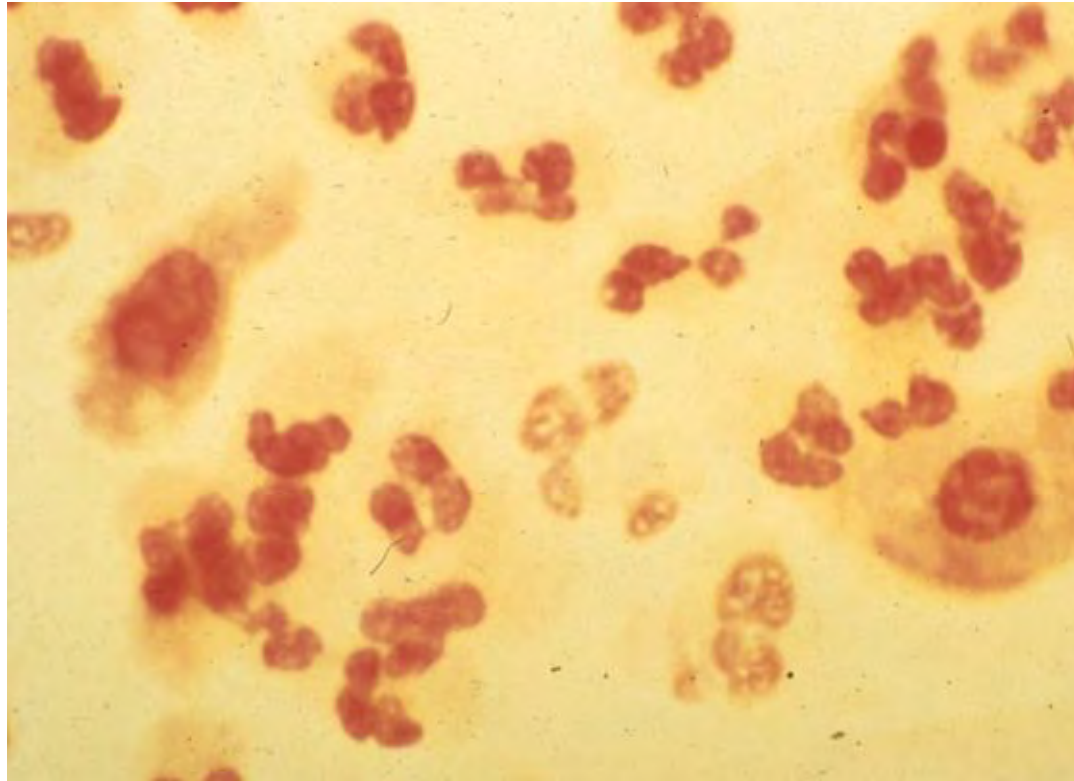


# Jill's Work-Up

- HIV Testing (HIV Ab/Ag test)
- Hepatitis C testing
- Gonorrhea and chlamydia testing
  - **3 site GC/CT NAAT**
  - Gram stain (if able)
- Trichomonas testing
- Syphilis testing (RPR)
- Pregnancy test
- Offer of HIV biomedical HIV prevention services (PrEP +/- PEP)



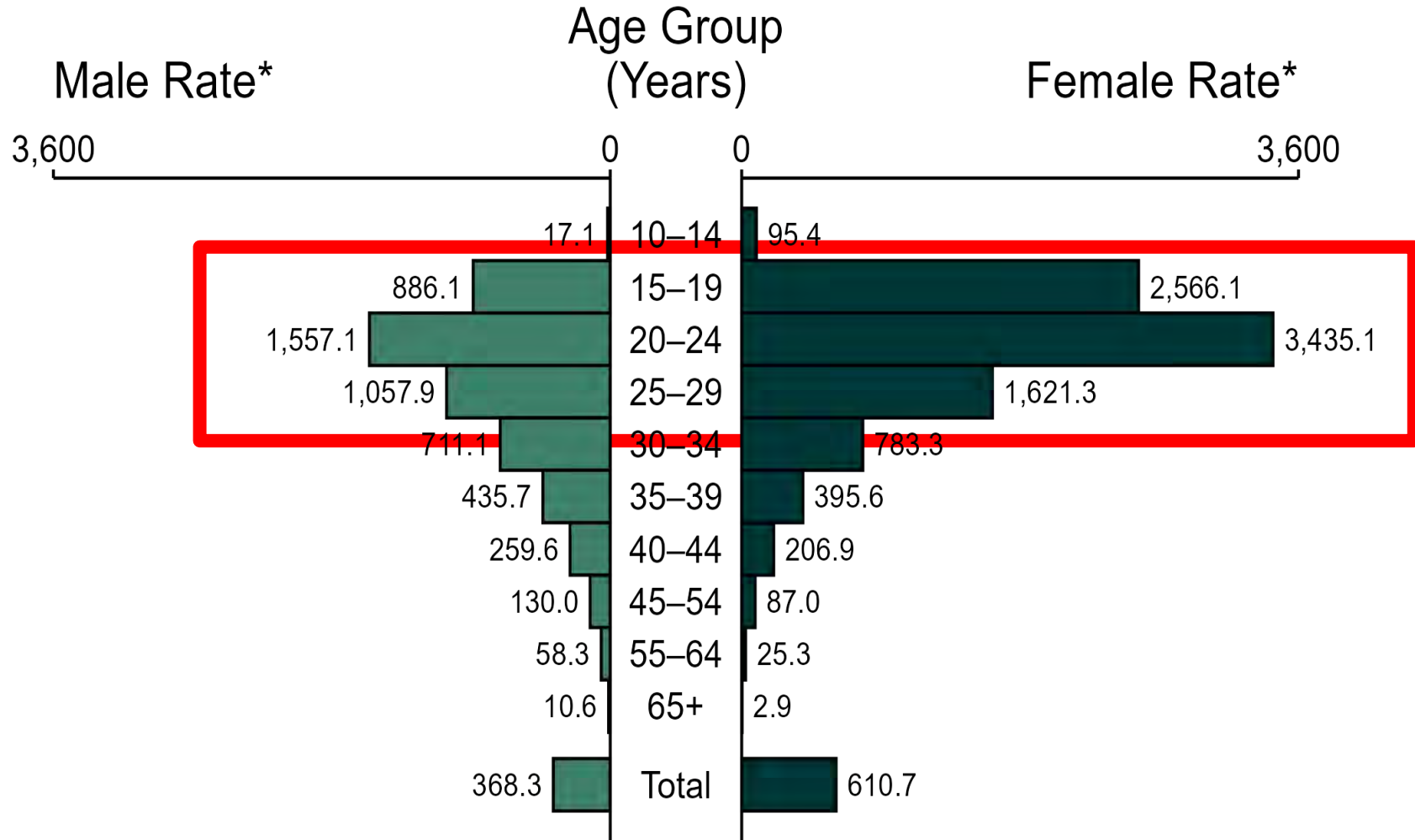
# Non-Gonococcal Urethritis



## Etiology

- ***C. trachomatis* (15-40%)**
- ***M. genitalium* (15-25%)**
- *T. vaginalis* (1-8%)
- HSV (3%)
- ***N. meningitidis***
- Other bacteria (i.e. *H. influenzae*)
- Other viruses (i.e. adenovirus, EBV)
- **UNKNOWN (~50%)!**

# Chlamydia — Rates of Cases by Age and Sex, 2023



Highest rates:  
Youth 15-30

# Testing for STIs in Women

- **New:** Consider extragenital testing for GC/CT rectal and GC in the pharynx
- **Data: 2016, review of 33 studies included women**
  - **Rectal GC 0.6- 35.8% (median 1.9%)**
  - Pharyngeal GC 0-29.6% (median 2.1%)
  - **Rectal CT 3-77.3% (median 8.7%)**
  - Pharyngeal CT 0.2-3.2% (median 1.7%)
- **Conclusions:**
  - Extragenital screening can increase detection of GC/CT from 6-50% compared with urine alone
  - High impact sexual health intervention!

Sexual history taking  
Shared decision making



# Treatment Guidelines – Chlamydia

## Preferred

Doxycycline 100 mg PO twice daily x 7 days

## Alternative

Azithromycin 1g orally once\*

\*Preferred during pregnancy

\*\*Pregnancy alternative: Amoxicillin 500mg orally 3 times per day for 7 days

**OR**

Levofloxacin 500mg orally x 7 days

# Why Make This Change for Chlamydia

## Genitourinary infection

- Microbiologic failure higher among men

## Rectal infection

- Doxycycline superior to azithromycin (20%-26%)
- Rectal infection not uncommon among women with genitourinary infection (33%-83%)



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THE NEW ENGLAND JOURNAL OF MEDICINE

ORIGINAL ARTICLE

## Azithromycin versus Doxycycline for Urogenital *Chlamydia trachomatis* Infection

William M. Geisler, M.D., M.P.H., Apurva Uniyal, M.A., Jeannette Y. Lee, Ph.D., Shelly Y. Lensing, M.S., Shacondra Johnson, B.S.P.H., Raymond C.W. Perry, M.D., M.S.H.S., Carmel M. Kadrnka, D.O., and Peter R. Kerndt, M.D., M.P.H.

- Efficacy of azithromycin was 97%
- Efficacy of doxycycline was 100%
- **Non-inferiority of azithromycin was not established**

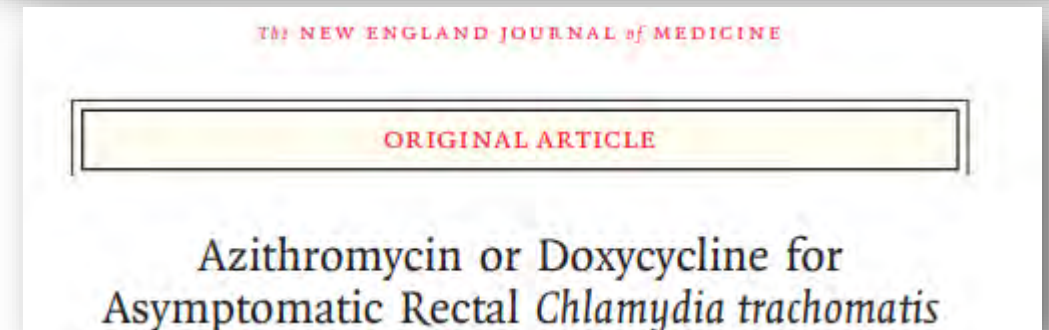
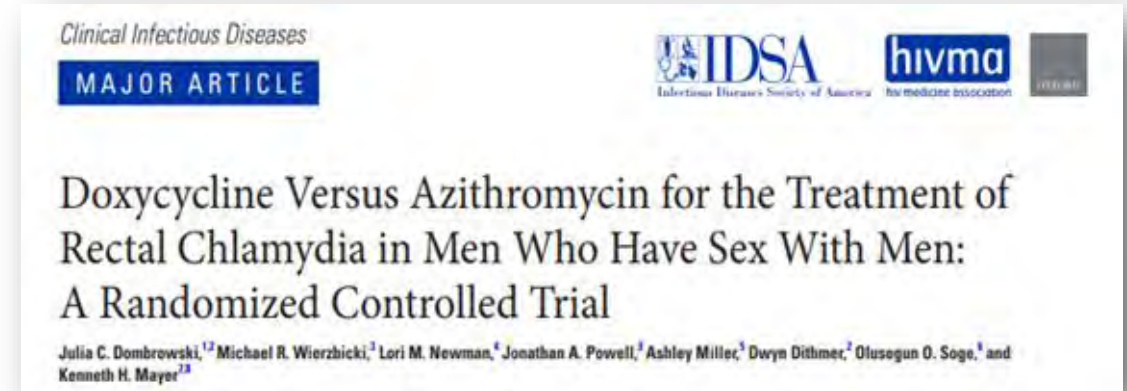
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**7-day course of doxycycline was significantly more effective than a single dose of azithromycin**

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## Genitourinary infection

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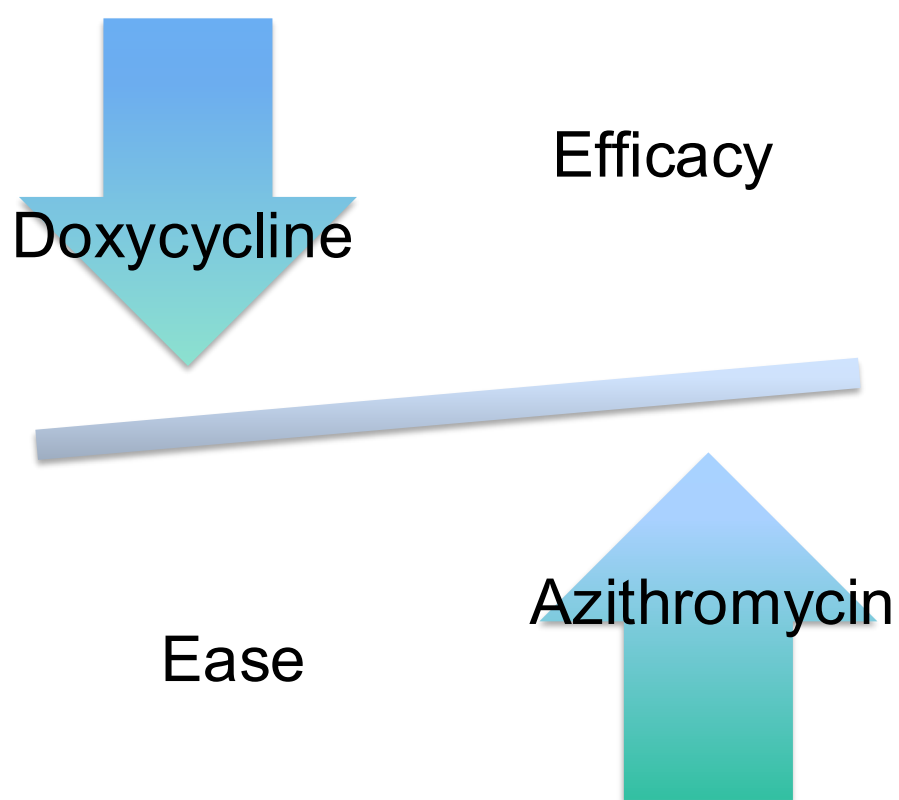
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- **Rectal infection not uncommon among women with genitourinary infection (33%-83%)**

Doxycycline versus azithromycin for the treatment of anorectal *Chlamydia trachomatis* infection in women concurrent with vaginal infection (CHLAZIDOXY study): a multicentre, open-label, randomised, controlled, superiority trial

Olivia Peuchant, Edouard Lhomme, Pervenche Martinet, Anne Grab, Dounia Baïta, Claire Bernier, Sophie Anne Gibaud, Isabelle Le Her, Erwan Le Naour, Nathalie Trignal-Viguer, Philippe Lanotte, Philippe Lefebvre, Anne Vachée, Thomas Girard, Julien Loubinoux, Cécile Bédar, Bellobes Ghezoui, Caroline Roussillon, Marion Kret, Bertille de Barbeyrac, and the CHLAZIDOXY Study Group\*

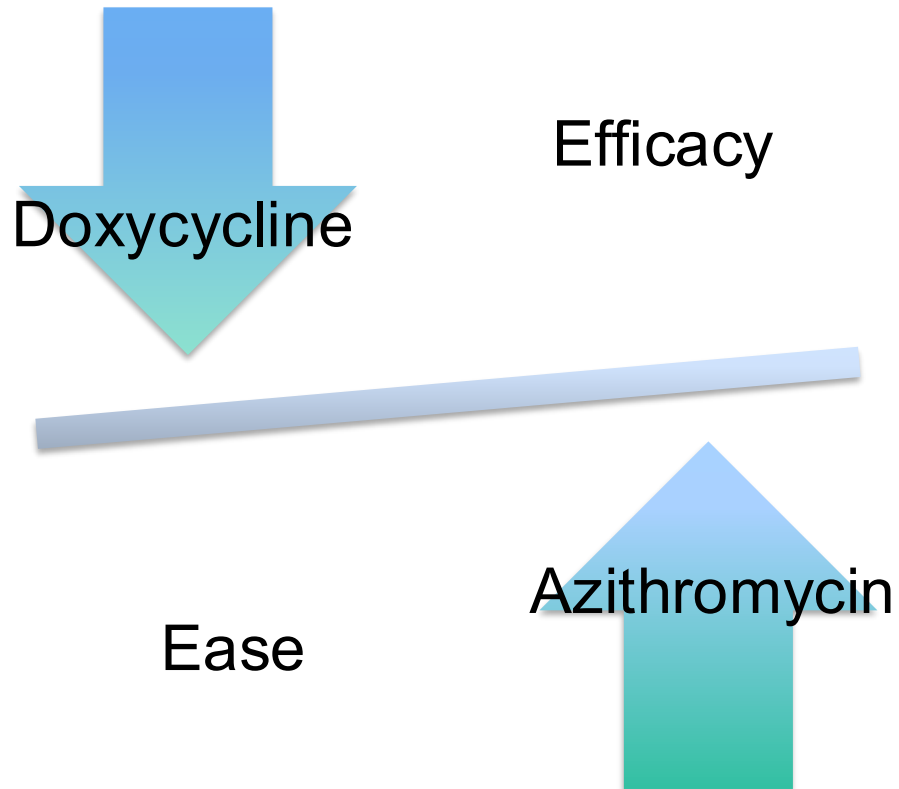
# Azithromycin vs. Doxycycline



## Ease

- Access
  - **Only 57.7% (95%CI, 50.9-64.5) of adolescents with STI diagnosis in an ED filled their prescription**
- Adherence
  - Studies suggest doxycycline self-reported adherence 60%-90%
- Confidentiality
- Side Effect Profile

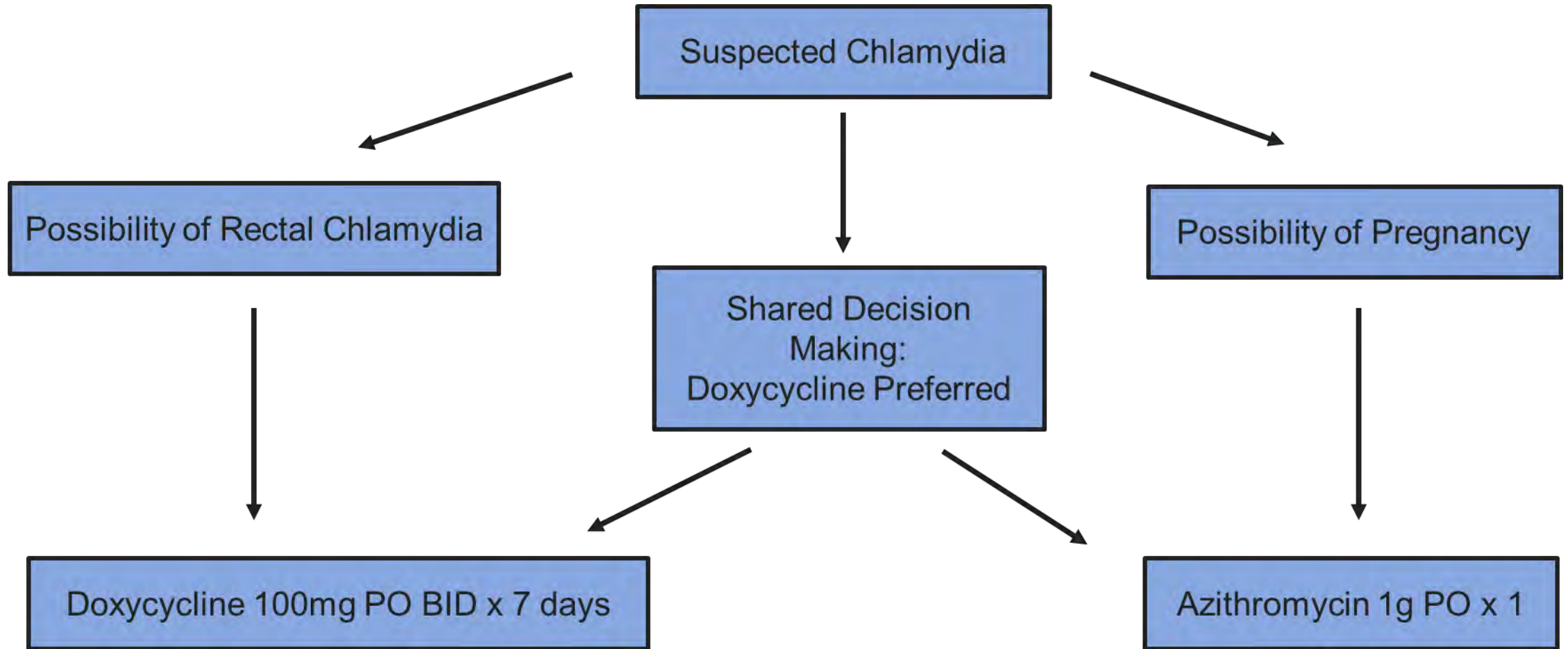
# Azithromycin vs. Doxycycline



## Indications for Azithromycin

- Pregnant or may be pregnant
- History of allergy or intolerance to doxycycline
- Unlikely to be adherent
- Unlikely to be able to obtain doxycycline and azithromycin is available at point of care

# Chlamydia Shared Decision Making



# Chlamydia Follow-Up

Abstain from sex until partners have completed treatment or 7 days after single dose therapy

**Consider repeat testing at 4 weeks for rectal CT treated with Azithromycin due to lower efficacy**

Test of cure at 4 weeks if pregnant

Rescreen at 3 months for re-infection

# What Did We Do For Jill?

Prescription Pad Dr. Z Sexual Health Clinic
Doxycycline 100mg PO Q12 x 7 days
HIV testing
Hepatitis C Ab testing
3 Site GC/CT testing
Syphilis Testing
HIV prevention counseling and offer of services
Pregnancy testing, counseling and services

# Sally has a Discharge

# Vaginitis: Itching, Burning, Irritation, Odor, and Discharge

## #1 Bacterial vaginosis:

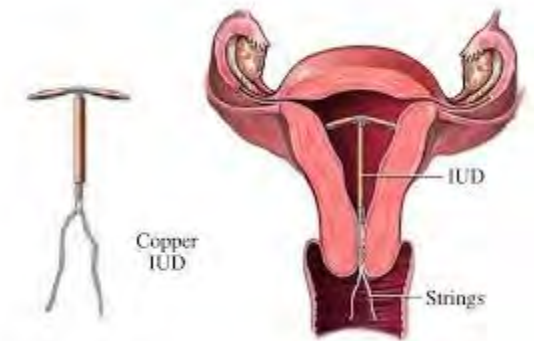
May be considered an STI based on new study showing treatment of partners leads to less recurrences.\*

Dysbiosis resulting from replacement of normal lactobacillus in the vagina with other anaerobic bacteria such as *Gardnerella vaginalis*, *prevotella*, *mobiluncus*

**Asymptomatic pregnant women should not be screened -> no data on risk to fetus or pregnancy**

## Risk factors:

- Multiple sex partners
- Female partners
- Douching
- Copper IUD



# Diagnosing Bacterial Vaginosis

## BV Diagnostic Scores

- Nugent score (#) (from vaginal gram stain of the concentration of organisms (0-3 normal)
  - # > 4 consistent with Gardnerella; # >6= BV
- Amsel's Clinical criteria (3 out of 4 below)
  - Milk-like discharge, Clue cells (e.g., vaginal epithelial cells studded with adherent bacteria), pH of vaginal fluid >4.5, fishy odor of vaginal discharge before or after addition of 10% KOH (i.e., the whiff test)

## Near and Point of Care Testing

- **Point of Care testing**
  - Osom BV Blue test (detects vaginal sialidase activity)
  - Affirm VP III- detects Gardnerella (most useful in those with symptoms)
  - FemExam Test Card- measures vaginal pH, and other aminopeptidases in Gardnerella
- **NAAT testing**- high sensitivity and specificity
  - Max Vaginal Panel, Aptima BV- FDA cleared
  - NuSwabVG, OneSwab BV panel PCR and SureSwab BV

# Bacterial Vaginosis

## Risks and Sequelae

- High likelihood of recurrence
- Can complicate GYN surgeries
- May increase risk of other STIs (MG, HSV2, and HPV)
- Certain BV associated bacteria may increase HIV susceptibility
  - *Prevotella bivia*, *Leptotrichia/Sneathia*, *Parvimonas 1&2*, *M. hominis*, *Eggerthella* spp.

## Prevention and Protection

- Male circumcision
- Condom use
- Lack of sexual activity
- Hormonal contraception
- Probiotics (Cohen, et al. NEJM 2020; 382: 1906-15) Lactin-V to prevent recurrence

# Treatment of BV

## Recommended Regimens for Bacterial Vaginosis

- Metronidazole 500 mg orally 2 times/day for 7 days
- OR
- Metronidazole gel 0.75% one full applicator (5 g) intravaginally, once a day for 5 days OR
- Clindamycin cream 2% one full applicator (5 g) intravaginally at bedtime for 7 days (preferred for allergy)

## Alternative Regimens

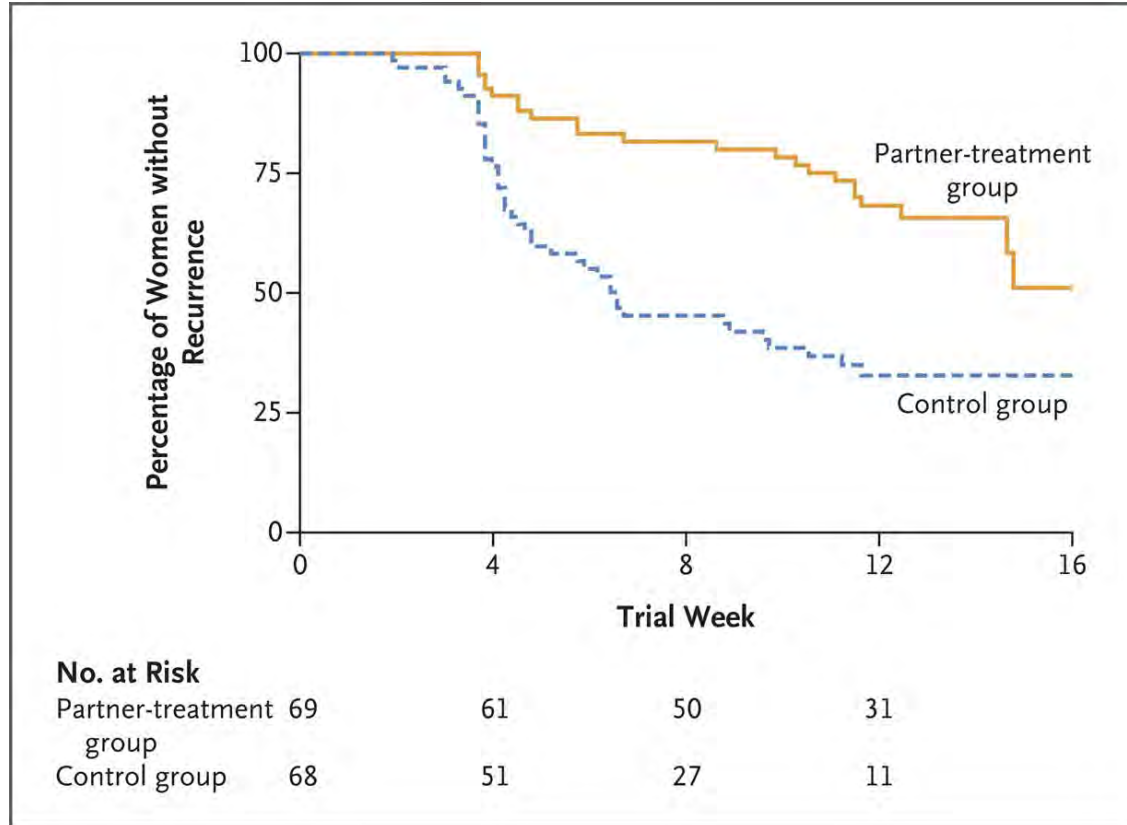
- Clindamycin 300 mg orally 2 times/day for 7 days (preferred for allergy)
- Secnidazole 2 g oral granules in a single dose (53% cure rate)
- Tinidazole 2 g orally once daily for 2 days or Tinidazole 1 g orally once daily for 5 days
- **Suppository options:**
  - Clindamycin ovules 100 mg\* intravaginally once at bedtime for 3 days (may weaken latex)
  - **NEW: SINGLE DOSE: metronidazole 1.3% gel and Clindesee 2% vaginal cream (37% cure rate)**

# Bacterial Vaginosis

Vodstrcil, L. et al

N Engl J Med 2025;392:947-957

Kaplan-Meier Curves for Time to recurrence of BV  
(Mod ITT population)



- Prevalence: college students (5-25%) and 12-61% of STI patients
- Treatment response: 30-60%
- Diagnostics:
  - Wet mount: clue cells- Amsel criteria
  - CLIA waived POC testing – vaginal sialidase activity
  - BV NAAT
- Screening: symptomatic women, female partners of women with BV, women prior to surgical abortion
- Treatment:
  - Metronidazole 500 mg orally twice a day for 7 days, OR
  - Metronidazole gel 0.75%, one full applicator x 5 days OR
  - Clindamycin cream 2%, one full applicator x 7 days
  - Alternative treatment: clindamycin 300mg 2 times/day x 7 days, secnidazole 2 gm single dose, tinidazole 2 gm daily x 2 days or tinidazole 1 gm daily x 5 days or clindamycin 100mg ovules vaginally x 3 days

Treatment of male partners with metronidazole 500mg BID and clindamycin cream BID lead to fewer recurrences of BV within 12 weeks. The trial was stopped early.

# More Vaginal Discharge: Trichomonas

- Why is it important:
  - Meta-analysis OB outcomes associated with trichomonas
  - PROM 1.4, preterm birth 1.4, endometritis 2.2, HIV acquisition 1.5
- Testing
  - Asymptomatic- many and screening only for women in correctional facility
  - Symptoms: Testing done
    - Men: urethritis, epididymitis, prostatitis; persistent symptoms (MSW)
    - Women: malodorous discharge; strawberry cervix
- Re-testing
  - Persistent infection (resistance testing + combination therapy)
  - Clearance by NAAT up to 3 weeks

# Trichomoniasis: Diagnostic Comparisons

## Nucleic Acid Amplification Tests

- Can order on same GC/CT specimen

**Sens/Spec: 88-100%, 97-99.9%**

## Point-of-care tests

- OSOM trichomonas rapid antigen test (Genzyme)
- Affirm VP III (BD)

OSOM **Sens/Spec: 67-100%**, 92-100%

Affirm VP **Sens/Spec: ~63 %**

**Sens/Spec: 75-95%, 100%**

## Saline Wet Mount

- Motile trichomonads
- pH >4.5
- Whiff test may be +

**Sens/Spec: 36-70%, ~100%**

## Culture

- Diamond's
- InPouch TV, BioMed Diagnostics

## Diagnosis: NAAT

- Vaginal discharge and women with HIV;
- Men
- Consider testing (high prevalence settings, high risk of infection)

# Trichomonas Treatment

NEW Treatments

## Preferred Regimen For Women

Metronidazole 500mg twice daily for 7 days

## Preferred Regimen For Men

• Metronidazole 2g once

## ALTERNATIVE Regimen

Tinidazole 2g x 1

## Regimens for TV Persistence

- Metronidazole or tinidazole 2 g daily x 7 days
- Tinidazole 2 g daily + intravaginal tinidazole 500mg 2 times/day x 14 days
- Tinidazole 1 g 3 times/day + intravaginal paromomycin (4 g of 6.25% intravaginal paromomycin cream nightly) x 14 days



# Trichomonas Treatment

NEW Treatments

Metronidazole 2 gm PO x 1 vs 500mg twice daily x 7 days

## Single-dose versus 7-day-dose metronidazole for the treatment of trichomoniasis in women: an open-label, randomised controlled trial



*Patricia Kissinger, Christina A Muzny, Leandro A Mena, Rebecca A Lillis, Jane R Schwebke, Laura Beauchamps, Stephanie N Taylor, Norine Schmidt, Leann Myers, Peter Augustini, William E Secor, Martina Bradić, Jane M Carlton, David H Martin*

- Multicenter, open-label, randomized controlled trial (2014-2017 published 2018)
- Block randomization
- 632 women enrolled
- Primary outcome was infection at test-of-cure 4 weeks after completion of treatment
- Patients in the 7-day-dose group were less likely to be positive at test-of-cure than those in the single-dose group 11% vs 19%
  - Relative risk 0.55, 95% CI 0.34–0.70;  $p < 0.0001$

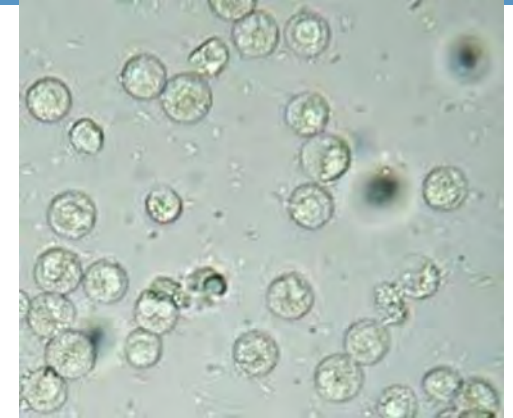
# Vulvovaginal Candidiasis (VVC)

- Nonspecific symptoms: dysuria, pruritus, dyspareunia, vaginal discharge
- 75% of women will have at least one episode

<b>Uncomplicated</b>	<b>Complicated</b>
Sporadic or infrequent	Recurrent (> 3 episodes per year)
Mild to moderate VVC	Severe
Likely candida albicans	Non-albicans
Non-immunocompromised women	Women with diabetes, immune compromise (HIV), immunodeficiency, or on steroids

# Vulvovaginal Candidiasis (VVC)

- Testing
  - Wet prep, saline, 10% KOH- to see budding yeast or hyphae on microscope
  - Culture remains standard (susceptibility testing)
    - *C. albicans* azole resistance more common
  - PCR testing for yeast- most not FDA cleared
- Recurrent VVC ( $\geq 3$  episodes/year) large economic burden
  - Fluconazole (100-mg, 150-mg, 200-mg oral dose) weekly for 6 months



# VVC Treatment: Uncomplicated Infection

- Over the counter agents (clotrimazole, miconazole, etc)
- Prescription intravaginal applications (oil based and weaken condoms)
  - Butoconazole 2% cream (single dose), 5 g
  - Terconazole 0.4% cream; 5 g daily x 7 days
  - Terconazole 80mg vaginal suppository daily x 3 days
- Prescription orals
  - Fluconazole 150 mg oral single dose

# VVC Treatment: Complicated Infection

- 7-14 days of topical or every 3<sup>rd</sup> day for 3 doses (Day 1,4,7)
- Recurrent VVC ( $\geq 3$  episodes/year) large economic burden- for prevention
  - Fluconazole (100-mg, 150-mg, 200-mg oral dose) weekly for 6 months
- Fluconazole use in pregnancy
  - Increase risk of congenital anomalies
  - Spontaneous abortion

Molgaard-Neilsen. JAMA 2016; 315: (1): 58-67.

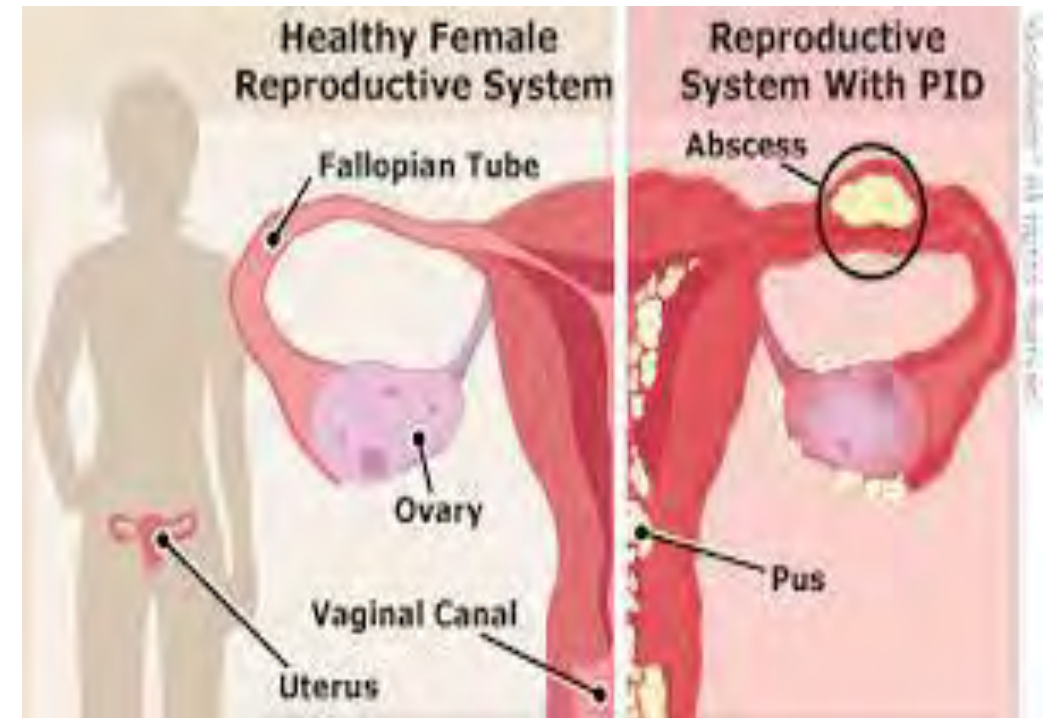
- Retrospective study, Denmark; nationwide registry 1997-2013
- 1,405,663 pregnancies; fluconazole exposed at weeks 7-22 in pregnancy
- 1:4 Oral fluc vs unexposed- match on propensity score, maternal age, year, gestational age
- Increased risk for spontaneous abortion in exposed group:
  - HR 1.48; 95% CI, 1.23-1.77
  - 147 out of 3315 women exposed vs 563 out of 13,246 unexposed women
- No impact on still births

# Non-Albicans Candidiasis

- 10% of symptomatic vulvo-candidiasis are due to non- albicans strains
- Strains
  - *C. glabrata* (*Nakaseomyces glabrata*)
  - C. krusei* (*Pichia Kudriavzeveii*)
  - C. parapsilosis*
  - C. tropicalis*
  - Less common
  - C. lusitaniae*
  - C. guilliermondi*
  - Also
  - Saccharomyces cerevisiae*
  - Trichosporon spp. (T. inkii)*ains:
- Treatment usually longer duration; often resistance to azole therapy
- Acute first line:
  - Boric acid vaginal suppositories 600mg daily x 14-21 days
  - Nystatin pessary 100,000 unites intravaginally x 12-14 days
- Alternative
  - Amphotericin B vag suppositories 50-100mg daily x 14-21 days
  - Flucytosine 5g cream 1g pessary (17%) daily x 14-21 days
  - Combination: ampho + flucytosine
  - Voriconazole 200-400mg daily x 14 days
  - Itraconazole 200mg daily + topicals

# Case #3: BB Has Pain

- BB presents with dysuria and abdominal pain 2 months after having CT infection
- Exam with cervical motion tenderness consistent with mild PID



# Cervicitis → Concern for PID Due to Symptoms

- Mild to moderate pelvic inflammatory disease (PID). No new information on the definition of this condition.
- Clinical diagnostic criteria (minimum 3 criteria)
  - Temperature >38.3C
  - Abnormal mucopurulent cervical discharge
  - WBC in vaginal saline microscopy (wet prep)
  - Elevated ESR and CRP
  - + test for GC/CT

# PID Treatment

- IM or ORAL

## NEW Treatments

Ceftriaxone 500 mg IM x 1  
for persons weighing <150kg\*

Ceftriaxone 1g Q24 hours

Doxycycline 100 mg PO twice  
daily x 14 days

Doxycycline 100 mg PO twice  
daily x 14 days

Metronidazole 500mg twice  
daily for 14 days

Metronidazole 500mg twice  
daily for 14 days

# PID Treatment

NEW Treatments

Clinical Infectious Diseases

MAJOR ARTICLE



## A Randomized Controlled Trial of Ceftriaxone and Doxycycline, With or Without Metronidazole, for the Treatment of Acute Pelvic Inflammatory Disease

Harold C. Wiesenfeld,<sup>1,2</sup> Leslie A. Meyn,<sup>1,2</sup> Toni Darville,<sup>3</sup> Ingrid S. Macio,<sup>2</sup> and Sharon L. Hillier<sup>1,2</sup>

<sup>1</sup>Department of Obstetrics, Gynecology and Reproductive Sciences, University of Pittsburgh, Pittsburgh, Pennsylvania, USA, <sup>2</sup>Magee Womens Research Institute, Pittsburgh, Pennsylvania, USA, and <sup>3</sup>Department of Pediatrics, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina, USA

(See the Editorial Commentary by Mitchell on pages 1190-91.)

**Background.** Anaerobic organisms are important pathogens in acute pelvic inflammatory disease (PID). The currently recommended PID regimen of a single dose of ceftriaxone and doxycycline for 14 days has limited anaerobic activity. The need for broader anaerobic coverage is unknown and concerns have been raised about metronidazole tolerability.

**Methods.** We conducted a randomized, double-blind, placebo-controlled trial comparing ceftriaxone 250 mg intramuscular single dose and doxycycline for 14 days, with or without 14 days of metronidazole in women with acute PID. The primary outcome was clinical improvement at 3 days following enrollment. Additional outcomes at 30 days following treatment were the presence of anaerobic organisms in the endometrium, clinical cure (absence of fever and reduction in tenderness), adherence, and tolerability.

**Results.** We enrolled 233 women (116 to metronidazole and 117 to placebo). Clinical improvement at 3 days was similar between the 2 groups. At 30 days following treatment, anaerobic organisms were less frequently recovered from the endometrium in women treated with metronidazole than placebo (8% vs 21%,  $P < .05$ ) and cervical *Mycoplasma genitalium* was reduced (4% vs 14%,  $P < .05$ ). Pelvic tenderness was also less common among women receiving metronidazole (9% vs 20%,  $P < .05$ ). Adverse events and adherence were similar in each treatment group.

**Conclusions.** In women treated for acute PID, the addition of metronidazole to ceftriaxone and doxycycline was well tolerated and resulted in reduced endometrial anaerobes, decreased *M. genitalium*, and reduced pelvic tenderness compared to ceftriaxone and doxycycline. Metronidazole should be routinely added to ceftriaxone and doxycycline for the treatment of women with acute PID.

**Clinical Trials Registration.** NCT01160640.

**Keywords.** pelvic inflammatory disease; anaerobes; metronidazole.

- Double-blind placebo-controlled trial
- 233 females
- Outcomes: Symptom improvement at 3 days and presence of anaerobic organisms in the endometrium
- Findings at Day 30 post treatment WITH metronidazole vs. placebo:
  - Endometrial anaerobes reduced (8% vs 21%,  $P < .05$ )
  - Pelvic tenderness less common (9% vs 20%,  $P < .05$ )
  - Decreased cervical *M. genitalium* (4% vs 14%,  $P < .05$ ) ?
  - Similar adverse events

# Summary: What's New for Vaginitis and PID

- Bacterial vaginosis:
  - Treating partners helps reduce recurrences
  - Single dose regimens for non-pregnant women (secnidazole 2 g oral, metro gel & clindesse cream)
  - No data linking nitroimidazole and alcohol adverse effect
- Trichomonas:
  - Test out option for women in correctional facilities
  - Treatment for 7 days recommended (males still have single dose treatment option)
- Candida
  - Review PCR treatment options (may not be FDA cleared yet)
  - Review data on fluconazole and spontaneous abortions (first trimester data)
- PID:
  - No new data refining diagnosis
  - Treatment includes metronidazole and clindamycin/gent demoted to alternative regimen

# NYC STI/HIV Prevention Training Center

The CDC-funded NYC STI/HIV Prevention Training Center at Columbia University provides a continuum of education, resources, consultation and technical assistance to health care providers, and clinical sites.

<https://www.publichealth.columbia.edu/nycptc>

## Didactic Presentations

Webinars, conferences, trainings and grand rounds presentations to enhance and build knowledge

## Technical Assistance

Virtual and on-site technical assistance regarding quality improvement, clinic implementation and best practices around sexual health provision

*For more information please contact:*  
[nycptc@cumc.columbia.edu](mailto:nycptc@cumc.columbia.edu)

## Clinical Consultation Warmline

Clinical guidance regarding STD cases; no identifying patient data is submitted

[www.stdccn.org](http://www.stdccn.org)

## Resources

Clinical guidance tools regarding the STD treatment guidelines, screening algorithms and knowledge books, such as the **Syphilis Monograph**.

To download a copy:

<https://www.publichealth.columbia.edu/file/15568/download?token=exDNYpJ->

