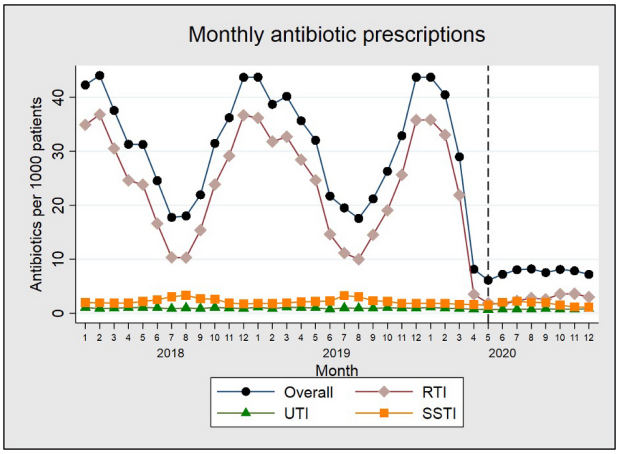
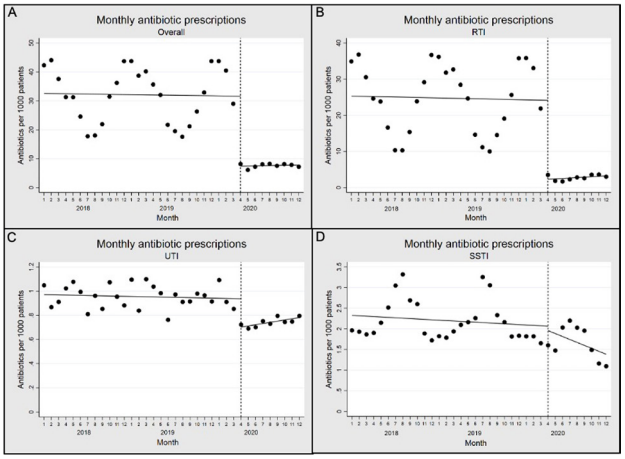
Figure 1. Antibiotic prescriptions per 1000 patients prescribed by month from January 2018 to December 2020, overall and for disease-specific subgroups



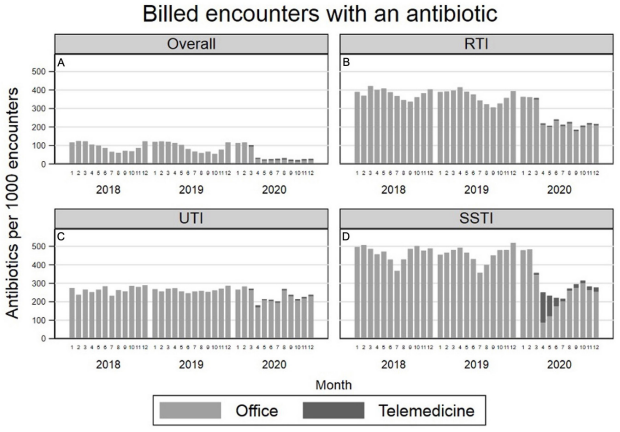

RTI = respiratory tract infection; UTI = urinary tract infection; SSTI = skin and soft tissue infection. Months are numbered sequentially, starting with January (number 1). Dashed line indicates first full month of the pandemic, April 2020.

Interrupted time series analysis for antibiotic prescriptions per 1000 patients by month from January 2018 to December 2020 for (A) all antibiotics as well as antibiotics prescribed at encounters with (B) respiratory tract infections (RTIs), (C) urinary tract infections (UTIs), and (D) skin and soft tissue infections (SSTIs)




Intervention starts in April 2020 (dashed line). Months are numbered sequentially, starting with January (number 1). Dashed line indicates first full month of the pandemic, April 2020.

Antibiotic prescriptions per 1000 billed encounters by month from January 2018 to December 2020 for (A) all encounters, as well as antibiotics prescribed at encounters with (B) respiratory tract infections (RTIs), (C) urinary tract infections (UTIs), and (D) skin and soft tissue infections (SSTIs)




Months are numbered sequentially, starting with January (number 1).

***Conclusion.*** Dramatic reductions in antibiotic prescribing in pediatric primary care during the COVID-19 pandemic were sustained through 2020, primarily driven by reductions in RTI encounters.

***Disclosures.*** **All Authors**: No reported disclosures

**163. High Prevalence of Urogenital and Rectal *Mycoplasma genitalium* in U.S. MSM with a History of STIs in the Last Year**

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**Session:** O-33. STIs and Enteric Infections

***Background.*** *M. genitalium* (*M. gen*) is an under-recognized sexually transmitted bacterial pathogen that causes 15-25% of nongonococcal urethritis (NGU) in men. Asymptomatic *M. gen* may serve as a reservoir, lead to transmission to sexual contacts, and drive the development of drug resistance. *M. gen* may be associated with an increased risk of HIV acquisition, as seen in some studies. Data are limited on *M. gen* prevalence among U.S. men who have sex with men (MSM) living with HIV or HIV-uninfected and on pre-exposure prophylaxis (PrEP).

***Methods.*** We analyzed baseline prevalence of urogenital and rectal *M. gen* using the Aptima *Mycoplasma genitalium* nucleic acid amplification test in participants enrolled in DoxyPEP, an ongoing randomized, open label trial of the effectiveness of doxycycline post-exposure prophylaxis (PEP) on incidence of gonorrhea, chlamydia, and early syphilis among MSM and transgender women living with HIV or on PrEP in San Francisco and Seattle (NCT03980223). Participants completing at least one follow up visit were also assessed for *M. gen* persistence, clearance, and incidence. Testing was at regular intervals and not symptom driven.

***Results.*** This analysis included 122 men; 34% with HIV and 66% on PrEP. In the prior 12 months, 18.9% had a diagnosis of syphilis, 58.2% chlamydia, and 63.9% gonorrhea. At baseline, *M. gen* was present in at least one site in 24%; 9% in the urine and 16% in the rectum, with 1 testing positive at both sites. *M. gen* presence was not associated with age, ethnicity, race, HIV status, number of partners in the past 3 months, or bacterial STI in the past 3 months. 65 participants had follow up tests a median of 9.1 months after baseline (IQR 7.8-9.8); among 7 participants with urogenital *M. gen* at baseline, *M. gen* cleared in 6 and persisted in 1. Among 11 participants with rectal *M. gen* at baseline, *M. gen* cleared in 4 cleared and persisted in 7. At follow up, *M. gen* was detected in 2 urine and 9 rectal specimens in those previously negative at these sites.

Table 1. Demographic Characteristics of Study Participants

| | N (%) or median (IQR) | | |
|---|---|---|---|
| **Variable** | **HIV PrEP** | **HIV-infected** | **Total** |
| Participants enrolled | 81 | 41 | 122 |
| Age, continuous (years) | 35 (28 - 45) | 49 (41 - 55) | 38.5 (30.0 - 52.0) |
| Race | | | |
| White | 59 (74.7%) | 27 (67.5%) | 86 (72.3%) |
| Black | 5 (6.3%) | 5 (12.5%) | 10 (8.4%) |
| Asian | 9 (11.4%) | 2 (5.0%) | 11 (9.2%) |
| Native American/Alaska Native | 1 (1.3%) | 0 | 1 (0.8%) |
| Multiple races | 2 (2.5%) | 1 (2.5%) | 3 (2.5%) |
| Other | 3 (3.8%) | 5 (12.5%) | 8 (6.7%) |
| Ethnicity | | | |
| Non-Hispanic/Latino | 61 (75.3%) | 25 (61.0%) | 86 (70.5%) |
| Hispanic/Latino | 20 (24.7%) | 16 (39.0%) | 36 (29.5%) |
| STDs diagnosed in the past year (mark all that apply): | | | |
| Syphilis | 15 (18.5%) | 8 (19.5%) | 23 (18.9%) |
| Chlamydia | 45 (55.6%) | 26 (63.4%) | 71 (58.2%) |
| Gonorrhea | 56 (69.1%) | 22 (53.7%) | 78 (63.9%) |
| Number of partners in past 3 months | 5 (2 - 14) | 6 (2 - 15) | 5 (2 - 15) |

Figure 1. Baseline prevalence of urogenital and rectal M. genitalium in MSM at high risk for STIs enrolled in DoxyPEP

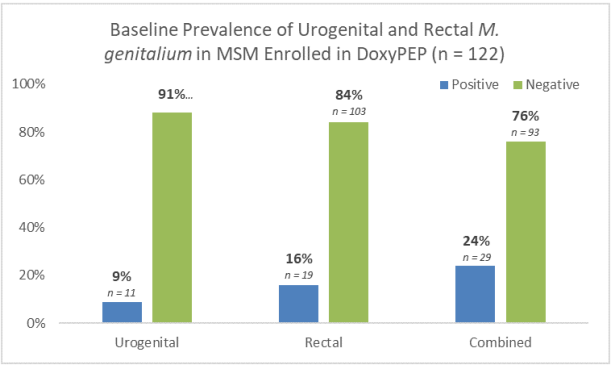
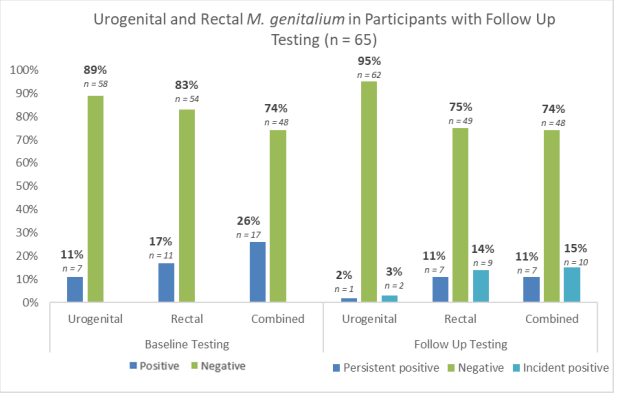


Figure 2. Detection of urogenital and rectal M. genitalium among participants with baseline and follow up testing




***Conclusion.*** In this cohort of MSM with a recent diagnosis of a bacterial STI, routine testing identified urogenital or rectal *M. gen* in 24% of participants at baseline and 31% at either baseline or follow-up. The association of persistent *M. gen* with the risk for subsequent symptomatic infection and drug resistance merits further investigation.

***Disclosures.*** **Emma D. Bainbridge, MD, MPH**, **Hologic** (Grant/Research Support) **Olusegun O. Soge, PhD**, **Hologic Inc.** (Grant/Research Support)**SpeeDx Inc.** (Grant/Research Support) **Annie Luetkemeyer, MD**, **Cepheid** (Grant/Research Support)**Hologic** (Grant/Research Support)**Mayne Pharma** (Grant/Research Support)

### 164. Antimicrobial Susceptibility of Urogenital and Extragenital *Neisseria gonorrhoeae* Isolates Among Men Who Have Sex with Men – SURRG and eGISP, 2018–2019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**Session:** O-33. STIs and Enteric Infections

***Background.*** Extragenital gonococcal infections are common among men who have sex with men (MSM); however, data comparing antimicrobial susceptibilities of urogenital and extragenital *Neisseria gonorrhoeae* isolates are limited. We investigated differences in gonococcal antimicrobial susceptibility by anatomic site among cisgender MSM using specimens collected through CDC's enhanced Gonococcal Isolate Surveillance Project (eGISP) and Strengthening the U.S. Response to Resistant Gonorrhea (SURRG).

***Methods.*** During January 1, 2018–December 31, 2019, 12 eGISP and 8 SURRG sites collected urogenital, pharyngeal, and rectal isolates from cisgender MSM in STD clinics. Gonococcal isolates were sent to regional laboratories for antimicrobial susceptibility testing by agar dilution. To account for correlated observations, linear mixed-effects models were used to calculate geometric mean minimum inhibitory concentrations (MICs) and mixed-effects logistic regression models were used to calculate the proportion of isolates with elevated or resistant MICs; comparisons were made across anatomic sites.

***Results.*** Participating clinics collected 3,974 urethral, 1,553 rectal, and 1,049 pharyngeal isolates from 5,456 unique cisgender MSM. There were no significant differences in the geometric mean MICs for azithromycin, ciprofloxacin, penicillin, and tetracycline by anatomic site. For cefixime and ceftriaxone, geometric mean MICs for pharyngeal isolates were higher compared to anogenital isolates ($p< 0.05$). The proportion of isolates with elevated ceftriaxone MICs ($\geq 0.125$ µg/ml) at the pharynx (0.67%) was higher than at rectal (0.13%) and urethral (0.18%) sites ($p< 0.05$).

**Table 1. Comparison* of antimicrobial susceptibility distribution by antimicrobial and anatomic site of gonococcal infection among men who have sex with men — eGISP and SURRG, 2018–2019**

| Antimicrobial and measured parameter** | Pharyngeal (n=1,049) | Rectal (n=1,553) | Urethral (n=3,974) | P-value |
|---|---|---|---|---|
| **Azithromycin** | | | | |
| Geometric mean MIC (95% CI) | 0.32 (95% CI: 0.30-0.34) | 0.31 (95% CI: 0.29-0.33) | 0.30 (95% CI: 0.29-0.31) | 0.27 |
| Number (%; 95% CI) with elevated MIC | 124/1,049 (11.2%; 95% CI: 9.4-13.3) | 182/1,553 (11.3%; 95% CI: 9.8-13.1) | 420/3,974 (10.2%; 95% CI: 9.3-11.3) | 0.38 |
| **Cefixime** | | | | |
| Geometric mean MIC (95% CI) | 0.0192 (95% CI: 0.0185-0.020) | 0.0181 (95% CI: 0.0175-0.0187) | 0.0176 (95% CI: 0.0173-0.018) | **<0.001** |
| Number (%; 95% CI) with elevated MIC | 3/1,049 (0.29%; 95% CI: 0.09-0.88) | 8/1,553 (0.52%; 95% CI: 0.26-1.0) | 11/3,974 (0.28%; 95% CI: 0.15-0.50) | 0.41 |
| **Ceftriaxone** | | | | |
| Geometric mean MIC (95% CI) | 0.0108 (95% CI: 0.0103-0.0113) | 0.00987 (95% CI: 0.0095-0.0102) | 0.0098 (95% CI: 0.0096-0.0101) | **<0.001** |
| Number (%; 95% CI) with elevated MIC | 7/1,049 (0.67%; 95% CI: 0.32-1.4) | 2/1,553 (0.13%; 95% CI: 0.03-0.51) | 7/3,974 (0.18%; 95% CI: 0.08-0.37) | **0.03** |
| **Ciprofloxacin** | | | | |
| Geometric mean MIC (95% CI) | 0.12 (95% CI: 0.10-0.15) | 0.11 (95% CI: 0.09-0.13) | 0.12 (95% CI: 0.10-0.13) | 0.50 |
| Number (%; 95% CI) with resistant MIC | 450/1,049 (42.7%; 95% CI: 39.5-46.0) | 649/1,553 (41.6%; 95% CI: 38.9-44.2) | 1701/3,974 (42.6%; 95% CI: 40.9-44.3) | 0.77 |
| **Penicillin** | | | | |
| Geometric mean MIC (95% CI) | 0.63 (95% CI: 0.58-0.68) | 0.60 (95% CI: 0.57-0.65) | 0.66 (95% CI: 0.63-0.69) | 0.08 |
| Number (%; 95% CI) with resistant MIC | 140/1,049 (13.0%; 95% CI: 11.0-15.2) | 200/1,553 (12.6%; 95% CI: 11.0-14.4) | 603/3,974 (14.8%; 95% CI: 13.7-16.0) | 0.06 |
| **Tetracycline** | | | | |
| Geometric mean MIC (95% CI) | 1.55 (95% CI: 1.44-1.68) | 1.48 (95% CI: 1.39-1.58) | 1.47 (95% CI: 1.40-1.53) | 0.45 |
| Number (%; 95% CI) with resistant MIC | 377/1,049 (35.7%; 95% CI: 32.7-38.8) | 512/1,553 (32.9%; 95% CI: 30.5-35.4) | 1377/3,974 (34.5%; 95% CI: 32.9-36.1) | 0.31 |

Abbreviations: eGISP= enhanced Gonococcal Isolate Surveillance Project; SURRG= Strengthening the U.S. Response to Resistant Gonorrhea; MIC= minimum inhibitory concentration; CI= Confidence interval

*We fitted overall models with and without "anatomic sites" and compared the two models to get the overall p-value; if the overall p-value was statistically significant (<0.05), we conducted post-hoc testing to adjust for multiple tests using the Holm adjustment. Linear mixed-effects model was used for geometric mean MICs and mixed-effects logistic regression model was used for the proportion of isolates with elevated or resistant MICs across anatomic sites, respectively, to account for the multiple isolates provided by the same patients.

**Clinical and Laboratory Standards Institute (CLSI) has not established criteria for resistance to azithromycin, cefixime, and ceftriaxone; breakpoints used to define "elevated MIC" for these antimicrobials include: azithromycin MIC of ≥2.0 µg/ml, cefixime MIC of ≥0.25 µg/ml, and ceftriaxone MIC of ≥0.125 µg/ml. Antimicrobial susceptibility testing results were interpreted according to criteria recommended by CLSI for penicillin resistance (MIC ≥ 2 µg/ml or β-lactamase positive), ciprofloxacin resistance (MIC ≥1.0 µg/ml), and tetracycline resistance (MIC ≥2.0 µg/ml). Tested ranges for antimicrobials (µg/ml): azithromycin (0.008–16), cefixime (0.002–1), ceftriaxone (0.001–1), ciprofloxacin (0.001–32), penicillin (0.008–64), tetracycline (0.06–64).

***Conclusion.*** Based on data collected from multi-jurisdictional sentinel surveillance projects, antimicrobial susceptibility patterns of *N. gonorrhoeae* isolates may differ among MSM at extragenital sites, particularly at the pharynx. Continued investigation into gonococcal susceptibility patterns by anatomic site may be an important strategy to monitor and detect the emergence of antimicrobial resistant gonorrhea over time.

***Disclosures.*** **Olusegun O. Soge, PhD**, **Hologic Inc.** (Grant/Research Support)**SpeeDx Inc.** (Grant/Research Support) **Stephanie N. Taylor, MD**, **GARDP - GC Antibiotic Development** (Scientific Research Study Investigator, To my institution.)**GlaxoSmithKline** (Grant/Research Support, Funds to my institution.)

### 165. Emergence of Extensively Drug-Resistant *Salmonella enterica* Serotype Typhi Infections—United States, 2008–2020


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**Session:** O-33. STIs and Enteric Infections

***Background.*** Typhoid fever, caused by *Salmonella* Typhi, is fatal in 12%–30% of patients not treated with appropriate antibiotics. In 2016, a large outbreak of extensively drug-resistant (XDR) Typhi infections began in Pakistan with cases reported globally, including the United States. In 2021, the Centers for Disease Control and Prevention (CDC) issued a health advisory on XDR infections among U.S. residents without international travel. We describe resistance of Typhi infections diagnosed in the United States to help guide treatment decisions.

***Methods.*** Typhoid fever is a nationally notifiable disease. Health departments report cases to CDC through the National Typhoid and Paratyphoid Fever Surveillance system. Isolates are submitted to the National Antimicrobial Resistance Monitoring System for antimicrobial susceptibility testing (AST) using broth microdilution. AST results are categorized by Clinical and Laboratory Standards Institute criteria. We defined XDR as resistant to ceftriaxone, ampicillin, chloramphenicol, and co-trimoxazole, and nonsusceptible to ciprofloxacin.

***Results.*** During 2008–2019, of 4,637 Typhi isolates, 52 (1%) were ceftriaxone resistant (axo-R); 71% were ciprofloxacin nonsusceptible, 1 azithromycin resistant (azm-R), and none meropenem resistant. XDR was first detected in 2018, in 2% of 474 isolates and increased to 7% of 535 in 2019. Of the 52 axo-R isolates, 46 were XDR, of which 45 were from travelers to Pakistan, and one from a non-traveler; 6 were not XDR, of which 4 were linked to travel to Iraq. In preliminary 2020 reports, 23 isolates were XDR; 14 were from travelers to Pakistan, 8 from non-travelers, and 1 from someone with unknown travel status. Among those with XDR infection, median age was 11 years (range 1–62), 54% were female, and 62% were from 6 states.

***Conclusion.*** Ceftriaxone-resistant Typhi infections, mostly XDR, are increasing. Clinicians should ask patients with suspected Typhi infections about travel and adjust treatment based on susceptibility results. Carbapenem, azithromycin, or both may be considered for empiric therapy of typhoid fever among travelers to Pakistan or Iraq and in uncommon instances when persons report no international travel. Ceftriaxone is an empiric therapy option for travelers to countries other than Pakistan and Iraq.