Extra-Genital Infections: Seek and Ye Shall Find

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During the webinar you may e-mail your questions for the presenter to:

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Questions will be answered at the end of the presentation
Disclosures

Susan Anne Tuddenham, MD, MPH, has no relevant relationships to disclose.

The planners for this activity reported they have no relevant relationships to disclose.

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Objectives

• Describe the epidemiology and risk factors associated with pharyngeal and rectal extra-genital sexually transmitted infections (STIs): focus on gonorrhea and chlamydia with a mention of LGV).

• Discuss the recommendations for screening & diagnosis of these extra-genital infections.

• Summarize the management of these extra-genital infections.
Extragenital STIs

Oral/Pharyngeal
- Gonorrhea
- Chlamydia (asymptomatic)
- Syphilis
- HSV
- HPV (head and neck cancer)

Rectal
- Gonorrhea
- Chlamydia
  - Lymphogranuloma venereum
- Syphilis
- HSV
- HPV (anal cancer, warts)
- (CMV)

Oral-anal or oral-genital contact after rectal intercourse: Enteric pathogens (*Campylobacter jejuni, Shigella flexneri*), Parasites (*Entamoeba histolytica, Giardia lamblia*) and Viruses (Hepatitis A)

Images courtesy Anne Rompalo and Cincinnati PTC
Neisseria gonorrhea

• 2\textsuperscript{nd} most commonly reported communicable disease in the US

• Clinical syndromes:
  – Urethritis/mucopurulent cervicitis
    • Men usually symptomatic at urethral site, women commonly asymptomatic or with non specific symptoms
    • In women can lead to PID, chronic pelvic pain, infertility, in men can cause epididymitis, prostatitis
  – Conjunctivitis
  – Perirectal infections-proctitis-but usually ASYMPTOMATIC
  – Pharyngeal infection-self limited, mild if any symptoms
  – Disseminated Gonococcal Infection
Chlamydia trachomatis

- Serovars D-K
- Most commonly reported communicable disease in the US
- Clinical syndromes:
  - Urethritis/Cervicitis
    - Majority of men and women are asymptomatic
    - Men can develop prostatitis/epididymitis, women can develop PID, chronic pelvic pain, infertility
  - Rectal: Proctitis-Usually ASYMPTOMATIC
  - Pharynx can be colonized, but asymptomatic
  - Conjunctivitis
  - Pneumonia in infants (mother to child)
  - Auto-immune
US Chlamydia Trends

4.7% increase during 2016! 497.3 cases/100,000
2.6% inc in women, 26.8% increase in men
US Gonorrhea Trends

18.5% increase during 2016! 145.8 cases/100,000
13.8% increase in women, 22.2% increase in men
Gonorrhea: Maryland, 2016

Gonorrhea (GC) by Gender and Age Groups, Maryland 2016

Source: Center for STI Prevention, Maryland Department of Health
Chlamydia in Maryland
Incidence Rates by County, 2016

National in 2016:
497.3/100,000

Source: Center for STI Prevention, Maryland Department of Health.
https://phpa.health.maryland.gov
Gonorrhea in Maryland: Incidence Rates by County, 2016

National in 2016: 145.8/100,000

Source: Center for STI Prevention, Maryland Department of Health. https://phpa.health.maryland.gov
Chlamydia and Gonorrhea Incidence Rates
Maryland 2012 – 2016

Source: Center for STI Prevention, Maryland Department of Health.
Case 1: 45 y.o. HIV + man routine follow-up

- “Alan”
- On Genvoya, suppressed X 10 years
- No symptoms, just “wants to get checked for everything.”
- Hepatitis B vaccinated
- Worried about syphilis
  - Three episodes before, including CNS
  - Occasionally uses crack cocaine, drinks 4-5 drinks on the weekends
  - MSM: multiple anonymous partners
  - Insertive and receptive oral and anal sex
  - Never had GC or CT, 3 previous urine NAT’s
  - No prior extragenital screening
- What STI screening tests should be ordered?
- A test was positive...
Case 1: 45 y.o. HIV+ man routine follow-up

- HCV ab: negative
- Syphilis treponemal test: Positive, RPR: negative
- Oral GC/CT NAT: **POS CT**
- Urine GC/CT NAT: Negative
- Rectal GC/CT NAT: **POS GC**
Prevalence Extragenital GC/CT: MSM

- Kent et al: CID 2003
  - N=5539 men who have sex with men (MSM) at STD clinic, N=895 at GMHC
  - NAAT testing as per reported site of exposure
  - Rectal: 5.7-8.8% CT+, 3.2-7.5% GC+
  - Pharyngeal: 1.3-1.7% CT+, 7.8-9.4% GC+

![Rectal infections chart]

![Urethral infections chart]

![Pharyngeal infections chart]
Prevalence Extragenital GC/CT: MSM

- Allan-Blitz, Int J STD AIDS 2016
- High prevalence of extragenital CT or GC among MSM and transgender women in Lima, Peru

<table>
<thead>
<tr>
<th>Location</th>
<th>Chlamydia</th>
<th>Gonorrhea</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharyngeal</td>
<td>1-3%</td>
<td>4-12%</td>
</tr>
<tr>
<td>Rectal</td>
<td>1-18%</td>
<td>6-21%</td>
</tr>
<tr>
<td>Genital</td>
<td>3-8%</td>
<td>3-11%</td>
</tr>
</tbody>
</table>

![Graph showing prevalence of different organisms by sex and gender identity](image-url)
What are we missing? MSM

Proportion of extragenital gonorrhea and chlamydia infections associated with concurrent negative urethral tests.

21,994 MSM attending 42 STD Clinic in US 2011-2012

Extragenital GC/CT: Women?

- 36% of women in US report ever RAI.*
- In a cohort at risk for HIV infection, 30% of women reported HAI in the last year.**
  - Women were less likely to report condom use with anal sex than men.

Neisseria gonorrhoeae and Chlamydia trachomatis Among Women Reporting Extragenital Exposures
Joshua D. Trebach, BS,* C. Patrick Chaulk, MD,**+ Kathleen R. Page, MD,**+ Susan Tuddenham, MD, MPH,* and Khalil G. Ghanem, MD, PhD*

- 10,389 patients, 42% women, 7% MSM, 2.5% HIV+, attending urban STD clinics, reporting extragenital exposures in last 3 months and tested for GC/CT.
- Prevalence estimates of any extragenital GC and CT were as follows:
  - Women: 2.4% GC and 3.7% CT
  - MSW: 2.6% GC and 1.6% CT
  - MSM: 18.9% GC and 11.8% CT
- Among women, 30.3% of GC infections and 13.8% of CT infections would have been missed with urogenital-only testing
- Unlike MSM, age <=18 years was the strongest predictor of extra-genital infections in women.

*Sex Transm Dis 2015;42:233-239*
What are we missing?
Women vs. MSM

- Bazan et al. J Womens Health 2015
  - N=331 women attending STD clinic with rectal GC/CT testing
  - Urogenital GC: 7%, CT: 13%
  - Rectal GC: 6%, CT: 13%
    - 14% of women with rectal CT tested negative for urogenital CT
    - 14% of women with rectal GC tested negative for urogenital GC

*Chandra, Nat Health Stat Report 2011, **Hess AIDS Behav 2017
MSM vs. Women

• Dukers-Muijrrers BMC ID 2015 (review)
  – 5-29% of anorectal CT in women are single site infections.
  – 33-83% of women with genital CT also have anorectal CT.
  – Of note, several studies note similar rates of rectal CT in women who do not report RAI as compared to women who do.

<table>
<thead>
<tr>
<th></th>
<th>MSM</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pharyngeal</td>
<td>CT 1-3%</td>
<td>GC 4-12%</td>
</tr>
<tr>
<td>Rectal</td>
<td>CT 1-18%</td>
<td>GC 6-21%</td>
</tr>
<tr>
<td>Genital</td>
<td>CT 3-8%</td>
<td>GC 3-11%</td>
</tr>
</tbody>
</table>
What about MSW?

- Relatively little data, some men may not disclose status as having sex with men
- Pharyngeal GC: 0.4-15.5%, Rectal GC: 0-5.7%*
- Pharyngeal CT: 0-22%, Rectal CT: 0-11.8%*

*Chan et al. Inf Dis OB/GYN, 2016
Screening: Seek and Ye Shall Find!

- 2015 CDC STD Treatment Guidelines: Screening
  - Sexually active MSM (including HIV+) should be screened at least annually for GC and CT at sites of exposure (urethra, rectum, pharynx*)
    *Pharyngeal CT screening not routinely recommended
  - MSM at increased risk should be screened q3-6 months
Extragenital GC/CT Screening for MSW and Women?

• CDC recs: Urogenital screening for GC/CT
  – All sexually active women <25, >=25 if at increased risk (new or multiple partners, transactional sex, hx partner with STI, illicit drug use, high local incidence.
  – CT screening should be considered in MSW in high prevalence settings e.g. STD clinics, adolescent clinics, correctional settings.

• No official recommendations for extra-genital screening, however:
  – Evidence suggests that you may miss significant pharyngeal gonorrhea and chlamydia at least in high prevalence settings.
  – Some proportion of rectal GC and CT will be missed in women with urogenital only testing, though somewhat less than in MSM.
  – Little data on rectal GC and CT in MSW.
  – Little cost-effectiveness data.
Self-Collection of Rectal Swab
ATTENTION: Read ALL instructions before you begin!

STEP 1
Wash your hands thoroughly.

STEP 2
Unopened Swab
Either squat down, or lift one leg on a toilet, ledge, or chair (as shown). Pull underwear down or off.

STEP 3
Open the swab.
DO NOT TOUCH THE TIP OF THE SWAB.

Twist first to break seal.

Then pull. The swab will stay attached to the cap.

Do NOT throw the plastic tube away! You will need to put your swab in it after you have collected the sample.

STEP 4
With your dominant hand (right if you're right-handed, left if you're left-handed), grip the opened swab 1.5” away from the tip of the swab (just below the first notch). DO NOT TOUCH THE TIP OF THE SWAB.

Do NOT, at any point, use anything (soap, saliva, or any kind of lubricant) either on your body or on the swab.

STEP 5
With your other hand, position your bare buttock and lift one cheek for easy access to the rectum. (DO NOT use anything on your rectum or the swab.)

Female Anatomy
Male Anatomy

STEP 6
Insert the swab 1.5 inches into your rectum until you feel your fingers touch your anus.

STEP 7
Once the swab is in, walk your fingers halfway down the swab (away from your body) and grip it there, for stability. (The swab should stay where it is—only your fingers should move.)

STEP 8
Gently rub the swab in a circle, touching the walls of your rectum, to collect the specimen.

STEP 9
When removing the swab from your rectum, slowly turn it in a circle while pulling it out.

STEP 10
Place used swab back into the transport tube. Close tightly to prevent leakage.

STEP 11
Place closed tube into the red plastic zip-lock bag. Seal the bag.

STEP 12
Place sealed zip-lock bag into the return mailer (white envelope with a blue diamond-shaped sticker on the front). 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.
Extragenital GC/CT screening: Mostly asymptomatic, ...So why do we care?

- Transmission

Positivity of Urethral CT and GC among MSW San Francisco City Clinic 2006-2010

Extragenital GC/CT screening: Mostly asymptomatic, ...So why do we care?

- **Transmission**

- **Increased risk of HIV acquisition.** (Rectal GC/CT in MSM)
  - Rectal GC or CT: **3X** inc risk HIV (Kelley et al. AIDS Res Hum Retroviruses 2015)
  - Rectal GC or CT: **8X** inc risk HIV if 2 or more infections in last 2 yrs (Bernstein et al. JAIDS 2010)

- **Development of drug resistance (Gonorrhea)**
  - Pharynx
What should ‘Alan’ be treated with?

- HIV + MSM
- Positive CT throat and GC rectal
- ‘Alan’ should get: Ceftriaxone 250mg IM X1 PLUS Azithromycin 1g po X1
- Note: While screening for pharyngeal CT is not recommended in the treatment guidelines, most GC/CT tests are bundled, and if you find it you will treat it as there is potential for transmission via oral sex).
Treatment: Extragenital GC

Neisseria gonorrhoeae causes gonorrhea, a sexually transmitted disease that can result in discharge and inflammation at the urethra, cervix, pharynx, or rectum.

**Resistance of Concern**

N. gonorrhoeae is showing resistance to antibiotics usually used for it. These drugs include:

- Ceftriaxone (an oral cephalosporin)
- Cefixime (an injectable cephalosporin)
- Azithromycin
- Tetracycline

**Public Health Threat**

Gonorrhea is the second most commonly reported notifiable infection in the United States and is easily transmitted. It causes severe reproductive complications and disproportionately affects sexual, racial, and ethnic minorities. Gonorrhea control relies on prompt identification and treatments of infected persons and their sex partners. Because some drugs are less effective in treating gonorrhea, CDC recently updated its treatment guidelines to slow the emergence of drug resistance. CDC now recommends only ceftriaxone plus either azithromycin or doxycycline as first-line treatment for gonorrhea. The emergence of cephalosporin resistance, especially ceftriaxone resistance, would greatly limit treatment options and could cripple gonorrhea control efforts.

In 2013, 327,460 cases of gonorrhea were reported to CDC, but CDC estimates that more than 800,000 cases occur annually in the United States.

<table>
<thead>
<tr>
<th>Drug Resistance</th>
<th>Percentage</th>
<th>Estimated number of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ceftriaxone</td>
<td>0%</td>
<td>114,400</td>
</tr>
<tr>
<td>Azithromycin</td>
<td>&lt;1%</td>
<td>2,460</td>
</tr>
<tr>
<td>Cefixime</td>
<td>&lt;3%</td>
<td>11,480</td>
</tr>
<tr>
<td>Tetracycline</td>
<td>&lt;7%</td>
<td>2,380</td>
</tr>
<tr>
<td>Resistance to ceftriaxone</td>
<td>11%</td>
<td>188,600</td>
</tr>
<tr>
<td>Resistance to azithromycin</td>
<td>1%</td>
<td>820,000</td>
</tr>
</tbody>
</table>

Sources: National Notifiable Diseases Surveillance System, CDC, 2014. Estimated number of cases based on 2013 data.
Gonorrhea Drug Resistance

- 1936: Sulfonamides, Sulfa resistance widespread Late 1940s
- 1945: Penicillin
- Late 1940s: Tetracycline
- 1984: Plasmid mediated tetracycline resistance
- 1989: Ceftriaxone recommended, penicillin dropped
- 1993: Quinolones, Cefixime 1st line
- 2007: Quinolone removed from guidelines
- 2012: Cefixime removed from 1st line

Modified from Workowski et al. Ann Int Med 2008.²

- 2006-2011: increasing MIC’s to cefixime in US; Cefixime failure in Europe, S. Africa, Canada
  - 2012: No more cefixime as first line treatment
- In US: GC with elevated MICs to cefixime are likely to be resistant to tetracyclines BUT susceptible to azithromycin
- Ceftriaxone treatment failures for pharyngeal infections reported in Australia, Japan, Europe
Gonorrhea Treatment: 2015
Uncomplicated Genital, Rectal, or Pharyngeal Infections

- Ceftriaxone 250 mg IM in a single dose
- Azithromycin 1 g orally
- Doxycycline 100 mg BID x 7 days

* Regardless of CT test result

**Doxycycline** has been **REMOVED** from recommended to alternative treatment
Will two agents prevent resistance?

Why it may work

- CTX and Azi have different mechanisms of action and should prevent emergence of resistance
  - Based on mathematical principal applied to rate of chromosomal mutation in bacteria
  - Works for TB and HIV

Why it may not

- Unlike TB that develops resistance through chromosomal mutations, GC is highly social, acquires foreign DNA in large chunks – like in plasmids – and can transform its DNA by incorporating naked DNA it acquires for the environment.
- Plus it mutates its DNA commonly and acquires resistance that way too.
- CTX and Azi are not always used in combination (Z-pack), Azi longer ½ life
- Both ABX have potential to select resistance to each other
- Pharyngeal GC: Poor drug penetration + environment for acquiring drug resistance

Rice LB. Sex Trans Infect 2015;91:238-240
A cluster of GC infections in Hawaii with decreased ceftriaxone susceptibility and high level resistance to azithromycin.

- Resistant to Ceftriaxone and Azithromycin
- Acquired in Thailand
GC Treatment Alternatives (not 1st line)

- Cefixime 400mg PO x1 + azithro 1g PO (only if ceftriaxone is not available)
- Doxycycline 100mg PO BID x 7 days (as the 2nd agent, if azithromycin allergic)
- True penicillin allergy? Gentamicin 240mg IM or Gemifloxacin 320mg po X1 Plus 2g po Azithromycin

Test of cure (NAT or culture) at 14 days if treating pharyngeal GC with alternative regimen (need culture if 2nd NAT pos)

Remember to re-screen at 3 months after treating

MMWR June 5, 2015;64(RR3):1-137
Treatment: Extragenital CT
CT Treatment

• Azithromycin 1gm PO, or
• Doxycycline 100mg PO BID X 7 days
• Alternatives:
  – Erythromycin base 500mg PO QID x 7 days
  – Erythromycin ethylsuccinate 800mg PO QID x 7d
  – Levofloxacin 500mg PO qday x 7 days
  – Ofloxacin 300mg PO BID x 7 days
• Pregnancy (No tetracyclines!) Azithromycin or Amoxicillin 500mg po tid X 7 days
  – TOC 3-4 weeks after completion and retesting 3 mos after treatment
  – Wait at least 3 weeks or you may get false pos (dead bug) with CT NAAT.

*Remember to re-screen at 3 months after treating*

MMWR June 5, 2015;64(RR3):1-137
Azithro vs. Doxy RCTs using NAAT: Urogenital

Recent RCT: Geisler et al, NEJM 2015: No treatment failures in doxycycline group, 3.2% treatment failure in azithromycin group.

Metaanalysis: Lau et al., STD 2002: no difference, Kong et al. CID 2014, 3% increased efficacy of doxycycline, 7% inc efficacy in symp urethral infection in men?
Azithro or Doxy for Rectal CT using NAAT

Kong et al. Metanalysis: random-effects pooled efficacy difference (based on five studies) of 19.9%
Lymphogranuloma Venereum
LGV

- **D-K serovars** of *Chlamydia trachomatis*: cause the common genital infections that we see.
- **L1-L3 serovars** of *Chlamydia trachomatis*: **Lymphogranuloma venereum (LGV)**
  - Strains more invasive
- Rare for many years in US and developed countries
- Clusters reported in Europe
- MMWR → Michigan: Outbreak amongst HIV+ MSM
LGV: Clinical Manifestations

• Primary Lesion 3-21 days after exposure
  – The primary lesion of LGV is a small **non painful** genital papule, which can ulcerate at the site of inoculation – often remains undetected.
  – Common lesion sites
    • Coronal sulcus, frenulum, prepuce, penis, urethra, glans and scrotum
    • Posterior vaginal wall, fourchette, posterior lip of the cervix and vulva

• Secondary lesions 10 days to 6 months

• Tender inguinal/femoral adenopathy (buboes)
  – most often unilateral
  – Coalesce to form stellate abscesses

• Systemic symptoms
LGV Clinical manifestations

• Proctitis: Diarrhea, rectal bleeding, mucous discharge, pain

• Hemorrhagic proctitis/proctocolitis
  – Constipation, spasms, tenesmus
  – Rectal scarring – stricture
  – Severe-can mimic IBD
Diagnosis--LGV

• Clinical Findings
• Serologic tests can support diagnosis
• Identification of C. trachomatis from a lesion/bubo/site of infection
• NAAT test will be positive, but need special testing to identify LGV strains—not routinely available. (CDC)
Treatment--LGV

• Doxycycline 100 mg bid x 21 days

• Alternatives
  – Erythromycin base 500 mg qid x 21 days
  – Azithromycin 1 gram orally weekly x 3 weeks

In SYMPTOMATIC MSM (proctitis) with Rectal CT+ or if HIV+, treat empirically for LGV, and try to send test.
# Proctitis/Proctocolitis

<table>
<thead>
<tr>
<th></th>
<th>Proctitis</th>
<th>Proctocolitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptoms</td>
<td>Anorectal pain, tenesmus, rectal discharge</td>
<td>Proctitis symptoms, may also have diarrhea, abdominal cramps, inflammation of colonic mucosa extending to 12 cm above the anus</td>
</tr>
<tr>
<td>Etiologic organisms</td>
<td>Gonorrhea, Chlamydia (including LGV), Syphilis, Herpes</td>
<td>LGV, (also Campylobacter, Shigella, Entamoeba histolytica, CMV)</td>
</tr>
<tr>
<td>Initial testing</td>
<td>In both: NAAT for GC/CT, Syphilis serologies, HSV (PCR, ideally)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>*note: Syphilis and LGV can mimic IBD.</td>
<td></td>
</tr>
</tbody>
</table>

**Empiric Treatment:** Ceftriaxone plus Doxycycline 100mg po BID for 7 days, if painful ulcers present, should also include treatment for genital herpes.

Symptomatic MSM who have either a positive rectal CT NAAT or are HIV+ should be offered presumptive treatment for LGV with doxycycline 100mg po BID for 3 weeks.
Take homes

• Extragenital gonorrhea and chlamydia may be transmitted to others.
• Rectal infection is linked to an increased risk of HIV acquisition.
• The throat may be an important site for the development of drug resistant gonorrhea.
• The majority of extragenital gonorrhea and chlamydia infections are asymptomatic.
• **Seek and ye shall find!** If you ask about sites of exposure and test accordingly, you will detect asymptomatic disease.
  – The majority of extragenital GC/CT infections in MSM will be missed with urogenital only screening. Ask and screen q3-6 mos in those at risk.
  – No explicit screening recommendations for women and MSW, but at least in high prevalence settings a significant proportion of infections may be missed with urogenital only screening.
  – Don’t ask, won’t tell; don’t test, won’t find.
• LGV is a rare but important cause of symptomatic proctitis/proctocolitis in MSM (particularly HIV+) and requires a longer treatment course of doxycycline.
  – Symptomatic MSM (proctitis) with + rectal CT or symptomatic MSM who are HIV+ should be treated for LGV and ideally have testing for LGV.
By law, health care providers in Maryland must report Chlamydia, Gonorrhea, Syphilis, Hepatitis B and C, and HIV.

Treatment for Chlamydia, Gonorrhea, and Syphilis also must be reported.

State and Local Health Departments are Your Allies in STI Prevention!

– Contact them with questions about diagnosis, treatment, or disease reporting. They can help you with contact notification (for HIV, Syphilis and Gonorrhea), looking up patients’ prior treatment, and interpreting test results.

– If they contact you regarding a possible case, provide them the information they need to do disease investigations!

Maryland Department of Health Center for STI Prevention
410-767-6690
mdh.sticlinicalconsult@maryland.gov
STD Treatment Guidelines
Guidelines, wall charts, pocket guides
Also available on itunes & Google Play

STD Clinical Toolbox App
Available on itunes

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Questions for the speaker?

Email questions to maphtc@jhu.edu
Prevalence Extragenital GC/CT: Women?

- Most studies tested rectal site only in those reporting RAI

Trebach JE, Chaulk CP, Page KR, Tuddenham S, Ghanem KG. *Sex Transm Dis* 2015;42:233-239  A summary of studies that assessed prevalence of GC and CT in women

<table>
<thead>
<tr>
<th>Study First Author</th>
<th>Year</th>
<th>Population/Setting</th>
<th>GC Prevalence Throat (95% CI)</th>
<th>GC Prevalence Rectum (95% CI)</th>
<th>CT Prevalence Throat (95% CI)</th>
<th>CT Prevalence Rectum (95% CI)</th>
<th>% missed CT and GC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trebach JD, et al. (current study)</td>
<td>2014</td>
<td>Baltimore City Health Department Eastern Health District and Druid Health Center, Maryland</td>
<td>2.09 (1.68–2.57) N=4203</td>
<td>2.95 (1.76–4.62) N=611</td>
<td>2.59 (2.10–3.16) N=3662</td>
<td>8.64 (6.52–11.17) N=602</td>
<td>CT: 13.8% (10.7–17.6) GC: 30.3% (23.4–37.9)</td>
</tr>
<tr>
<td>Van Liere, G et al.</td>
<td>2014</td>
<td>South Limburg Public Health Service STI clinic, Netherlands</td>
<td>2.3% (1.54–3.23) N=1321</td>
<td>0.9% (0.47–1.58) N=1321</td>
<td>1.4% (0.87–2.23) N=1321</td>
<td>4.8% (3.68–6.06) N=1321</td>
<td>CT: 22.8% (14.72–32.75) GC: 58.5% (42.11–73.68)</td>
</tr>
<tr>
<td>Garner AL, et al.</td>
<td>2014</td>
<td>Manchester Centre for Sexual Health, UK</td>
<td>0.6% (0.17–1.59) N=642</td>
<td>1.1% (0.03–5.97) N=91</td>
<td>2.5% (1.43–4.02) N=642</td>
<td>6.6% (2.46–13.80) N=91</td>
<td>CT: 12.9% (5.74–23.85) GC: 28.5% (3.67–70.96)</td>
</tr>
<tr>
<td>Ladd J, et al.</td>
<td>2014</td>
<td>Home testing using iwanthekit.org</td>
<td>N/A</td>
<td>2.4% (0.80–5.60) N=205</td>
<td>N/A</td>
<td>12.7% (8.45–18.03) N=205</td>
<td>N/A</td>
</tr>
<tr>
<td>Jenkins WD, et al.</td>
<td>2014</td>
<td>Memorial Medical Center Emergency Department, IL</td>
<td>0.66% (0.18–2.38) N=301</td>
<td>N/A</td>
<td>0.66% (0.18–2.38) N=301</td>
<td>N/A</td>
<td>Pharyngeal CT: 0% Pharyngeal GC: 9.09% (2.53–27.81)</td>
</tr>
<tr>
<td>Shaw SG, et al.</td>
<td>2013</td>
<td>STI center in the United Kingdom</td>
<td>0.28% (0.03–0.49) N=1799</td>
<td>0.64% (0.08–2.30) N=312</td>
<td>1.3% (0.81–1.91) N=1799</td>
<td>7.1% (4.47–10.48) N=312</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Duration of Extragenital GC and CT infections among MSM

- Pharyngeal GC – 114.1-137.8 days
- Rectal GC – 346 days
- Pharyngeal CT – 667.1 days
- Rectal CT – 578.7 days

Chow et al. (Abstract-Systematic review) Sex Health 2016
What about MSW?

- Relatively little data, some men may not disclose status as having sex with men
- Pharyngeal GC: 0.4-15.5%, Rectal GC: 0-5.7%*
- Pharyngeal CT: 0-22%, Rectal CT: 0-11.8%*

Trebach et al. STD 2015, Baltimore STD clinics: MSW

<table>
<thead>
<tr>
<th></th>
<th>Gonorrhea</th>
<th>Chlamydia</th>
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</thead>
<tbody>
<tr>
<td>Pharyngeal</td>
<td>2.54% (128/5082)</td>
<td>1.56% (71/4552)</td>
</tr>
<tr>
<td>Rectal**</td>
<td>5.71% (2/35)</td>
<td>9.09% (3/33)</td>
</tr>
</tbody>
</table>

**Small numbers, anal sex likely not recorded

* Chan et al. Inf Dis OB/GYN, 2016
Prevalence GC/CT in HIV+ MSM

• 624 MSM, HIV clinic in London 2009-2010

• Overall prevalence: 17%

Soni et al, STD 2011

<table>
<thead>
<tr>
<th></th>
<th>Rectum</th>
<th>Pharynx</th>
<th>Urethra</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT</td>
<td>9.8% (56/571)</td>
<td>1.7% (10/589)</td>
<td>2.6% (16/605)</td>
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<tr>
<td>GC</td>
<td>4.2% (24/571)</td>
<td>3.9% (23/589)</td>
<td>1.3% (8/605)</td>
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